

Explaining Suicide Among Blacks and Whites: How Socioeconomic Factors and Gun Availability Affect Race-Specific Suicide Rates*

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Objectives. What are the correlates of suicide among blacks and whites? One body of literature suggests that structural factors such as poverty, inequality, joblessness, and family disruption are the key contributors, while another literature considers the availability of firearms to be the central factor. No studies have thoroughly explored both possibilities together and thus we know little about the relative contributions of motivation to commit suicide due to structural conditions and opportunity to commit suicide due to firearm availability. The current study addresses this issue. *Methods.* Using suicide data from Mortality Multiple Cause of Death Records and 2000 Census data, we examine the roles of motivation and opportunity in shaping suicide rates among young white and young black males in U.S. cities. *Results.* We find racial differences in the predictors of suicide; although concentrated disadvantage directly affects suicide among young white males, it only raises levels for young black males by increasing access to firearms. This finding is confirmed in additional analyses, which examine the effects of concentrated disadvantage on black and white gun and nongun suicides separately. *Conclusion.* The findings suggest complex relationships among the structural characteristics of cities, gun availability, and suicide. They also begin to address unresolved issues in the literature including why blacks have demonstrated comparatively lower rates of suicide despite higher levels of disadvantage as well as what may have fueled the increase in young black male suicide over the last 30 years. Finally, the findings have important implications for the study of race and suicide prevention.

Although suicide rates have been steadily declining since the late 1980s, suicide continues to be a serious problem in the United States and has

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SOCIAL SCIENCE QUARTERLY, Volume 90, Number 5, December 2009
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actually increased among certain populations. Adolescents and young adults have experienced the greatest increase and they are the only age group whose rates are higher now than they were in 1970 (McKeown, Cuffe, and Schulz, 2006). For this population, only accidents and homicides leave more casualties. As with other age groups, adolescent and young adult males have much higher rates than their female counterparts.

Beyond age and gender, there are important racial distinctions. Historically, whites have committed suicide at a greater rate than blacks but recent reports show this gap is narrowing, primarily due to a rise in rates among young African-American males. According to some, this rise is largely accounted for by an increase in suicide by firearms (Joe and Kaplan, 2002). Although firearms are the most common suicide method for all demographic groups in the United States (Brent and Bridge, 2003:1192), they have increasingly become the method of choice for young black males. Between 1979 and 1997, the rate of firearm-related suicides among black males aged 15 to 19 increased by 133 percent, from 3.6 to 8.4 per 100,000. Among black males aged 20 to 24, the rate increased by 24 percent, from 12.5 to 15.5. In contrast, the rate for white males in the younger age group increased by only 7 percent (from 9.7 to 10.4), and the rate for white males in the older age group did not vary significantly over time (Joe and Kaplan, 2002:333).

These trends raise questions about the role of firearms in understanding suicide patterns for the population as a whole and for young white and black males in particular. Although several studies find that structural forces such as poverty, inequality, joblessness, and family disruption are the key contributors to suicide rates (Almgren et al., 1998; Burr, Hartman, and Matteson, 1999; Kubrin, Wadsworth, and DiPietro, 2006; Stockard and O'Brien, 2002), another body of literature considers the availability of firearms to be the central factor (Kleck and Patterson, 1993; Miller, Azrael, and Hemenway, 2002). Unresolved, however, are the relative contributions of *motivation* to commit suicide due to structural conditions and *opportunity* to commit suicide due to firearm availability. Understanding the unique contribution of each of these factors, as well as how they may interact, is essential to explaining suicide patterns across both geographic areas and racial and ethnic groups.

The current research addresses these issues by examining the relative roles of motivation and opportunity for explaining suicide rates of young white and young black males in U.S. cities. We use suicide data from Mortality Multiple Cause of Death Records and Census data to answer the following questions: (1) Which structural factors are associated with young white and young black male suicide rates? (2) Does firearm availability mediate or moderate the relationships between these factors and suicide rates for whites and blacks? and (3) Are structural factors equally important in shaping gun compared to nongun suicide for these populations? The answers to these questions address unresolved issues in the sociological and public health

literatures, including why blacks have lower suicide rates than whites despite higher disadvantage levels, and why suicide has risen dramatically for young black males over the last 30 years.

Literature on Suicide Motivation

Most of the sociological literature on suicide at the aggregate level advances a motivation argument. These studies examine the structural conditions associated with suicide, such as poverty, inequality, family disruption, and joblessness. These factors are hypothesized to be related to suicide, in large part, because they affect levels of social integration, or the degree to which individuals feel connected to, and part of, a larger social group. The argument that integration and suicide are related dates back to the work of Durkheim. In *Suicide* (1897), Durkheim theorized that “suicide varies inversely with the degree of integration of the social groups of which the individual forms a part” (1897:209). Accordingly, suicide is expected to be lower in communities with a high degree of economic, religious, familial, and other types of integration, compared to communities marked by isolation. These ideas form the basis of the social integration-regulation thesis, prominent in the sociological literature on suicide.

In line with this thesis, scholars have examined the relationship between aggregate suicide rates and various measures of cohesion, including unemployment (Almgren et al., 1998; Chuang and Huang, 1996; Crawford and Prince, 1999), poverty and income inequality (Burr, Hartman, and Matteson, 1999; Crawford and Prince, 1999; Kubrin, Wadsworth, and DiPietro, 2006), divorce and family structure (Baller and Richardson, 2002; Burr, McCall, and Powell-Griner, 1994; Stockard and O’Brien, 2002), immigration and cultural assimilation (Wadsworth and Kubrin, 2007), and cohort size (Stockard and O’Brien, 2002). Regardless of the measure, integration is typically found to affect suicide rates in the direction the social integration-regulation thesis predicts—more integration results in less suicide.

More recently, researchers have begun to reference the criminological literature that stresses the importance of social organization, opportunity structures, and subcultural adaptation for explaining variation in suicide rates, particularly among racial and ethnic minorities. Concerning suicide among young black males, Kubrin, Wadsworth, and DiPietro (2006) draw on the work of Anderson (1999), Bruce, Roscigno, and McCall (1998), and Sampson and Wilson (1995) to suggest that disadvantage may influence suicide among this population through two interrelated processes: first, by decreasing opportunities to develop positive identities and self-esteem through legitimate social structures (e.g., school, employment); and second, through the development of detrimental psychological states such as nihilism, which result from growing up in an environment dominated by a constant threat of violence. Although these mechanisms linking disadvan-

tage and suicide may operate for both blacks and whites, blacks are more likely to live in communities characterized by extreme concentrated disadvantage. Scholars suggest this may give rise to a host of aggravating factors, including the adoption of norms that are more accepting of violence, the prevalence of weapons carrying, and alienation from traditional sources of formal control and support (Anderson, 1999; Bruce, Roscigno, and McCall, 1998; Sampson and Wilson, 1995). That these are more likely to occur in minority communities suggests the importance of examining the relationship between disadvantage and suicide separately for blacks and whites.

For the most part, measures of opportunity such as gun availability have been left out of this literature. The exclusion of opportunity measures may be related to the belief that motivation is the driving force behind suicide and that opportunities are always available. For instance, it is often argued that unless levels of motivation change, limiting gun availability may decrease gun suicides, but other types of suicide will increase. This is referred to as the substitution thesis. According to this perspective, altering the number of guns in an area may lead to temporary decreases in suicide rates but people who are determinedly suicidal will eventually find other ways to kill themselves (Rich et al., 1990:344).

