The Effects of Weaponry on Human Violence*

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Abstract

This article assesses the impact of weapons, especially firearms, on three types of outcomes of threatening or hostile interactions: (1) whether a threatening situation escalates to an actual physical attack, (2) whether the attack is completed, i.e., results in an injury, and (3) whether the injury inflicted results in death. Data on violent incidents among strangers, taken from the 1979-1985 National Crime Surveys and the 1982 Supplementary Homicide Reports, were used to estimate bivariate probit equations with a correction for sample selection bias. Results indicate that deadly weapons, including firearms, appear to inhibit attack and, in the case of an attack, to reduce the probability of injury, whereas, once an injury occurs, they appear to increase the probability of death. The overall net effect of the availability of guns on the probability of the victim's death is very close to zero.

The importance of violence and force as sources of power has only recently begun to achieve recognition among sociologists (Goode 1972; Black 1983). Power has traditionally been conceptualized as deriving from lasting attributes of persons and from their position in the social structure, e.g., from their social-class position, gender, age, and race. When power is examined at the interpersonal level, as in the family-violence literature (Strauss, Gelles & Steinmetz 1980), it is typically viewed as deriving from family role and gender. All of these sources of power, however, ultimately derive to some extent from a capacity to use physical force and violence, exercised either by the actor or by agents upon whom the actor can call (Goode 1971). This capacity, in turn, often

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relies partly on a rather transitory attribute of the person — the possession of weaponry.

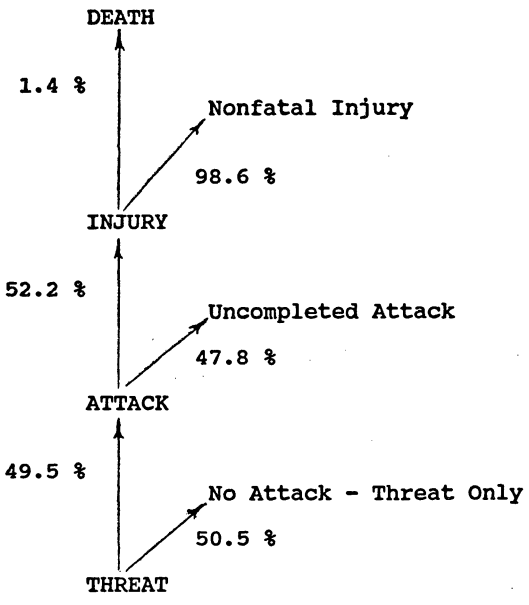
Indeed, the single most important factor that sets human violence apart from aggression among lower animals is arguably the human's greater technological capacity to inflict harm. The tools of death available to humans are vastly more lethal than even the most deadly natural equipment of other species. Interpersonal conflict of some sort is inevitable and universal, but it may be factors such as use of weaponry that partially determine whether verbal conflict escalates to violence, whether physical attacks are completed by reaching their target, and, when they do reach their target, whether such attacks result in serious injury or death. Yet little is reliably known about the impact of weaponry on violence or how weaponry is used to coerce compliance in hostile social encounters (for a review, see Wright, Rossi & Daly 1983).

The power that weaponry confers has been conventionally treated as exclusively violence-enhancing — it is assumed that the possession and use of weapons only increases the likelihood of the victim's injury and death (e.g., Newton & Zimring 1969). Such a conceptualization of the significance of weaponry is unduly restrictive. A broader perspective starts with a recognition of weapons as sources of power, used instrumentally to achieve goals by inducing compliance with the user's demands. The ultimate goal behind an act of violence may not necessarily be the victim's death or injury but rather money, sexual gratification, respect, attention, or the humiliation and domination of the victim. Power can be, and usually is, wielded so as to obtain these goals without actually inflicting injury. Threats, implied or overt, usually suffice and are often preferred to physical attack. The inflicting of injury may even be an indication that the preferred mode of exercising power has failed.

We argue that weapons are an important source of power, especially in a nation such as the United States, where half of the households possess a gun (Wright, Rossi & Daly 1983). As such, they are frequently wielded to achieve some emotional or material goal — to obtain money in a robbery, sexual gratification in a rape, or, more frequently, to terrify and dominate their victims in some other kind of assault. All of these goals can be achieved without inflicting a gunshot wound. Indeed, the use of a gun can serve as a substitute for an attack rather than as its vehicle. While this idea has not been given much serious attention in connection with weapon effects, it fits in well with a proposition stated by Goode (1971) in the family-violence field. Goode distinguishes between force broadly construed, which encompasses much of what has been widely labeled "power," and the subcategory of "overt force," which corresponds to physical violence. Noting the many nonviolent sources of coercive power that middle- and upper-income adult males have at their command, he asserts that research on family violence supports the proposition that "the greater the other resources an individual can command, the more force he *can* muster, but the less he will actually deploy or use force in an overt manner" (628). Similarly, we can hypothesize that in a potentially violent conflict situation, the greater the resources of weaponry individuals command, the more force they *can* muster, but the less likely they will be to actually attack.

To explore these issues, we analyze data from the National Crime Surveys (NCS) and the FBI's Supplementary Homicide Reports (SHR) to examine the

FIGURE 1: The Hierarchy of Violence*



* Percentages are weighted. Those below INJURY are from the 1979-1985 NCS stranger violent incident sample. Those above INJURY are from the merged 1982 NCS and SHR dataset.

impact of weaponry, especially firearms, on the seriousness of assault outcomes. We emphasize that we are specifically interested in the effects of the *aggressor's* rather than the victim's possession and use of weapons on the outcomes of the incidents.

Issues of Assault Outcomes

Hostile or threatening situations can be categorized into the "hierarchy of violence" illustrated in Figure 1. By "threatening situation" we mean encounters in which one person (the victim) either is physically attacked or perceives that another person (the aggressor) is threatening him or her with physical harm through verbal threats, menacing gestures, or other actions. Most threatening situations never proceed beyond mere threat. Aggressors obtain what they want from a threatening speech or gesture, or they limit their aggression to words, because they fear the consequences of further action. (In the common law, to threaten to hurt another person is assault, regardless of whether any actual attempt to physically injure the person is made.) In the 1979-1985 NCS, half of the assaults were threats that did not involve an attack. Of those assaults that

did involve an attack, only about half were completed, i.e., resulted in an injury. Finally, based on combined NCS and SHR data for 1982, only about 1% of those attacks that caused injury resulted in death. We will address each of these possible outcomes of threats separately, assessing the impact of weaponry on each.