Research testing the substitution thesis indicates this logic is not always correct. Miller, Azrael, and Hemenway (2002:523) find that *both* firearm-related and total suicide rates were associated with state and regional gun levels, which suggests that although substitution of deadly means may take place where guns are less available, substitution is incomplete. In his review of the literature, Stack (1998:99) claims that “the bulk of evidence in to date indicates that the would-be gun suicides are not displaced to non gun suicides.” A final point is that nonfirearm suicide methods are less effective, resulting in fewer deaths. A Canadian study found that 92 percent of gun attempts resulted in death compared to 78 percent of attempts using carbon monoxide or hanging, 67 percent of drowning attempts, and 23 percent of intentional drug overdoses (Chapdelaine, Samson, and Kimberley, 1991). Thus, even if those attempting suicide substitute alternative means when guns are unavailable, their likelihood of success is diminished (Miller and Hemenway, 1998:61).

In sum, despite advancing a clearer understanding of how socioeconomic and demographic factors relate to suicide patterns across geographic areas and different populations, this literature has, for the most part, ignored the role of opportunity-related factors such as gun availability. Stack (1998:96) argues: “There is relatively little work testing sophisticated multivariate models of suicide that incorporates gun availability as one of its predictors.” This is unfortunate given the increased availability of handguns among young men during the last quarter-century (Blumstein and Cork, 1996; Hagan and Foster, 2000; Wintemute, 2000), especially inner-city minority youth (Fagan and Wilkinson, 1998). In commenting on the role of guns for understanding externalized violence, Cook (1981:64) suggested over 20

years ago that “no etiological theory of violent crime is complete without due consideration of the technology of violent crime.” We believe the same is true for suicide.

Literature on Suicide Opportunity

“Populations vary in the structured opportunities that exist for suicide” (Stack, 1998:95). This statement provides the foundation of a counterargument for understanding suicide patterns at the aggregate level. This thesis focuses on opportunities for committing suicide by considering the availability of different suicide methods. As noted earlier, guns constitute the most effective method and thus gun availability is expected to be associated with higher suicide rates.

Indeed, studies find that gun availability matters: “All case-control studies indicate that a gun in the home is significantly associated with a higher risk of suicide, especially among youth” (Miller and Hemenway, 1998:73; see also Kellerman et al., 1992; Miller, Azrael, and Hemenway, 2002). Another review of the evidence concluded: “In the United States, firearms are by far the most common method of completed suicide, and the prevalence of firearms suicide is closely correlated with firearms ownership rates in both state evaluations and in international comparisons. Case-control studies indicate that firearms are much more likely to be in the homes of suicide completers than controls and that if a gun is in the home, it is highly likely to be used as the method of suicide” (Brent and Bridge, 2003:1206).

Although most of this research has been conducted at the individual level, some studies find that gun availability and suicide are related across cities, metropolitan areas, and states. Using 1979–1982 data for 170 large U.S. cities and including 29 control variables in their model, Kleck and Patterson (1993) show that cities with higher gun density levels had higher suicide rates. Gun density was captured using five measures, including percentage of suicides committed with a gun, percentage of nonfelony homicides committed with a gun, percentage of aggravated assaults known to the police committed with a gun, percentage of robberies known to the police committed with a gun, and percentage of the dollar value of all stolen property reported to the police that was due to firearm thefts. Recent research at the state level finds a positive association between levels of household gun ownership and suicide rates for the entire population, in virtually every age group, and for both men and women (Miller, Azrael, and Hemenway, 2002:521). A related literature documents an inverse relationship between restrictiveness in firearms legislation and suicide rates (Boor and Bair, 1990; Lester, 1988; Lester and Murrell, 1986; Loftin et al., 1991; Markush and Bartolucci, 1984; Medoff and Magaddino, 1983). It is important to note, however, that there is also some evidence for method substitution (Lester, 1990, 1996; Rich et al., 1990). Rich et al. (1990:342) find that gun control

legislation in Canada led to a decrease in suicide by guns for men but the difference was offset by an increase in suicide by other methods.

The opportunity argument is based, in large part, on the notion that suicide is impulsive behavior, not something that typically involves forethought and planning. The impulsive nature of many gun-related suicide attempts is attested to by studies of survivors. In a study of 18 cases of men who survived a self-inflicted intentional gunshot wound to the face, subsequent attempts were uncommon (Chapdelaine, Samson, and Kimberley, 1991). In another study of self-inflicted gunshot wounds that were considered fatal without emergency medical treatment, none of the 30 attempters had written a suicide note and more than half reported having suicidal thoughts for less than 24 hours. Moreover, within two years of followup, none had attempted suicide again (Peterson et al., 1985). Thus, "suicidal individuals are often ambivalent about killing themselves, and the risk period is transient" (Miller and Hemenway, 1998:61). As such, it is argued that gun availability occupies a central role in the calculus.

Like the motivation studies, the literature on gun availability and suicide has weaknesses. Miller and Hemenway (1998) note two major problems with ecological studies of firearms and suicide: (1) lack of reliable data on gun ownership levels in the United States by either city or state, and (2) failing to control for key confounders in the study. Concerning the first limitation, many studies do not include measures of gun availability, particularly those that attempt to assess the effect of gun control legislation on suicide rates (Boor and Bair, 1990; Lester, 1990; Lester and Murrell, 1982; Medoff and Magaddino, 1983; Rich et al., 1990; Yang and Lester, 1991). These studies assume that more restrictive legislation has resulted in fewer firearms within households but they include no measures of gun availability to verify this. Yet Lester (1988) points out that the prevalence of gun ownership, rather than strictness of gun control laws per se, is the best predictor of suicide. In short, too often gun regulation is used as an imperfect proxy for gun availability.

Concerning the second limitation, many studies have not controlled for possible confounding factors, such as the socioeconomic and demographic correlates of suicide that are largely accounted for in the motivation literature (Farmer and Rohde, 1980; Killias, 1993; Killias, Van Kesteren, and Rindlisbacher, 2001; Lester 1987, 1989, 1990; Lester and Murrell, 1982, 1986). Some studies simply report a bivariate correlation between gun ownership and suicide, without controlling for any additional factors (e.g., Killias, Van Kesteren, and Rindlisbacher, 2001). This concern is raised by Stack (1998:95), who maintains that "an overreliance on bivariate analysis" and "a neglect of nonadditive models" characterize this literature. According to his review, most research on opportunity factors and suicide is based on two variables: a measure of suicide and a measure of opportunity. As a result, important questions remain unanswered, such as whether the link between guns and suicide is spurious, and how important gun availability is relative to other predictors of suicide.

Regarding nonadditive models, Stack (1998) points to the results of one study by Gundlach (1990), which finds that living alone was strongly related to suicide in cities with high levels of gun availability. In contrast, in cities with low gun availability, living alone was unrelated to suicide. Along these lines, Stack (1998:98) notes, "some social variables known to be predictive of suicide may depend on gun availability to facilitate their association with suicide. In turn, some of the conflicting results on guns and suicide may be due to varying degrees of the presence of sociological risk factors in the groups being investigated from study to study." Collectively, these limitations have resulted in the belief that: "The empirical evidence from the cross-sectional studies are at best suggestive that an association may exist between gun density and suicide" (Miller and Hemenway, 1998:73).