ATTACKS ON VICTIMS

How does the possession of weaponry influence whether hostile persons physically attack the objects of their hostility? An attack could be the throwing of a punch, the swinging of a club, the thrusting of a knife, or the firing of a gun. Does possession of any of the various common weapons encourage or discourage attack? We conceptualize the principle possible effects of weapons on attack as facilitation, triggering, inhibition, and redundancy.

Facilitation

Possession of a weapon grants power that may be especially important in facilitating the aggression of weaker aggressors toward stronger victims. It has long been argued that firearms give some people the courage to attempt aggressive acts that they otherwise would be afraid to attempt. Cook (1982:257) has shown that guns are more commonly used in homicides in which the attacker is older and presumably weaker and the victim younger and presumably stronger.

Guns also permit attack from a great distance, though few assaults occur at ranges longer than the average barroom or kitchen. Finally, it has been hypothesized that guns may facilitate attack by persons too squeamish to come into close contact with their victims or to use messier methods to injure them (Newton & Zimring 1969:40).

Triggering

Experimental psychologists Berkowitz and LePage (1967) have proposed the "weapons effect" hypothesis, which states that the sight of a weapon can elicit aggression from angered persons, because of the learned association between weapons and aggressive behavior. In short, weapons can trigger attacks by angry persons. The experimental evidence of these authors and the many psychologists who have attempted to replicate their work (reviewed in Kleck & Bordua 1983) has been very mixed, the general pattern being that the greater the realism of the weapons used and the forms of aggression measured, the less the hypothesis has been supported.

Nevertheless, two findings from this literature are noteworthy. First, aggression-elicitation effects depend on the meaning that subjects assign to weapons. Without an aggressive meaning being assigned to weapons, they do not elicit aggression (Turner, Layton & Simons 1975). Second, some studies have found that guns can inhibit as well as elicit aggression among some subjects (Fischer, Kelm & Rose 1969; Fraczek & Macaulay 1971; Turner, Layton & Simons 1975).

Inhibition

In many assaults aggressors not only lack an intent to kill but specifically want to *avoid* killing their victims. Instead, they may want only to frighten or to hurt them. Possession of a lethal weapon gives such assaulters more killing power than they need or want. To attack would risk doing far more damage than the assaulter wants. The possession of weapons with such "excess lethality" raises the stakes in what may seem to be an all-or-nothing situation — kill or do not attack at all. Assuming that the intentions of assaulters as a group cluster predominantly at the less deadly end of the continuum, one effect of the possession of guns and other deadly weapons could be inhibition of attack behavior.

Redundancy

A deadly weapon empowers its possessor to terrify, to coerce compliance with demands, to deter another's aggression, to injure nonfatally, and to kill. Power increases the likelihood that its user will get what he or she wants. If most assaulters do not want to kill, a lethal weapon enables its user to achieve other goals. In robberies, the aggressor's use of a gun insures compliance with his or her demands for money and deters the victim from resisting the aggressor, convincing the victim that the robber has the capacity to inflict death or serious injury (Luckenbill 1982). Without a gun it would often be impossible for the robber to achieve this compliance without actually attacking the victim. Threat with a gun can thereby serve as a substitute for actual attack rather than as its vehicle. In other words, possession of a gun can make a physical attack *unnecessary*. Supporting this idea, at least nine prior studies have found, without exception, that robbers armed with guns are less likely to injure their victims than robbers without guns (Normandeau 1968; Conklin 1972; Feeney & Weir 1973; McDonald 1975:138; Hindelang 1976; Block 1977; Cook & Nagin 1979; Luckenbill 1981; U.S. Bureau of Justice Statistics 1986).

However, this pattern need not be limited to acquisitive crime such as robbery. Simple percentage analysis of early NCS victimization survey data indicates that the fraction of assaults resulting in attack and the fraction resulting in injury were both lower in incidents involving gun-armed offenders than in those involving either offenders armed with other weapons or unarmed offenders (U.S. Bureau of Justice Statistics 1986:4). Using analysis of variance on later NCS data, King (1987) also finds lower rates of injury for gun-armed offenders in assault as well as in robbery. Aggressors in ordinary anger-instigated assaults have their own peculiar goals, which, if they have a weapon, aggressors can achieve without attacking. Those who want to frighten, humiliate, or dominate their victims can do so merely by pointing a gun without firing it. A combatant may be able to regain a favorable situational identity through the use of a weapon to control others and exact their unwilling obedience. With a gun assaulters can demonstrate to their victims, to themselves, and to any bystanders that they cannot be pushed around and that they must be granted respect or at least fear (Luckenbill 1982). On the other hand, without a gun, nothing short of attack may suffice. The same qualities of weapons that make them dangerous if used to attack can inhibit or preclude the necessity of

actually using them.

One combatant's use of a lethal weapon may also give his or her opponent a socially acceptable excuse for not retaliating for an insult or other challenge: "Only a fool attacks a man with a gun." The failure to retaliate, which might otherwise be regarded by witnesses as evidence of cowardice, is viewed instead as mere prudence in the face of greatly unequal power. The extreme imbalance of power can thus prevent an escalation to physical violence by exacting from the weaker opponent some gesture of deference or an exit from the scene.

VICTIM INJURIES

If an attack does occur, it may or may not be completed, i.e., result in an injury by a bullet reaching its target, a knife penetrating skin, a fist or club bruising flesh or smashing bone. The attributes of weapons that can facilitate attack may also reduce the attack completion rate by encouraging attacks at a longer range, against more formidable opponents, or under more difficult conditions. It is possible to shoot a victim from a great distance, but the rate at which this is achieved is likely to be far lower than the rate at which thrown punches land. Concerning the more common close-range gun attacks, those unfamiliar with firearms marksmanship may assume that shooters are virtually certain to hit their target. This assumption is not born out by the experiences of persons shooting under conditions of emotional stress. NCS data covering the United States from 1979 to 1987 indicate that only 19% of incidents where an attacker shot at a victim resulted in the victim being hit, i.e., suffering a gunshot wound (U.S. Bureau of Justice Statistics 1990:5). In contrast, corresponding data on NCS-reported knife attacks indicate that about 55% resulted in a knife wound (U.S. Bureau of Justice Statistics 1986:5; 9.8% of knife assaults involved a knife wound, while another 7.9% involved an attempted knife attack without injury — 9.8/[9.8+7.9]=0.55).

Even individuals trained and presumably mentally prepared to shoot under stressful conditions commonly have difficulty hitting their targets. A study of shots fired by New York City police officers when they unambiguously intended to shoot their adversaries (warning shots excluded) indicates that, of 2,703 shots fired "in defense of life" or "to prevent or terminate crime," only 39% wounded the opponent (computed from Fyfe 1979:318, 320). It is not surprising that this rate was even lower among the mass of civilians lacking the training and relative emotional preparedness of police officers. Consequently, it is possible that the net effect of gun use would be to reduce the fraction of attacks resulting in injury.

VICTIM DEATHS

For victim deaths, predictions concerning the impact of weaponry are much clearer. If injury is inflicted, the injury is more likely to be fatal if it is a gunshot wound. The lethality of guns may be exaggerated in the minds of those whose experience with them derives from television and films — only about one in six gunshot woundings known to the police results in death (Cook 1985:96). Nevertheless, at least among attacks known to police, gunshot wounds are more

likely to result in death than wounds inflicted by a knife, the weapon generally assumed to be the next most lethal among those that can be used in the same circumstances as guns. While widely cited data from a single city indicate that the death rate from gun attacks is five times that from knife attacks (Zimring 1968:728), other police-based and medical studies limited to woundings indicate a 3 to 1 ratio of death rates resulting from gun and knife wounds, respectively (Wilson & Sherman 1961:640-42; Block 1977).

It is unlikely that all of this difference in death rates is attributable solely to the technical properties of the weapons themselves. Part of the difference is probably a result of the greater "lethality" of the users of the more deadly weapons. We assume that those with more serious intentions or with a stronger instigation to aggression choose more serious weaponry, regardless of how impulsively and even unconsciously they might arrive at their intentions. Reanalysis of data from a prison survey by Wright and Rossi (1986) indicates that felons who reported using guns in the offense for which they had been incarcerated admitted to a larger number of lifetime assaults and arrests than those who had not used guns (Kleck 1986:303). This finding suggests that, on average, the willingness of a criminal gun user to do violence and to inflict serious injury is greater than that of criminals who do not use guns. Further, men are universally regarded as being more willing than women to inflict injury on others, and they are also more likely to use guns in their acts of violence (Kleck & Bordua 1983).

It is impossible to measure strength of motivation at the time of the assault directly or to do experiments with serious, real-life violence. To isolate the effects of weaponry itself on assault outcomes, we cannot directly control for offender motivation, but only for presumed correlates of motivation. Thus we improve on the efforts of previous researchers in this respect only to the extent that the controls we introduce are indeed correlated with the strength of an attacker's aggressive drive.

Problems in Previous Research

Previous studies of the effects of weapons in violent incidents have all suffered from one or more of four problems. First, all studies using cases known to the police or treated by physicians have analyzed samples that have been biased regarding the dependent variable, i.e., some measure of assault outcome, including death. Police- or hospital-based studies have examined samples in which incidents of minor violence have been systematically omitted because they were not regarded as serious enough to bother reporting to the police or because they did not require medical treatment. Second, these studies have analyzed local samples, usually limited to a single city. Weaponry varies sharply across localities, not only in its general availability (e.g., fewer guns in urban areas than rural areas, more in the South than elsewhere) but also in its distribution across subcategories (a higher fraction of guns owned being handguns in urban areas, etc.) and in its reasons for ownership (more crime-oriented ownership, either for criminal or defensive purposes, in urban areas) (Wright, Rossi & Daly 1983). Consequently, there may be very limited generali-

zability of findings from urban-only or single-jurisdiction studies (e.g., Zimring 1968; Wilson & Sherman 1961; Felson & Steadman 1983).

Third, analysis in these studies has commonly been unsophisticated, relying on simple percentage table methods — and often bivariate analysis (e.g., Zimring 1968). This reliance is particularly a problem because there are no controls for any correlates of assaulter motivation or aggressive-drive levels.

Fourth, with few exceptions (e.g., Cook & Nagin 1979), prior research on real-life violence has ignored the distinction between the effects of weapons on whether the aggressor attacks (rather than merely threatening) and on whether an attack is completed, i.e., results in an injury. Either only the attack outcome is studied or the two are lumped together into a combined attack-and-injury variable, usually labeled "injury" (e.g., King 1987; Block 1977).

The present study goes beyond the work of others by using nationally representative samples of violent incidents covering the full range of seriousness from very minor threats to homicides — including both incidents reported to the police and those not reported — using multivariate analytic techniques that distinguish between attack, injury, and death as outcomes of violent situations and that control for a number of likely correlates of offender motivation strength. Our study is also unique in combining nationally representative samples of both fatal and nonfatal violent incidents in a single analysis to study weapon effects on death.

Problems in Analyzing Violent Incidents

The NCS interviews a representative sample of the noninstitutionalized American population age 12 and older. Respondents (*R*s) are asked whether they have been a victim of crime in the previous six months and are questioned about the details of the crime incidents they recall. At least three "reverse record checks" studies have found that *R*s' ability or willingness to recall crimes is worse for assaults than for any other type of crime — as few as 36-48% of assaults known to police were reported to NCS interviewers (Dodge 1981; Murphy & Dodge 1981; Turner 1981).

These studies indicate that violent incidents among persons who knew one another were most likely to go unreported. For example, only 22% of assaults involving relatives were reported, compared with 54% of those involving strangers (Turner 1981). We address this problem by limiting analysis to stranger cases, where there is at least somewhat less room for underreporting to bias results.

Other known patterns of bias concern *R*s' education and race. Blacks appear to underreport violent incidents more than whites, especially less serious incidents. And better-educated persons consistently report more incidents, especially minor ones, than less-educated persons (Skogan 1981). By recalling a larger number of assaults without attack or injury, better-educated *R*s make their assaults seem less likely to result in these outcomes, and an opposite, equally artificial pattern is evident for blacks compared with whites. The result is that the measured fraction of assaults resulting in attack or injury may be artificially elevated for blacks and artificially lowered for better-educated

people. We roughly control for these effects by including education and race of victim in all initial versions of equations.