We suggest a third weakness. The relationship between gun availability and suicide, to our knowledge, has been modeled only as a general process. The possibility that the relationship is race specific has not been explored (Brent and Bridge, 2003:1196–97). Again, drawing from the criminological literature may be informative in this respect. Researchers have found, for example, that the possession of guns for aggressive and defensive purposes is more common in disadvantaged than affluent communities and is most prevalent among young males in poor minority communities (Anderson, 1999; Fagan and Wilkinson, 1998; Krivo and Peterson, 1996). Anderson (1999), who interviewed young African-American males in Philadelphia's most impoverished communities, noted that as a result of an atmosphere of danger, even youth with a nonviolent orientation purchased guns for protection. In their study of violence in inner-city New York neighborhoods, Fagan and Wilkinson found that minority youth reported carrying guns because their neighborhoods were like a "war zone" and the streets were often "dangerous" and "unpredictable" (1998:138). For these youth, guns also served the purpose of building respect among peers: "it was understood that using a gun to harm his opponent was the best way to handle the situation both in terms of what was expected on the street and what an individual had to do to maintain a 'positive' (respected) identity" (1998:139). Thus, even if young white and black males have equal access to firearms, the purpose and meaning of gun ownership, as well as how the guns are used, stored, and carried, may be different. If this is the case, then the relationship between gun availability and its use as an instrument of suicide may vary by race. In sum, both the patterns of, and the motivation for, gun possession in these communities suggests the relationship between firearm availability and suicide may be unique for young black males. We assess this possibility in the current study.

Data and Methods

To examine the relationship between structural characteristics of cities, gun availability, and young male suicide, we use data from three sources: (1)

1998–2001 Mortality Multiple Cause of Death (MMCD) Records from the Centers for Disease Control (CDC) for information on the number of suicides in each city, total and disaggregated by race (white and black) and method (gun and nongun), (2) 1999–2001 Supplemental Homicide Report Data on the number of homicides (gun and nongun) in each city, and (3) 2000 Census data on socioeconomic and demographic characteristics of cities, disaggregated by race.

Variables

The dependent variables are suicide counts for white and black males under the age of 35, total and disaggregated by method (gun and nongun). We generated these counts from MMCD Records. Included in the file are data records for all deaths in the United States each year processed by the CDC. Data records contain underlying cause and demographic data for each death. We selected out cases where the underlying cause of death was suicide.

A potential concern has to do with the validity of official suicide data, more specifically, underreporting due to possible misclassification (Wars-hauer and Monk, 1978). Pescosolido and Mendelsohn (1986) analyzed sets of independently collected suicide data for counties, evaluating the impact of underreporting suicide on standard suicide correlates. They found the relationships among these variables and official suicide data were not appreciably altered in terms of direction and magnitude of effects as a result of underreporting. Thus, along with others, we argue that official suicide data are appropriate for analysis (see Burr, Hartman, and Matteson, 1999:1056; Cutchin and Churchill, 1999:102; Kowalski, Faupel, and Starr, 1987:90).

We aggregated the suicide data to the city level ($N = 179$).¹ The city is the most appropriate unit of analysis for several reasons. First, SMSAs, a larger level of aggregation, can be very heterogeneous. Indeed, Burr, Hartman, and Matteson (1999) include a percent urban variable in their analysis to control for the wide variation in urban and rural territories that exists in many SMSAs. Cities, on the other hand, are more homogeneous. Second, Kowalski, Faupel, and Starr (1987:85) find that sociological variables in urban areas have greater explanatory power than in rural or middle-urban areas and conclude that most sociological explanations of suicide apply primarily to urban environments. Third, the relationship between structural factors (e.g., poverty, unemployment) and gun availability is apt to be stronger in urban areas where guns are more often purchased for protection and security than

¹We include cities with populations greater than 100,000. Twenty-three cities were excluded because the CDC did not provide cause of death data. Another 17 were excluded because the UCR did not provide homicide data (needed to construct the gun availability measure). Mean levels of key characteristics do not differ significantly across the samples; thus, we argue that the exclusion of these cases does not affect the overall pattern of results.

for hunting or livestock management (Cao, Cullen, and Link, 1997). Following common practice (Burr, Hartman, and Matteson, 1999; Cutchin and Churchill, 1999; Kubrin, Wadsworth, and DiPietro, 2006; Wadsworth and Kubrin, 2007), we use counts computed over a multiyear period, 1998–2001, to account for the relatively rare nature of suicide and to minimize the impact of annual fluctuations.

We regress total and disaggregated black and white young male suicide counts on the structural characteristics of cities gathered from the 2000 Census. Variables representing economic structure and community organization include race-specific measures of percent male joblessness (percent males aged 16+ not working), median family income, percent poverty (percent population living below the poverty line), residential mobility (percent population aged 5+ who have moved in the last five years), racial segregation (Index of Dissimilarity), percent single-female households with children under 18 years, percent of the population aged 25+ with at least a high school education, and population (total and race- and ethnic-specific). We also include five inequality measures that reflect racial differences in income (white to black median family income), unemployment (black to white unemployment), joblessness (black to white joblessness), education (white to black high school graduation rates), and poverty (black to white poverty rates). Finally, we control for geographical region.

Not surprisingly, many of these characteristics are highly correlated. We thus performed principal components factor analysis with varimax rotation separately for blacks and whites (Burr, Hartman, and Matteson, 1999; Kubrin, Wadsworth, and DiPietro, 2006). For each group, the factor analysis generated two indices that capture disadvantage and racial inequality between blacks and whites. The following variables loaded strongly on the black disadvantage index (loadings follow in parenthesis): black male joblessness (0.81), black high school graduation rates (–0.84), black median family income (–0.88), black poverty (0.90), and black female-headed households with children under 18 (0.78). This factor had an eigenvalue of 5.41. The second index, racial inequality, with an eigenvalue of 1.68, is comprised of the ratio of white to black high school graduation rates (0.68), ratio of white to black median family income (0.67), ratio of black to white poverty rates (0.79), ratio of black to white unemployment rates (0.81), and the ratio of black to white joblessness rates (0.78).

Factor analysis for white disadvantage and inequality produced similar results. The white disadvantage index had an eigenvalue of 4.01, with the following variables loading on the index: white male joblessness (0.82), white high school graduation rates (–0.82), white median family income (–0.86), white poverty (0.90), and white female-headed households with children under 18 (0.68). The white racial inequality index had an eigenvalue of 2.62, with the following variables loading on the index: white to black high school graduation rates (0.82), ratio of white to black median family income (0.80), ratio of black to white poverty rates (0.71), ratio of

black to white unemployment rates (0.73), and the ratio of black to white joblessness rates (0.86).

Gun availability and gun ownership have been notoriously difficult to directly measure (Miller and Hemenway, 1998). Although the General Social Survey and the Behavioral Risk Factor Survey Surveillance have included measures of household gun ownership at the regional and state levels, respectively, neither provides data that can be used at lower aggregation levels such as the city. Survey data can also be problematic as individuals may not report “illegal” guns (Miller, Azrael, and Hemenway, 2002:523). In the current work, we combined two measures using principal components factor analysis to create a factor representing firearm availability (loadings are in parentheses)—the percentage of suicides by firearm (0.79) and the percentage of homicides by firearm (0.79). This factor has an eigenvalue of 1.24. Miller, Azrael, and Hemenway (2002) and Azrael, Cook, and Miller (2004) have demonstrated that the percentage of suicides committed by firearms (FS/S) is a strong proxy for gun availability—it exhibits significant variation by state (ranging from 0.29 in Hawaii to 0.80 in Mississippi) and is highly correlated with survey-based measures of regional and state-level gun ownership.² Although there has been some debate on this issue, researchers have shown this measure can be used in multivariate models predicting suicide rates without introducing bias (Azrael, Cook, and Miller 2004; Miller, Azrael, and Hemenway, 2002).³ The proxy FS/S is based on the assumption that, independent of overall suicide rates, cities in which a larger proportion of suicides are committed with guns are cities in which guns are more available. Conversely, cities in which more of the suicides are committed via nongun methods are cities in which there are fewer guns.