Some minor assaults may be recalled only because they were repeated, i.e., part of an ongoing pattern. While serious assaults are generally recalled in any case, minor assaults, i.e., those without attack or injury, are more likely to be recalled if they were repeated than if they were isolated, artificially making it appear that repeated incidents are less likely to involve an attack or injury. In NCS terminology, a "series incident" is an incident that is one of three or more incidents occurring in a six-month recall period that are so similar that the *R* cannot separately describe them. Although not all repeated assaults are series incidents, all series incidents are repeated crimes. We control for this effect by including a measure of whether an incident was a series case.

Next we are brought to the relationship between the biases noted above and weapon involvement in violence. Could the fraction of assaults involving attack or injury be distorted by response biases that vary across weapon categories? Certainly the NCS coverage of nonfatal assaults is incomplete for both assaults involving attack and/or injury and those involving neither. Although the NCS covers minor assaults better than police records do, Cook (1985) has shown that the NCS covers the most serious assaults, such as gunshot woundings, *less* completely than do police records. That is, cases involving injury and more serious weaponry are frequently missed in the NCS. Whether this undercoverage is greater for serious-weapon assaults than for minor-weapon assaults is not clear, since minor-weapon assaults may be covered in the NCS at just as low a rate as the more serious ones. The undercoverage of the NCS simply may have been more easily detected with gun assaults because of unusually complete police knowledge of assaults requiring medical treatment — physicians are commonly required by law to report gunshot wounds to the police. Consequently, it is unclear whether the relative average seriousness levels of NCS assaults are more distorted by these problems in some weapons categories than they are in others.

Methods of the Present Analysis

SAMPLES

Two data sets are analyzed. The first, used to analyze whether assaults result in attacks on victims and whether attacks result in injury to victims, is the set of all NCS violent incidents that occurred in the United States from 1979 through 1985 and that involved victims and offenders who were strangers to one another (U.S. Bureau of Justice Statistics 1987). The NCS covers only victims age 12 or older. We have attempted to be as inclusive as possible to avoid the introduction of additional sample bias by needlessly excluding relevant cases. The only exception is our decision to exclude nonstranger cases, which was motivated by our judgment that the advantages of reducing the response bias associated with violence among intimates outweighed the sample-biasing effects of this exclusion. This NCS sample includes series incidents as well as incidents with multiple victims or offenders. All cases involved at least a threat of violence, although they may also have involved the elements of other crimes

besides assault. Thus the sample includes incidents classified as rape or robbery in the NCS Type-of-Crime classification. Dummy variables measure whether the elements of rape, robbery (theft plus force), or burglary (illegal entry) were also involved in an incident.

The second data set, used to analyze whether injuries result in the deaths of victims, is a merger of all NCS stranger violence incidents for 1982 and all SHR intentional stranger homicides of victims age 12 and older for 1982, including both civilian and police justifiable homicides (U.S. FBI 1983). The year 1982 was used because it was in the middle of the period covered in the first data set. The SHR program, run by the Federal Bureau of Investigation and based on police offense reports, records information on the victim, the offender (when known), and the circumstances of about 90% of homicides in the United States. To maintain comparability between the NCS and SHR data sets, homicides of victims under age 12 were excluded, and negligent (unintentional) manslaughters were excluded because the NCS is intended to cover only intentional acts. NCS incidents occurring outside the United States were also excluded because the SHRs cover only homicides occurring within American police jurisdictions. All other relevant homicides were retained, including both incidents involving multiple offenders or multiple victims and civilian or police justifiable homicides. All variables that existed in some form in both sources were identified and given a common coding scheme. A weight was computed that equaled the NCS incident weight for NCS cases and a number slightly larger than one for SHR cases (see the Appendix). The resulting merged data set is a national sample of intentional stranger assault incidents, some fatal and some nonfatal, weighted up to represent national totals.

ESTIMATION TECHNIQUES

Since our three dependent variables were all binary variables, we generally used some form of probit to estimate equations. Ordinary least squares (OLS) regression was used for preliminary screening with the attacks on victims and victim injury models before applying the more computationally expensive maximum-likelihood estimation techniques. A very liberal significance level ($p<.30$) was used in the screening to avoid excluding a relevant variable prematurely. Because of the extreme distribution of the victim death variable, even preliminary screening had to be done with probit.

All final versions of the victim injury and victim death equations were estimated with bivariate probit, with a correction for nonrandom sample selection (Van de Ven & Van Praag 1981; Greene 1985). This correction was applied because of the way we subdivided the samples into increasingly serious subsets. First, all assaults were examined to determine why some involved an attack and others did not. Then analysis was limited to cases with an attack to analyze why only some attacks resulted in injury. Finally, cases resulting in injury were analyzed to explore why only some injuries resulted in death.

To estimate victim injury equations on the full assault sample would muddle the distinction between attack and injury — estimated models of the victim injury variable would reflect processes affecting attacks on victims as well as those affecting victim injury in cases involving an attack. However,

selecting only cases that involved an attack for estimation of the victim injury equation is a nonrandom selection that could bias the coefficient estimates (Berk 1983). To correct for this bias, a "selection" equation was estimated that modeled the inclusion of cases into the sample on which the "substantive" equation was estimated. The attacks on victims equation predicts whether an incident will involve an attack. The victim injury equation was estimated only on cases that involved an attack, since those that did not involve an attack obviously could not result in injury. Thus the attacks on victims equation in effect predicts whether a case will be "selected" for inclusion in the sample on which the substantive victim injury equation was estimated. A similar procedure was used to estimate the substantive victim death equations, with an victim injury equation being used as the selection equation, since only cases involving injury were "eligible" to result in death. The sample selection correction procedure works by including a measure reflecting the predicted probability of a case not being selected for the sample as a variable in the substantive equation (Heckman 1979; Van de Ven & Van Praag 1981).

DEFINITIONS OF KEY VARIABLES

Table 1 lists the variables included in analyses and their means and standard deviations. Most of the variables are binary, representing the presence or absence of an attribute. Because some incidents involved more than one offender, the offender dummies indicate whether there was at least one offender with the indicated trait. Thus, when male offender is 1, there was at least one male offender; there could also have been female offenders. To avoid near-perfect collinearity, at least one dummy variable representing a category of some larger variable was always excluded from each equation. For example, both male offender and female offender, dummies representing the two possible categories of offender sex, could not both be included in an equation, since if there was no male offender, it would always indicate the presence of a female offender, and vice versa.

The dependent variables — attacks on victims, victim injury, and victim death — are necessarily generic; they reflect attack, injury, or death involving *any* weapon (or no weapon). Therefore, an incident with a gun present and involving an attack and/or injury did not necessarily involve a gunshot wound. Rather, a gun-armed assaulter may have fired the gun and missed, used the gun only to threaten, used it as a blunt instrument, or not used it all, instead attacking and/or injuring the victim with fists or feet or with some weapon other than a gun. Table 1 lists three different versions of each gun variable. In the analyses of attacks on victims, the gun variables measure whether guns were present, i.e., whether offenders possessed them in a way evident to the victims. In the analyses of victim injuries, the gun variables measure whether a gun was actually used to *attack* the victim, i.e., whether the victim was shot or shot at. And in the analyses of victim deaths, the variables indicate whether the victim actually suffered a gunshot wound. In all cases, a victim could be confronted with an offender with more than one type of weapon and could be attacked or injured in more than one way. However, less than .1% of assaults involve the use of more than one weapon type in an attack.

TABLE 1: Variables in the Analysis[a]

	NCS Assaults 1979-1985		NCS Attacks 1979-1985		NCS/SHR Injuries 1982	
	Mean	SD	Mean	SD	Mean	SD
Victim outcome						
Attacked	.495	.500	1.000	.000	1.000	.000
Injured	.258	.438	.522	.500	1.000	.000
Killed	.000	.000	.000	.000	.014	.119
Offender's weapons present						
Handgun present	.114	.318	.061	.239		
Other gun present	.022	.147	.014	.120		
Knife present	.122	.328	.107	.309		
Other weapon present	.136	.343	.170	.376		
Offender's weapons used						
Handgun fired	.011	.103	.022	.146	.021	.144
Other gun fired	.004	.065	.009	.093	.004	.060
Knife used	.021	.144	.043	.202	.056	.230
Other weapon used	.061	.239	.123	.329	.168	.374
Unknown weapon used	.010	.099	.018	.133	.000	.016
Source of victim injuries						
Handgun wound					.021	.144
Other gun wound					.004	.060
Knife wound					.056	.230
Blunt object injury					.223	.416
Other weapon injury					.017	.131

[a] Blank spaces indicate variable did not exist in that dataset.

Equations were estimated not only for the full sample of stranger violent incidents but also for each of three subsets. First, to see whether results were distorted by lumping robbery, rape, and confrontational burglary incidents with "pure" assaults, estimates were obtained for the "nonfelony" subset of violent incidents that did not have the elements of theft, rape, or illegal entry. Second, it might be argued that victim recall is poor for series incidents, since the information obtained refers to the average features of multiple incidents rather than to any one specific incident. Therefore, estimates were obtained for the "nonseries" subset excluding series incidents. Finally, one could argue that some assaults involve "victims" who were really aggressors and that variables referring to the "victim" were actually describing the offender, and vice versa (see the Appendix). On the assumption that victims reporting incidents to the police were more likely to regard themselves as true victims, we analyzed separately only those cases that the victim or a member of the victim's household reported to the police.

Most of the variables in each equation were included as likely correlates of

TABLE 1: Variables in the Analysis (Continued)

	NCS Assaults 1979-1985		NCS Attacks 1979-1985		NCS/SHR Injuries 1982	
	Mean	SD	Mean	SD	Mean	SD
Victim characteristics						
Household income	8.120	3.947	8.005	3.962		
Years of school	15.790	6.475	15.260	6.420		
Married	.329	.470	.286	.452		
Gun-carrying occup.	.038	.192	.040	.195		
Black	.136	.343	.136	.343	.119	.324
Male	.703	.457	.698	.459	.730	.444
Offender characteristics						
Age 11 or younger	.010	.099	.014	.116	.004	.062
Age 30 or older	.236	.425	.197	.398	.202	.402
Male	.942	.233	.936	.244	.941	.236
Unknown race	.021	.143	.022	.146	.025	.156
Advantages of offender on victim						
Age	.210	.407	.209	.407	.269	.444
Sex	.257	.437	.257	.437	.228	.420
Number[b]	.767	2.787	.910	3.219	.814	1.928
Assault circumstances						
Robbery	.286	.452	.317	.465	.335	.472
Burglary	.038	.192	.030	.170	.032	.176
Rape	.029	.166	.037	.189	.042	.202
In city of 250K+	.324	.468	.331	.471	.307	.461
In June-August	.279	.448	.283	.450	.270	.444
Dark	.542	.498	.578	.494		
Indoors	.267	.442	.241	.428		
Series incident	.057	.232	.037	.189		

[b] Number offenders minus number of victims

offender "motivation," broadly conceived as how willing and able (apart from weaponry possession) aggressors were to attack and injure victims. Offender attributes (male offender, offender younger than age 12, offender older than age 29, black offender) were included because they reflect differing levels of willingness to aggress — males, persons age 12-29, and blacks commit violent acts more frequently and seriously than others. Victim attributes (victim married, victim in gun-carrying occupation) were included because they reflect differing levels of difficulty or risk to the aggressor in attacking and trying to injure the victim — married victims are more likely to have a spouse nearby, while victims employed as a security guard or police officer are more likely to possess a gun. On the other hand, it should be noted that people in gun-carrying occupations are also more likely to encounter more seriously violent persons. Variables indicating whether robbery, rape, or burglary were involved were included on the assumption that robbers, rapists, and burglars have longer

and more serious records of prior violence than simple assaulters and are therefore more willing to use violence in a sample incident. Yet these types of aggressors also have goals other than hurting the victim, which could reduce attacks and injuries. The power-differential variables (which indicate whether there was an advantage to the offender[s] in age, sex, or number) were included on the assumption that aggressors with a power advantage would be more willing to attack and injure because they were at less risk of effective counterattack from their victims. On the other hand, aggressors with such advantages may also be more able to get what they want without actually attacking or injuring their victims. Summer was included as a variable on the assumption that people are more easily and strongly angered when the weather is hot. Finally, variables indicating that events occurred after dark and indoors were included because darkness and an inside location should make witness identification or interruption of the crime less likely and thus could reduce situational inhibitions against attack and injury.