We combine the FS/S measure with an indicator of the percentage of homicides committed with guns (FH/H) due to the relatively low rate of suicide and relatively high rate of homicide in black communities. FH/H

²Azrael, Cook, and Miller (2004:49) document correlations of 0.90 between FS/S and state-level measures of household firearms ownership (Behavioral Risk Factor Surveillance Systems) and 0.93 between FS/S and regional measures of household firearms ownership (General Social Survey). Other commonly used measures of firearm availability, such as subscriptions to *Guns and Ammo* magazine and National Rifle Association membership, exhibited much weaker correlations with the survey-based measures (0.67 and 0.55 with the BRFSS, and 0.51 and -0.06 with the GSS).

³The debate has to do with concern over potential bias stemming from two sources. First, it has been claimed that using the same measure as a numerator or denominator on both sides of the equation may introduce bias into the model. This claim has been refuted (Gibbs and Firebaugh, 1990; Long, 1979) as these studies demonstrate that the potential for such bias is low and even lower when utilizing regression-based, compared to correlation-based, analyses, which we do in the current study. The second concern is that there will be correlated measurement error between multiple terms in the equation. We address this concern by regressing race-, gender-, and age-specific suicide counts on a measure of gun availability that is comprised of general, not race-, gender-, or age-specific, measures of suicide *and* homicide. Given our approach to creating the gun availability measure (using multiple and general measures), there is little likelihood we have introduced correlated measurement error into the models.

has also been used in the suicide literature (Kleck and Patterson, 1993; Lester, 1987). In the absence of city-level data on true gun ownership levels, we believe this proxy serves as a strong measure of firearm availability (Hemenway, 2004:42).

It should be noted that while our suicide measures and structural factors are race specific, we have chosen to use general (non-race-specific) measures of gun availability. This decision was informed by the literature on the diffusion of firearms. Findings from a survey of 835 criminally active youth serving time in juvenile correctional facilities in four states and a sample of 1,653 students in 10 inner-city high schools are particularly informative. Wright, Sheley, and Smith (1992) report that carrying a gun was relatively common among all youth in their sample, that family members and friends were also likely to own and carry firearms, and that guns were abundant and readily accessible. They additionally find that guns were easily stolen and were claimed to be stolen in large quantities, and that youth obtained guns mostly through informal purchases, trades with family members and friends or acquaintances, and street sources. Additional studies corroborate these findings; only 60–70 percent of firearm sales are transacted through licensed dealers, with the remainder taking place in the “secondary market” (Cook, Molliconi, and Cole, 1995). Sales to youth, in particular, occur in the “secondary market” (Ash et al., 1996; Wright and Rossi, 1994). In short, particularly among adolescents and young adults, guns change hands frequently.

More importantly, such movement is not limited to within racial and ethnic groups (Sheley and Wright, 1993). In exploring homicide rates among white adolescents, Blumstein and Cork (1996) argue that while the growth of gun availability in the 1980s began predominantly among non-whites, it likely played an important role in the increase in white youth homicide. They suggest a diffusion process occurred through networks of youth connected to juvenile drug dealers (i.e., youth who attend the same school or travel in similar areas). As the availability of guns became more widespread, there was greater incentive for other juveniles in more diverse social networks to arm themselves. Blumstein notes:

As more juveniles were recruited to sell crack, they armed themselves with guns. For those transporting valuable illicit merchandise, whether money or drugs, a gun was seen as necessary for protection, especially because they could not call for police assistance if threatened. Since juveniles are tightly networked in schools and in their neighborhoods, some youths not involved in the drug business felt they had to carry guns to protect themselves from armed juvenile drug sellers . . . Gun possession escalated into an arms race that diffused the weapons broadly throughout the community. (1996:2)

As we have found little empirical support for the idea that guns circulate only within racial groups, we argue that general measures of gun availability

are more appropriate. By using general measures, we also avoid deleting 35 cities from the analyses, which had either no black homicides or no black suicides during this time period (and thus could not be used to generate race-specific FS/S or FH/H measures). Given our interest in predicting race-specific suicide, dropping such cities from the analysis would likely introduce bias into our models, as we would be selecting our sample based on values of the dependent variable.⁴

Analyses

Our analysis proceeds in several stages. First, we regress young black and young white male suicide counts on the race-specific covariates identified above. We then add measures of firearm availability to the models to determine the extent to which access to guns mediates or moderates the relationship between structural factors and suicide. We also explore the possibility of conditional effects by examining the interaction between a key structural variable—concentrated disadvantage—and gun availability. To more fully delineate the causal processes, we also assess the degree to which structural characteristics of cities influence gun availability. Finally, we examine gun and nongun suicide separately to determine whether the influence of structural characteristics on suicide is dependent on the chosen suicide method.

Suicide is a rare event and many cities have few incidents, especially after disaggregating the data by race and method. This results in a heavily skewed distribution that violates the assumptions of OLS regression. We therefore employ negative binomial regression, discussed at length in Osgood (2000), which is often used in suicide research (Burr, Hartman, and Matteson, 1999; Kubrin, Wadsworth, and DiPietro, 2006; Wadsworth and Kubrin, 2007). Using negative binomial regression adjusts for both the skewness and overdispersion of the data. As called for, we employ suicide counts instead of rates, include the log of young white and young black males as the exposure variables (populations at risk), and constrain these coefficients to equal 1.

⁴In addition to the issue of external validity, Berk describes problems associated with selecting cases based on values of the dependent variable. He notes that when there is a relationship between X and Y but the sample is limited to cases for which the value of Y is above a certain threshold (the case if we dropped all cities with zero black suicides) “for low values of X , the regression line falls on or above the expected values, while for high values of X , the regression line falls on or below the expected values. For low values of X , therefore, negative disturbances will predominate, while for high values of X , positive disturbances will predominate. This implies that X will be positively correlated with the disturbance term. As a result, estimates of the slope and intercept will be biased (and inconsistent as well)” (1983:388). One potential concern is collinearity bias due to the intercorrelations among the explanatory variables. We examined variance inflation factor (VIF) scores in the models; most were low and all fell below 5. Neter, Wasserman, and Kutner (1990) claim, as a rule of thumb, that VIF scores over 10 suggest the possibility of significant collinearity. Thus, we are confident that collinearity is not a problem in the analyses.

Controlling for the size of the population at risk in this way is comparable to analyzing rates (Osgood, 2000:33).

Means and standard deviations for all variables are displayed in Table 1. Below we discuss the regression results.