Findings

In all tables, the excluded weapon category was "no weapon present" (or "no weapon used"), so coefficients reflect the effect of each weapon category relative to weaponless assaults, i.e., those involving only hands, feet, etc. All equations were significant at a level less than .001.

ATTACKS ON VICTIMS

The findings in Table 2 support the view that the net effect of the presence of deadly weaponry in threatening situations is to reduce the probability of attack by the possessors of the weapons. The negative association is significant for handguns, "other" guns (mostly rifles and shotguns), and knives. The apparent effect of the presence of less lethal "other" weapons (blunt objects, broken bottles, etc.) is to increase the probability of attack. Thus, as lethality of the weapons present increases, the probability of attack decreases. Equation 1 shows the OLS estimates for the full sample of stranger violent incidents, and equation 2 presents the full sample probit estimates. The findings are substantively identical and hence not dependent on the estimation procedure used. The findings also hold regardless of whether felony-linked assaults are excluded (eq. 3), series incidents are excluded (eq. 4), or the analysis is restricted just to those cases reported to the police (eq. 5). Since the "weapons effect" thesis is intended to apply only to angry persons, our findings are relevant to the extent that we can assume that aggressors in our sample incidents were angry. If the "weapons effect" does exist, the findings indicate that the conditions necessary for it to produce a net assault-triggering effect are rarely met in real-life violent incidents. The "weapons effect" and the facilitation effect still may exist; however, if they do, they apparently are being overwhelmed by the attack-inhibiting or "redundancy" effects of deadly weaponry.

Notice that the education and series variables have the expected negative signs. Better-educated respondents were more likely to report assaults in which an attack did not occur, and reported series incidents were more likely than

TABLE 2: Attacks on Victims Equations[a]

Equation:	1	2	3	4	5
Est. Method:	OLS	Probit	Probit	Probit	Probit
Subsample:	All	All	Nonfelony	Nonseries	Reported to Police
Offender's weapons					
Handgun present	-.2836	-.7704	-.6084	-.7769	-.9310
	(-22.40)	(-21.64)	(-12.74)	(-21.57)	(-17.00)
Other gun present	-.1579	-.4223	-.3040	-.4451	-.6650
	(-5.90)	(-5.76)	(-3.60)	(-5.93)	(-6.02)
Knife present	-.1246	-.3259	-.2264	-.3392	-.3860
	(-10.13)	(-9.94)	(-5.07)	(-10.16)	(-7.05)
Other weapon present	.0961	.2545	.2702	.2422	.1614
	(8.27)	(8.14)	(7.59)	(7.54)	(2.89)
Offender characteristics					
Age 11 or younger	.1681	.4654	.5135	.4385	.1804
	(4.22)	(4.17)	(3.95)	(3.78)	(0.87)
Age 30 or older	-.0632	-.1668	-.2092	-.1746	-.0709
	(-6.68)	(-6.56)	(-7.21)	(-6.67)	(-1.59)
Victim characteristics					
Years of school	-.0053	-.0741	-.0179	-.0141	-.0074
	(-8.53)	(-8.44)	(-8.92)	(-8.23)	(-2.52)
Married	-.0640	-.1699	-.1799	-.1658	-.1617
	(-7.49)	(-7.41)	(-6.64)	(-7.01)	(-4.12)
Gun-carrying occup.	.0769	.2081	.2162	.2528	.2647
	(3.69)	(3.71)	(3.69)	(4.05)	(2.93)
Assault circumstances					
Robbery	.0895	.2391	—	.2391	.3112
	(9.70)	(9.60)		(9.47)	(7.30)
Burglary	-.0785	-.2056	—	-.1963	-.1917
	(-3.60)	(-3.49)		(-3.27)	(-2.32)
Indoors	-.0293	-.0820	-.0966	-.0751	-.1759
	(-3.05)	(-3.18)	(-3.42)	(-2.81)	(-3.51)
Series incident	-.1885	-.5075	-.5032	—	-.3922
	(-10.98)	(-10.72)	(-10.10)		(-4.45)
Dark	.8418	.2256	.2609	.2222	.1786
	(10.46)	(10.44)	(10.09)	(9.98)	(4.65)
Constant	.5987	.2592	.2900	.2627	.3031
Log-likelihood	(0.08)[b]	-9704.3	-6830.5	-9167.6	-3030.6
N	14922	14922	10420	14040	4772

[a] Equations include the coefficient and the ratio of the coefficient to the standard error. Sample: NCS violent incidents between strangers, occurring in U.S., 1979-1985

[b] Adjusted R^2

nonseries incidents to be threats without attack. Victim race, on the other hand, was unrelated to attacks on victims.

VICTIM INJURY

The findings in Table 3 indicate that, in the case of an attack, the use of guns has a significant net negative association with victim injury. The use of knives and "other weapons" in an attack was positively associated with injury. The general pattern of findings is that the more lethal the weapon used in an attack, the less likely it will actually inflict an injury. These findings hold regardless of the estimation procedure used (eqs. 6-8). This finding is important because the correction for sample selection bias used in the bivariate probit estimates will only improve estimates if the sample selection equation models the selection process reasonably well, something of which we cannot be certain. Since the procedure corrects for the probability of a case being excluded from the sample, if we cannot accurately model the selection process, our inability to do so is the same as our either failing to include a relevant variable in the equation (sample selection bias as a specification error — Heckman 1979) or our including a poor measure of that needed control variable.

VICTIM DEATH

The findings in Table 4, based on analysis of the merged 1982 SHR/NCS assault and homicide data set, indicate that, in the case of a wounding, the wound is more likely to be fatal if it is inflicted by a gun. The results suggest the existence of a clear hierarchy of weapon lethality, with gun woundings the most likely to result in death, followed respectively by injuries produced by knives, "other weapons," blunt objects, and, finally, hands and feet. These findings are largely independent of the estimation procedure used (eqs. 12-14) and data subsamples analyzed (eq. 14 vs. eqs. 15 and 16).

The only missing data indicator variable (see the Appendix) with a coefficient significantly different from zero in any of the equations was offender race unknown in the victim death equation, indicating that missing data patterns were essentially random with respect to all three assault outcome measures, except that incidents where the offender's race was unknown were more likely to be fatal.

Discussion and Conclusions

Our findings support a more complex picture of the significance of firearms in American violence than has commonly been a part of the debate over gun control. The possession of guns appears both to inhibit attack and, in the case of an attack, to reduce the probability of injury, while also increasing the probability of death in the case of an injury. The positive effect of guns on death was larger than their negative effects on attack and injury. What would be the net effect on deaths of a reduction in aggressor possession of guns in threatening situations? To answer this question, an equation was estimated on the full sample of stranger violent incidents — not just on those with injuries. The

TABLE 3: Victim Injury Equations[a]

Equation:	6	7	8	9	10	11
Est. Method:	OLS	Probit	Bivar	Bivar	Bivar	Bivar
Subsample:	All	All	All	Nonfelony	Nonseries	Reported to Police
Offender's weapons used in attack						
Handgun fired	-.3136	-.9267	-.9257	-1.1858	-.9391	-1.3116
	(-8.03)	(-7.75)	(-7.85)	(-8.22)	(-7.77)	(-5.88)
Other gun fired	-.3506	-1.1619	-1.1619	-1.1912	-1.1386	-1.2612
	(-5.72)	(-5.40)	(-7.10)	(-6.67)	(-6.82)	(-4.37)
Knife used	.1357	.3625	.3625	.1674	.3704	.3418
	(4.81)	(4.72)	(4.56)	(1.70)	(4.53)	(2.33)
Other weapon used	.2058	.5597	.5597	.4623	.5770	.5747
	(11.81)	(11.64)	(11.18)	(7.95)	(11.15)	(6.56)
Victim characteristics						
Years of school	-.0043	-.1142	-.0113	-.0187	-.0116	-.0070
	(-4.76)	(-4.78)	(-4.42)	(-5.50)	(-4.39)	(-1.62)
Household income	-.0035	-.0094	-.0095	-.0152	-.0104	-.0090
	(-2.40)	(-2.43)	(-2.43)	(-3.17)	(-2.62)	(-1.27)
Gun-carrying occupation	-.0799	-.2133	-.2133	-.0851	-.1943	-.1524
	(-2.73)	(-2.73)	(-2.87)	(-1.07)	(-2.41)	(-1.24)
Advantages of offender on victim						
Sex	-.0537	-.1403	-.1403	-.2623	-.1618	-.1494
	(-3.82)	(-3.79)	(-3.79)	(-5.41)	(-4.32)	(-2.43)
Age	.5592	.1482	.1482	.1113	.1503	.0377
	(3.95)	(3.95)	(3.96)	(2.26)	(3.93)	(0.63)
Assault circumstances						
Rape	.1324	.3428	.3428	—	.3544	.2227
	(4.19)	(4.09)	(3.87)		(3.95)	(1.61)
Robbery	.0615	.1647	.1647	—	.1602	.2454
	(4.85)	(4.90)	(4.57)		(4.39)	(4.05)
Dark	.1121	.2943	.2942	.2503	.2940	.1953
	(9.60)	(9.54)	(8.95)	(5.67)	(8.67)	(3.54)
Constant	.5104	.0298	.0298	.3079	.0576	.0775
Log-likelihood	(0.06)[b]	-4800	-14542	-10062	-13796	-4623
N	7300	7300	7300	4937	7007	2400

[a] Equations include the coefficient & the ratio of the coefficient to the standard error. Sample: NCS violent incidents with an attack, involving strangers, occurring in U.S., 1979-1985.

[b] Adjusted R^2

TABLE 4: Victim Death Equations[a]

Equation:	12	13	14	15	16
Est. Method:	OLS	Probit	Bivar	Bivar	Probit[b]
Subsample:	All	All	All	Nonfelony	Reported to Police
Offender's weapons used to inflict injury					
Handgun wound	.3782	2.964	2.602	3.093	3.282
	(35.28)	(12.49)	(13.53)	(2.97)	(17.59)
Other gun wound	.3948	2.773	2.531	2.654	7.261
	(15.41)	(7.29)	(4.63)	(2.58)	(0.28)
Knife wound	.0438	1.397	1.679	1.728	1.264
	(6.53)	(6.41)	(14.37)	(11.01)	(8.07)
Blunt object injury	-.0051	0.013	0.160	0.106	0.054
	(-1.36)	(0.05)	(2.13)	(1.11)	(0.28)
Other weapon injury	.0048	.336	.531	.381	.555
	(0.41)	(0.62)	(2.72)	(1.69)	(1.42)
Advantages of offender on victim					
Age	.0054	.419	.507	.372	.234
	(1.53)	(2.29)	(6.57)	(3.85)	(1.70)
Number	-.0027	-.158	-.066	-.052	-.017
	(-3.33)	(-2.63)	(-3.16)	(-1.94)	(-0.33)
Assault circumstances					
Robbery	-.0137	-.560	-.199	—	-.537
	(-4.10)	(-2.80)	(-2.74)		(-3.62)
Victim characteristics					
Black	.0165	.716	.264	.318	.626
	(3.37)	(3.65)	(2.45)	(2.15)	(4.18)
Offender characteristics					
Race unknown	.0880	1.139	1.425	1.316	.961
	(8.80)	(4.13)	(8.73)	(6.26)	(4.50)
Male	-.0353	-.723	.018	.193	-1.056
	(-5.38)	(-2.89)	(0.11)	(0.96)	(-5.24)
Constant	0.0379	-2.485	0.064	-0.112	-1.702
Log-likelihood	(0.29)[c]	-144.81	-3893.5	-2480.6	-252.1
N	4322	4322	4322	2868	3914

[a] Equations include the coefficient and the ratio of the coefficient to the standard error.

[b] Bivariate probit estimates could not be computed because the correction for sample selection created a near-singular estimated variance matrix.