TABLE 1
Variable Names, Descriptions, and Descriptive Statistics

	Variable Description	Mean	SD
<i>Young Male Suicide Counts by Race and Weapon</i>			
Young black male suicide	<i>Suicide counts for black males age < 35</i> (annual rates per 100,000 in parentheses)	8.9 (22.2)	17 (27.2)
Young black male gun suicide	<i>Gun suicide counts for black males age < 35</i> (annual rates per 100,000 in parentheses)	5.5 (11.1)	10.1 (11.2)
Young black male nongun suicide	<i>Nongun suicide counts for black males age < 35</i> (annual rates per 100,000 in parentheses)	3.4 (11.2)	7.6 (26.4)
Young white male suicide	<i>Suicide counts for white males age < 35</i> (annual rates per 100,000 in parentheses)	23.6 (25.7)	25 (12.6)
Young white male gun suicide	<i>Gun suicide counts for white males age < 35</i> (annual rates per 100,000 in parentheses)	12 (13)	13.4 (8.4)
Young white male nongun suicide	<i>Nongun suicide counts for white males age < 35</i> (annual rates per 100,000 in parentheses)	11.6 (12.8)	13.5 (7.3)
<i>Gun Availability Variables</i>			
FS/S	<i>Percentage of suicides committed with a firearm</i>	50%	13%
FH/H	<i>Percentage of homicides committed with a firearm</i>	63%	16%
<i>Structural Variables</i>			
Population	<i>Population of city</i>	366,537	708.188
Black population	<i>Black population of city</i>	79,870	190,206
White population	<i>White population of city</i>	167,965	248,203
Young black males	<i>Black male population age 15–34</i>	11,411	26,808
Young white males	<i>White male population age 15–34</i>	24,988	35,779
% Black	<i>% Pop. black</i>	20%	19%
% Hispanic	<i>% Pop. Hispanic</i>	19%	18%
% White	<i>% Pop. white</i>	52%	20%
Black mobility	<i>% Blacks that moved in the last 5 years</i>	57%	10%
White mobility	<i>% Whites that moved in the last 5 years</i>	48%	7%
Black to white dissimilarity	<i>Index of Dissimilarity</i>	0.45	0.17

TABLE 1—continued

	Variable Description	Mean	SD
<i>Variables Loading on Black Disadvantage</i>			
% Black male joblessness	% Black male pop. not working	41%	10%
Black median family income	Median income black families	\$36,027	\$11,437
% Black poverty	% Black families living below poverty line	24%	9%
% Black high school graduation	% Black pop. age 25+ with high school diploma	78%	9%
% Black single-female households	% Black families with children headed by single female	31%	8%
<i>Variables Loading on White Disadvantage</i>			
% White male joblessness	% White male pop. not working	31%	7%
White median family income	Median income white families	\$58,420	\$13,811
% White poverty	% White families living below poverty line	9%	4%
% White high school graduation	% White pop. age 25+ with high school diploma	87%	7%
% White single-female households	% White families with children headed by single female	9%	2%
<i>Variables Loading on Racial Inequality</i>			
White/black HS graduation rate	Ratio white to black HS graduation rates	1.12	0.11
White/black median family income	Ratio white to black median family income	1.69	0.40
Black/white poverty rate	Ratio black to white poverty rates	2.65	0.82
Black/white unemployment rate	Ratio black to white unemployment rates	2.46	0.79
Black/white joblessness rate	Ratio black to white joblessness rates	1.34	0.27
<i>Region</i>			
Northeast	0 = Non-Northeast location; 1 = Northeast location	13%	34%
Central	0 = Noncentral location; 1 = central location	19%	39%
West	0 = Nonwestern location; 1 = western location	37%	48%
South	0 = Nonsouthern location; 1 = southern location	31%	31%

Findings

The Role of Structural Characteristics and Gun Availability in Shaping Young Male Suicide

Model 1 in Table 2 displays the regression results examining the influence of structural factors on young black male suicide counts. Although we in-

TABLE 2
Negative Binomial Regression Findings for Structural Characteristics and Gun Availability on Black and White Suicide Counts^a

Variable	Structural Characteristics		Structural Characteristics and Gun Availability	
	Model 1 Young Black Male Suicide	Model 2 Young White Male Suicide	Model 3 Young Black Male Suicide	Model 4 Young White Male Suicide
Disadvantage (race specific)	0.127* (0.065)	0.169*** (0.035)	0.073 (0.062)	0.140*** (0.036)
Mobility (race specific)	0.185 (0.624)	-0.649 (0.498)	0.509 (0.586)	-0.498 (0.485)
Black/white inequality	0.015 (0.045)	0.013 (0.041)	0.023 (0.041)	0.004 (0.040)
Dissimilarity	-0.003 (0.004)	-0.001 (0.002)	-0.001 (0.004)	-0.001 (0.002)
Northeast	-0.149 (0.132)	-0.758*** (0.117)	0.148 (0.151)	-0.554*** (0.132)
Central	0.164 (0.098)	-0.146 (0.080)	0.290** (0.094)	-0.038 (0.086)
West	0.166 (0.106)	0.060 (0.076)	0.232* (0.099)	0.010 (0.074)
Gun availability	—	—	0.134** (0.041)	0.104** (0.034)
Constant	-7.124*** (0.514)	-6.461*** (0.294)	-7.504*** (0.496)	-6.590*** (0.289)
Young males (race specific)	(Exposure)		(Exposure)	
χ^2	17.90	151.29	2.26	116.00
P	0.000	0.000	0.066	0.000
-2 LL	-376.547	-568.133	-372.077	-563.792

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

^aEntries are unstandardized coefficients followed by standard errors in parentheses.

cluded a variety of measures representing inequality, residential segregation, residential mobility, population size, and geographic region, black disadvantage emerged as the only significant predictor. Cities with higher levels of black poverty, male joblessness, and single-female households, and lower levels of high school graduation and median family income, had higher levels of suicide among young black males. Model 2 in Table 2 tells a very similar story for whites. Concentrated disadvantage among whites is a key structural predictor of young white male suicide. The only other significant factor in the white model is region; Northeast cities have less suicide compared to cities in the South. The finding that disadvantage is the strongest structural predictor of suicide for both young black and white males is consistent with previous research (Kubrin, Wadsworth, and DiPietro, 2006).

In Models 3 and 4 of Table 2 we added the measure of gun availability to the equations. Once gun availability is included, the findings for whites and blacks begin to diverge. Although the effect of gun availability is highly significant in both the black and white models, it is stronger in the black models. More importantly, for blacks, the inclusion of gun availability reduces the coefficient for disadvantage by over 40 percent and attenuates its influence on black suicide to the point that disadvantage is no longer significant. The results of a test for “seemingly unrelated estimation” (Stata, 2003) show that the coefficient for black deprivation is significantly different in Model 1 than in Model 3 ($\chi^2 = 3.35$ $p < 0.035$ in a one-tailed test). In contrast, including gun availability in the white model has only a nominal effect on the relationship between disadvantage and suicide, reducing the disadvantage coefficient by 17 percent. That the inclusion of gun availability eliminates the significant relationship between disadvantage and suicide for black males suggests that guns may mediate the relationship between structural disadvantage and suicide for this population. In contrast, the relationship between disadvantage and suicide among white males is not greatly affected by the availability of guns, suggesting that the effect of disadvantage on white suicide is more direct.

We also explored the possibility of conditional effects to address questions such as: Does gun availability only increase suicide in areas with high levels of concentrated disadvantage? If so, is this effect race-specific? To answer these questions, we used a variety of approaches to test for interaction effects, including creating multiplicative terms and dividing the sample of cities into those with high versus low levels of disadvantage. We found no evidence of interaction effects; the influences of disadvantage and gun availability were not conditioned by each other.

The findings suggest that the pathways leading from economic disadvantage to suicide may be different for black and white young men. To further explore these patterns, we examine the role of socioeconomic and demographic characteristics in shaping gun availability. Table 3 displays the results of these regression models.

As shown in Table 3, both black and white disadvantage increase overall gun availability. Other significant predictors of gun availability include the size of the black population, black residential mobility, and geographic region. Cities with larger and more mobile black populations had higher levels of gun availability. Compared to southern cities, gun availability was lower in Northeast and central cities. Collectively, the analyses paint a relatively complex picture of the relationship between structural characteristics and race-specific young male suicide.

Disaggregating Suicide by Method

To further examine racial differences in suicide, we examined the effects of the structural characteristics on white and black suicide counts disaggre-

TABLE 3

Ordinary Least Squares Regression Findings for Gun Availability on Structural Characteristics^a

Variables	Model 1 Gun Availability	Model 2 Gun Availability
Disadvantage (black)	0.149* (0.075)	—
Disadvantage (white)	—	0.173* (0.074)
Mobility (black)	1.942* (0.847)	—
Mobility (white)	—	-0.316 (1.045)
Black/white inequality	-0.023 (0.067)	0.007 (0.068)
Population	0.000 (0.000)	0.000 (0.000)
Percent black	3.010*** (0.518)	2.160*** (0.442)
Percent Hispanic	0.784 (0.401)	0.371 (0.409)
Northeast	-1.500*** (0.228)	-1.671*** (0.235)
Central	-0.691*** (0.180)	-0.820*** (0.195)
West	0.044 (0.172)	-0.037 (0.174)
Constant	-1.485* (0.625)	0.110 (0.612)
R^2	0.47	0.46

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.^aEntries are unstandardized coefficients followed by standard errors in parentheses.

gated by method—gun and nongun. Models 1 and 3 in Table 4 display the effects of structural characteristics on black and white gun suicides, while Models 2 and 4 display these effects on nongun suicides. In both the black and white gun models (Models 1 and 3), disadvantage plays a significant role in shaping gun suicide counts. In both cases, disadvantage leads to more suicides by firearms.

Turning to nongun suicide, however, some interesting findings emerge. Unlike with gun suicide, disadvantage has no effect on nongun suicides for blacks (Model 2 in Table 4). In other words, concentrated disadvantage does not increase the number of suicides committed by nonfirearm methods. To confirm the divergent effects of disadvantage on black gun and nongun suicide, we used the equation $t = (b_1 - b_2) / \sqrt{(SEb_1)^2 + (SEb_2)^2}$ (Paternoster et al., 1996). The results indicate that the observed differences are

TABLE 4

Negative Binomial Regression Findings for Structural Characteristics on Black and White Gun and Nongun Suicide Counts^a

Variable	Model 1 Black Gun Suicide	Model 2 Black Nongun Suicide	Model 3 White Gun Suicide	Model 4 White Nongun Suicide
Disadvantage (race specific)	0.223** (0.080)	-0.027 (0.098)	0.166** (0.053)	0.191*** (0.036)
Mobility (race specific)	0.113 (0.767)	0.444 (0.921)	0.115 (0.750)	-1.538** (0.508)
Black/white inequality	-0.002 (0.054)	0.032 (0.067)	-0.020 (0.061)	0.069 (0.042)
Dissimilarity	-0.000 (0.005)	-0.006 (0.006)	-0.002 (0.004)	-0.001 (0.002)
Northeast	-0.677*** (0.166)	0.594** (0.189)	-1.223*** (0.184)	-0.364** (0.114)
Central	-0.058 (0.117)	0.558*** (0.146)	-0.395** (0.119)	0.064 (0.079)
West	0.062 (0.129)	0.359* (0.160)	-0.161 (0.112)	0.239** (0.077)
Constant	-7.610*** (0.630)	-9.259*** (0.768)	-7.276*** (0.439)	-6.899*** (0.305)
Young males (race specific)		(Exposure)	(Exposure)	
χ^2	10.24	5.54	181.50	12.52
P	0.001	0.009	0.000	0.000
-2 LL	-313.131	-290.580	-511.049	-456.469

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

^aEntries are unstandardized coefficients followed by standard errors in parentheses.

statistically significant ($t = 1.97$, $p < 0.025$ in a one tailed test). On the other hand, disadvantage is a significant predictor of nongun suicides for whites (Model 4). Although not significantly different, the effect of disadvantage on nongun suicide is higher than for gun suicide among whites.

The other divergent finding across the racial groups has to do with residential mobility. Although not related to suicide among young black males, residential mobility was negatively associated with nongun suicide among white males. This may be the result of some residents' inability in entrenched neighborhoods to relocate to better areas, despite a desire to do so. These residents may perceive that their options for relocating are limited, which can result in frustration and depression—both precursors to suicide. Why this operates only among the white population and only influences nongun suicide is an issue worth exploring in future research.

The findings in Table 4 are consistent with the racial differences identified in the analyses of suicide rates for young men presented in Table 2. For both whites and blacks, disadvantage increases suicide. However, the two sets of

analyses reveal a key distinction—disadvantage directly increases young white male suicide but only raises levels for young black males by increasing access to firearms. This is evident in the first set of analyses by the attenuation of the disadvantage coefficient for blacks when a measure of gun availability is added to the model. This mediating process is reinforced in the second set of analyses by the fact that for blacks, disadvantage significantly influences gun suicide but has no effect on nongun suicide.

Conclusion and Discussion

This study sought to determine the structural correlates of suicide rates among young black and white males in U.S. cities. In particular, we investigated the roles of motivation to commit suicide due to structural conditions and opportunity to commit suicide due to firearm availability in two sets of analyses. The first assessed whether gun availability mediated the effect of structural characteristics, and disadvantage in particular, on suicide levels for blacks and whites. The second determined whether structural characteristics such as disadvantage had a stronger impact on gun or nongun suicide for each population.

The results suggest complex relationships among structural characteristics of cities, gun availability, and suicide. First, for blacks and whites, disadvantage was the strongest predictor of suicide; cities with higher levels of poverty, joblessness, and female-headed households with children, and lower levels of high school graduates and median family income, had more young black *and* young white male suicides. When measures of gun availability were included in the models, however, racial differences began to emerge. For blacks, the inclusion of a gun availability measure strongly affected the relationship between disadvantage and suicide, such that disadvantage was no longer significant once gun availability was accounted for. On the other hand, although gun availability also exhibited a strong positive relationship with suicide among white male youth, it did not mediate the relationship between disadvantage and suicide. In fact, the reduction in the effect of disadvantage on young white male suicide once gun availability was accounted for was relatively small. The finding of racial differences was confirmed in the second set of analyses, which determined that for blacks, disadvantage was significantly related only to gun suicides, not nongun suicides. In contrast, disadvantage was significantly related to both gun and nongun suicide for whites. These findings begin to speak to the relative and combined contributions of motivation and opportunity for understanding suicide patterns across geographic areas and racial and ethnic groups.

The finding that suicide among young black males is directly attributable to access to guns is consistent with other literature, which documents the growth in homicide resulting from handguns during the 1990s was restricted to young people and concentrated among African-American youth

(Blumstein and Rosenfeld, 1998; Hagan and Foster, 2000:47). In their analysis of homicide trends from 1965 to 1995, Blumstein and Cork (1996:5) find that “while there has been a significant decline in homicides committed by older offenders, homicides committed by younger offenders grew dramatically beginning in 1985. An important factor in that growth has been a significant increase in the availability of guns to young people.” They also find that for black youth, nongun homicides actually decreased during this time period.

Beyond more clearly specifying the roles of motivation and opportunity in shaping suicide rates, the current work addresses a number of unresolved issues in the literature. These include questions concerning why blacks have demonstrated comparatively lower rates of suicide despite higher levels of poverty, unemployment, and family disruption, as well as what has fueled the increase in young black male suicide over the last 30 years. A more thorough understanding of the relationships among structural disadvantage, guns, and black suicide, as revealed in the findings of this study, can help address these issues.

There is consensus in the literature concerning the link between structural disadvantage and suicide for both blacks and whites (Almgren et al., 1998; Crawford and Prince, 1999; Kubrin, Wadsworth, and DiPietro, 2006). Groups experiencing greater disadvantage tend to have higher suicide rates. Although this has been true within racial groups, disadvantage has not been useful in explaining rates across racial groups—blacks are more disadvantaged compared to whites, yet they demonstrate lower suicide rates. This has been attributed to protective factors present in the black community, including family support networks, religious involvement, and civic participation, which scholars argue historically have mitigated the anomic effect of disadvantage (Gibbs, 1997). Stack (2000:147) notes: “The historical discrimination against African Americans is said to have created a cultural ‘survival strategy’ centered on ties to the African American family and church. These are life-saving institutions offering social support.” These institutions also foster cultural norms that lead to low suicide acceptability for blacks relative to whites (Early, 1992).

The current findings suggest another possibility. If the process by which disadvantage leads to suicide differs across racial groups, we would not expect relative disadvantage levels between blacks and whites to explain cross-race differences. At least among young males this appears to be the case—disadvantage shapes suicide by influencing motivation among whites and opportunity, via gun availability, among blacks. As the causal mechanisms are race specific, it is possible they are also responsive to different disadvantage levels. Drawing from work by Sampson and Wilson (1995), Bruce, Roscigno, and McCall (1998), and Anderson (1999), we suggest that disadvantage, and accompanying social isolation and pro-violence norms, may only become influential in shaping firearm availability (the proximate cause of suicide for blacks) when they reach very high levels. In contrast, the

point at which disadvantage begins to influence motivation to commit suicide for whites may occur at an earlier point on the disadvantage continuum. In other words, moderate disadvantage levels may be influential in shaping white suicide, while higher disadvantage levels, operating through gun availability, are necessary to influence black suicide. Although the current study does not offer a test of this hypothesis, the findings do point to important differences in the linkage between disadvantage and suicide, differences that deserve continued attention in future research.

In addition to this issue, scholars, community activists, and public health practitioners have sought to understand why suicide among young black men has increased dramatically over the last 30 years. As the current analyses are not longitudinal in nature, we are hesitant to make strong assertions regarding this trend. However, the current work points to a possibility that parallels a process discussed in the criminological literature—lethal violence among young people has increased because their access to guns has increased. Although poverty has long been a problem in black communities, the proliferation of guns is a more recent problem. Our findings suggest that the proliferation of guns marks the difference between cities with high and low suicide rates. Whether gun availability can explain longitudinal changes in suicide among young black males, or among the broader population, is a critical question for future work.

The current work brings together two essential components of our understanding of suicide patterns across geographic areas and racial and ethnic groups. We are unaware of any studies that have thoroughly examined the confluence of motivation and opportunity in suicide models or that have assessed the influence of opportunity on suicide disaggregated by race. Our study addresses these issues. In so doing, we offer insight into the process by which structural factors lead to suicide for diverse populations, and begin to address some unresolved issues in the suicide literature. We are optimistic that continuing this two-pronged approach, and expanding analyses both across time and to additional populations, will lead to significant discoveries in the study and prevention of suicide.

REFERENCES

- Almgren, Gunnar, Avery Guest, George Immerwahr, and Michael Spittel. 1998. "Joblessness, Family Disruption, and Violent Death in Chicago, 1970–90." *Social Forces* 76:1465–93.
- Anderson, Elijah. 1999. *Code of the Street: Decency, Violence, and the Moral Life of the Inner City*. New York: W.W. Norton and Company.
- Ash, P., A. L. Kellerman, D. Fuqua-Whitley, and A. Johnson. 1996. "Gun Acquisition and Use by Juvenile Offenders." *Journal of the American Medical Association* 275:1754–58.
- Azrael, D., P. Cook, and M. Miller. 2004. "State and Local Prevalence of Firearms Ownership: Measurement, Structure and Trends." *Journal of Quantitative Criminology* 20:43–62.

- Baller, Robert D., and Kelly K. Richardson. 2002. "Social Integration, Imitation, and the Geographic Patterning of Suicide." *American Sociological Review* 67:873–88.
- Berk, Richard. 1983. "An Introduction to Sample Selection Bias in Sociological Data." *American Sociological Review* 48:386–98.
- Blumstein, Alfred. 1996. *Youth Violence, Guns, and Illicit Drug Markets*. Washington, DC: National Institute of Justice.
- Blumstein, Alfred, and Daniel Cork. 1996. "Linking Gun Availability to Youth Gun Violence." *Law and Contemporary Problems* 59:5–24.
- Blumstein, Alfred, and Richard Rosenfeld. 1998. "Explaining Recent Trends in U.S. Homicide Rates." *Journal of Criminal Law and Criminology* 88:1175–1216.
- Boor, M., and J. H. Bair. 1990. "Suicide Rates, Handgun Control Laws, and Sociodemographic Variables." *Psychological Reports* 66:923–30.
- Bridge, Jeffrey. 2003. "Firearms Availability and Suicide." *American Behavioral Scientist* 46:1192–1210.
- Bruce, Marino A., Vincent Roscigno, and Patricia L. McCall. 1998. "Structure, Context, and Agency in the Reproduction of Black-on-Black Violence." *Theoretical Criminology* 2: 29–55.
- Burr, Jeffrey A., John T. Hartman, and Donald W. Matteson. 1999. "Black Suicide in U.S. Metropolitan Areas: An Examination of the Racial Inequality and Social Integration-Regulation Hypotheses." *Social Forces* 77:1049–81.
- Burr, Jeffrey A., Patricia L. McCall, and Eve Powell-Griner. 1994. "Catholic Religion and Suicide: The Mediating Effect of Divorce." *Social Science Quarterly* 75:300–18.
- Cao, Liqun, Francis T. Cullen, and Bruce G. Link. 1997. "The Social Determinants of Gun Ownership: Self-Protection in an Urban Environment." *Criminology* 35:629–57.
- Chapdelaine, A., E. Samson, and M. D. Kimberley. 1991. "Firearm Related Injuries in Canada: Issues for Prevention." *Canadian Medical Association Journal* 145: 1217–23.
- Chuang, Hwei-Lin, and Wei-Chuao Huang. 1996. "A Reexamination of Sociological and Economic Theories of Suicide: A Comparison of the U.S.A. and Taiwan." *Social Science and Medicine* 43:421–23.
- Cook, Phillip J. 1981. "The Effect of Gun Availability on Violent Crime Patterns." *Annals of the American Academy of Political and Social Science* 455:63–79.
- Cook, Phillip J., Stephanie Molliconi, and Thomas B. Cole. 1995. "Regulating Gun Markets." *Journal of Criminal Law and Criminology* 86:59–92.
- Crawford, M. J., and M. Prince. 1999. "Increasing Rates of Suicide in Young Men in England During the 1980s: The Importance of Social Context." *Social Science and Medicine* 49:1419–23.
- Cutchin, Malcolm P., and Robert R. Churchill. 1999. "Scale, Context, and Causes of Suicide in the United States." *Social Science Quarterly* 80:97–114.
- Durkheim, Emile. 1897. *Suicide: A Study in Sociology*, 1951 reprint. New York: Free Press.
- Early, K. 1992. *Religion and Suicide in the African American Community*. Westport, CT: Greenwood Press.
- Fagan, Jeffrey, and Deanna Wilkinson. 1998. "Guns, Youth Violence, and Social Identity in Inner-Cities." *Crime and Justice* 24:105–88.

- Farmer, R., and J. Rohde. 1980. "Effect of Availability and Acceptability of Lethal Instruments on Suicide Mortality." *Acta Psychiatrica Scandinavia* 62:436–46.
- Gibbs, Jack P., and Glenn Firebaugh. 1990. "The Artifact Issue in Deterrence Research." *Criminology* 28:347–67.
- Gibbs, Jewelle Taylor. 1997. "African-American Suicide: A Cultural Paradox." *Suicide and Life-Threatening Behavior* 27:68–79.
- Gundlach, J. 1990. "Absence of Family Support, Opportunity and Suicide." *Family Perspective* 24:7–14.
- Hagan, John, and Holly Foster. 2000. "Making Corporate and Criminal America Less Violent: Public Norms and Structural Reforms." *Contemporary Sociology* 29:44–53.
- Hemenway, David. 2004. *Private Guns Public Health: A Dramatic New Plan for Ending America's Epidemic of Gun Violence*. Ann Arbor, MI: University of Michigan Press.
- Joe, Sean, and Mark S. Kaplan. 2002. "Firearm-Related Suicide Among Young African-American Males." *Psychiatric Services* 53:332–34.
- Kellerman, A. L., F. P. Rivara, G. Somes, D. T. Reay, and J. Francisco. 1992. "Suicide in the Home in Relation to Gun Ownership." *New England Journal of Medicine* 327:467–72.
- Killias, Martin. 1993. "International Correlations Between Gun Ownership and Rates of Homicide and Suicide." *Canadian Medical Association Journal* 148:1721–25.
- Killias, Martin, John Van Kesteren, and Martin Rindlisbacher. 2001. "Guns, Violent Crime, and Suicide in 21 Countries." *Canadian Journal of Criminology* 43:429–48.
- Kleck, Gary, and E. B. Patterson. 1993. "The Impact of Gun and Gun Ownership Levels on Violence Rates." *Journal of Quantitative Criminology* 9:249–87.
- Kowalski, Gregory S., Charles E. Faupel, and Paul D. Starr. 1987. "Urbanism and Suicide: A Study of American Counties." *Social Forces* 66:85–101.
- Krivo, Lauren J., and Ruth Peterson. 1996. "Extremely Disadvantaged Neighborhoods and Urban Crime." *Social Forces* 75:619–48.
- Kubrin, Charis E., Tim Wadsworth, and Stephanie DiPietro. 2006. "Deindustrialization, Disadvantage, and Suicide Among Young Black Males." *Social Forces* 84:1559–79.
- Lester, David. 1987. "Availability of Guns and the Likelihood of Suicide." *Sociology and Social Research* 71:287–88.
- . 1988. "Research Note: Gun Control, Gun Ownership, and Suicide Prevention." *Suicide and Life-Threatening Behavior* 18:176–79.
- . 1989. "Gun Ownership and Suicide in the United States." *Psychological Medicine* 19:519–21.
- . 1990. "The Availability of Firearms and the Use of Firearms for Suicide." *Acta Psychiatrica Scandinavia* 81:146–47.
- . 1996. "Gun Ownership and Rates of Homicide and Suicide." *European Journal of Psychiatry* 10:83–85.
- Lester, David, and M. E. Murrell. 1982. "The Preventive Effect of Strict Gun Control Laws on Suicide and Homicide." *Suicide and Life-Threatening Behavior* 12:131–40.
- . 1986. "The Influence of Gun Control Laws on Personal Violence." *Journal of Community Psychology* 14:315–18.

- Loftin, Colin, David McDowall, Brian Wiersema, and T. Cottey. 1991. "Effects of Restrictive Licensing of Handguns on Homicide and Suicide in the District of Columbia." *New England Journal of Medicine* 325:1615–20.
- Long, Susan B. 1979. "The Continuing Debate Over the Use of Ratio Variables: Facts and Fiction." In Karl F. Schuessler, ed., *Sociological Methodology 1980*. San Francisco, CA: Jossey-Bass.
- Markush, R., and A. Bartolucci. 1984. "Firearms and Suicide in the United States." *American Journal of Public Health* 64:123–27.
- McKeown, Robert E., Steven P. Cuffe, and Richard M. Schulz. 2006. "U.S. Suicide Rates by Age Group, 1970–2002: An Examination of Recent Trends." *American Journal of Public Health* 96:1744–51.
- Medoff, M. H., and J. P. Magaddino. 1983. "Suicides and Firearm Control Laws." *Evaluation Review* 7:357–72.
- Miller, Matthew, Deborah Azrael, and David Hemenway. 2002. "Household Firearm Ownership and Suicide Rates in the United States." *Epidemiology* 13:517–24.
- Miller, Matthew, and David Hemenway. 1998. "The Relationship Between Firearms and Suicide: A Review of the Literature." *Aggression and Violent Behavior* 4:59–75.
- Neter, John, William Wasserman, and Michael H. Kutner. 1990. *Applied Linear Statistical Models*, 3rd ed. Chicago, IL: Irwin Press.
- Osgood, Wayne D. 2000. "Poisson-Based Regression Analysis of Aggregate Crime Rates." *Journal of Quantitative Criminology* 16:21–43.
- Paternoster, Raymond, Robert Brame, Paul Mazerolle, and Alex Piquero. 1996. "Using the Correct Statistical Test for Equality of Regression Coefficients." *Criminology* 36:859–66.
- Pescosolido, Bernice A., and Robert Mendelsohn 1986. "Social Causation or Social Construction of Suicide? An Investigation into the Social Organization of Official Rates." *American Sociological Review* 51:80–101.
- Peterson, L. G., M. Peterson, G. J. O'Shanick, and A. Swann. 1985. "Self-Inflicted Gunshot Wounds: Lethality of Method vs. Intent." *American Journal of Psychiatry* 142:228–31.
- Rich, Charles, James G. Young, Richard C. Fowler, John Wagner, and Nancy A. Black. 1990. "Guns and Suicide: Possible Effects of Some Specific Legislation." *American Journal of Psychiatry* 147:342–46.
- Sampson, Robert J., and William Julius Wilson. 1995. "Toward a Theory of Race, Crime and Urban Inequality." Pp. 37–54 in John Hagan and Ruth D. Peterson, eds., *Crime and Inequality*. Stanford, CA: Stanford University Press.
- Sheley, Joseph F., and James D. Wright. 1993. *Gun Acquisition and Possession in Selected Juvenile Samples*. Washington, DC: National Institute of Justice.
- Stack, Steven. 1998. "Research on Controlling Suicide: Methodological Issues." *Archives of Suicide Research* 4:95–99.
- . 2000. "Suicide: A 15-Year Review of the Sociological Literature. Part I: Cultural and Economic Factors." *Suicide and Life-Threatening Behavior* 30:145–62.
- Stata. 2003. *Stata Reference Manual*. College Station, TX: Stata Corporation.
- Stockard, Jean, and Robert M. O'Brien. 2002. "Cohort Variations and Changes in Age-Specific Suicide Rates Over Time: Explaining Variations in Youth Suicide." *Social Forces* 81:605–42.

Wadsworth, Tim, and Charis E. Kubrin. 2007. "Hispanic Suicide in U.S. Metropolitan Areas: Examining the Effects of Immigration, Assimilation, Affluence, and Disadvantage." *American Journal of Sociology* 112:1848–85.

Warshauer, Ellen M., and Mary Monk. 1978. "Problems in Suicide Statistics for Blacks and Whites." *American Journal of Public Health* 68:383–88.

Wintemute, Garen. 2000. "Guns and Gun Violence." Pp. 45–96 in Alfred Blumstein and Joel Wallman, eds., *The Crime Drop in America*. Cambridge, UK: Cambridge University Press.

Wright, James D., and Peter H. Rossi. 1994. *Armed and Dangerous: A Survey of Felons and Their Firearms*. New York: Aldine de Gruyter.

Wright, James D., J. F. Sheley, and M. Dwayne Smith. 1992. "Kids, Guns, and Killing Fields." *Society* 30:84–9.

Yang, B., and David Lester. 1991. "June. The Effect of Gun Availability on Suicide Rates." *Atlantic Economics Journal* 19:74.