[c] Adjusted R^2

equation included all variables that were available in the combined 1982 SHR/NCS data set and that appeared in any of the three equations for attack, injury, or death. It was estimated with OLS and probit. The results are shown

TABLE 5: Summary of Weapon Effects in Violent Incidents[a]

Weapon	Attack		Injury, Given Attack		Death, Given Injury		Net Effects, All Incidents Death	
	b	B	b	B	b	B	b	B
Handgun[b]	-.284	-.181	-.314	-.092	.378	.459	.014	.079
Other gun[c]	-.158	-.046	-.351	-.065	.395	.199	.016	.038
Knife[d]	-.125	-.082	.136	.055	.044	.085	.003[e]	.018
Other weapon[f]	.096	.066	.206	.135	-.005[g] .005[h]	-.018[g] .005[h]	-.000[e]	-.002

[a] Omitted weapons category — incidents where no weapons were present or used
b=unstandardized OLS regression coefficients
B=standardized OLS regression coefficients
[b] "Handgun present" in attack equation; "handgun fired" in injury equation; "handgun wound" in death equation
[c] "Other gun present" in attack equation; "other gun fired" in injury equation; "other gun wound" in death equation
[d] "Knife present" in attack equation; "knife used" in injury equation; "knife wound" in death equation
[e] Not significant at .05 level
[f] "Other weapon present" in attack equation; "other weapon used" in injury equation; "other weapon injury" in death equation
[g] Coefficient for blunt object
[h] Coefficient for other weapon

in the last two columns of Table 5, which summarizes the sizes of the effects of the weapon variables on each of the assault outcomes.

Note that OLS coefficient estimates are unbiased when the dependent variable is binary and that their values can be interpreted as linear probability coefficients (Aldrich & Nelson 1984:13, 18). The linear probability interpretation is most meaningful when the predictors, as a group, take on average values, since this is where OLS slopes are essentially identical to slopes estimated with methods assuming nonlinear relationships, such as probit or logit.

The aggressor's possession of a handgun in a violent incident apparently exerts a slight net positive effect on the likelihood of the victim's death. The linear probability interpretation of the OLS coefficient implies that the presence of a handgun increases the probability of the victim's death by 1.4%. Thus the violence-increasing and violence-suppressing effects of gun possession and use almost exactly cancel each other out, making the net effect on the likelihood of the victim's death very close to zero.

The effects of aggressor weaponry are quite substantial when taken stage by stage (i.e., when examining attack, injury, and death separately), which is why, for example, impressive-appearing results can be obtained when researchers examine only the last stage — looking solely at the impact of guns on the likelihood of the victim's death — among those attacked or wounded. Guns probably do substantially increase the probability that a wounding will result in

death. The effects of guns, however, are very small when one assesses the overall impact of all their effects, both positive and negative, at all stages of violent incidents. The explanation for this apparent contradiction is simple: gun possession and use have opposite sign effects at the various stages, which largely cancel each other out.

Note also the effect of omitting any direct measure of aggressor motivation. More seriously violent people use more serious weaponry (Kleck 1986), and it seems reasonable to expect that, on average, the intensity of the aggressor's desire to hurt the victim seriously at the moment of attack would also be positively correlated with the presence of serious weaponry. Since aggressor motivation is almost certainly positively associated with the probability of a victim being killed, omitting direct measures of motivation tends to bias the gun coefficients in a positive direction, making gun use seem to have more of a positive effect than it really does. Consequently, the slight apparent net positive effect of guns on the death outcome would be reduced — and could easily disappear altogether — if motivation was properly measured and controlled.

Nevertheless, at this point there does seem to be a slight net effect on the likelihood of the victim's death that may be attributable to guns. It can be tentatively concluded that aggressor possession of guns may slightly increase the net probability of the victim dying in a violent incident, which leads to the expectation that laws effective in reducing gun possession among aggressors in violent incidents could slightly reduce the homicide rate. On the other hand, gun possession among potential victims may deter some aggressors from initiating violent incidents in the first place (Kleck 1988). Any laws that might reduce gun possession among potential victims, including those who are also sometimes aggressors, could thereby encourage assaults. The net impact of these opposite effects on the homicide rate could be positive, negative, or zero, depending on their relative magnitudes. These conclusions help explain the findings of prior research, which indicate that trends in aggregate gun levels has no net effect on trends in homicide rates (Kleck 1984).

Three limitations of the study are important to note. First, it is unclear what response biases may be affecting NCS data. It is possible that a large fraction of gun assaults, even those not involving attack or injury, are remembered just because they involved guns, with many minor nongun assaults going unremembered or unreported. The result would be that an artificially higher fraction of nongun assaults would appear to have resulted in attack, injury, or death relative to gun assaults, making the gun-nongun differences appear smaller than they really are. Second, the NCS and SHR provide data on only a few of the variables that may influence assault outcomes, having no direct measures of assaulters' motives or the strength of their aggressive drives, which increases the possibility of our models being misspecified because of the exclusion of variables associated with both weapon variables and assault outcomes. Finally, our findings are based on violent incidents between strangers. Whether weapons effects are different in violence among nonstrangers is impossible to say.

APPENDIX

Weighting Cases. For NCS cases, the incident weight, which averages about 1,500, was used — each sample case represents about 1,500 cases in the population. For SHR homicides, each case was weighted approximately one. Since the SHRs encompass a virtually complete population, each case is essentially self-representing. However, while SHR homicides are not sampled according to a probability scheme, they are also not quite representative of the entire population of homicides. The vital statistics count of all intentional homicides recorded on death certificates was about 10.2% higher in 1982 than the SHR total (negligent manslaughters excluded and civilian and police justifiable homicides included in both counts). A few homicides get recorded on death certificates but not by the police, while others are recorded by police but not on SHR forms submitted to the FBI. Thus to weight the SHR cases up to the highest known national total calls for a weight of about 1.102. However, we also limited analysis to homicides known to the police as stranger homicides. A large number of homicides do not have a known victim-offender relationship, a problem almost entirely due to the absence of any information concerning offenders in those killings not cleared by the arrest of a suspect. We believe that these cases are disproportionately stranger cases, since the lack of a known relationship between the killer and his or her victim would itself be a major obstacle to police identification of the killer. Therefore, the known stranger homicide count understates the true total. In the 1982 SHR there were 3,721 known stranger homicides and another 5,141 homicides where victim-offender relationship was unknown. Although many — perhaps most — of these "unknown relationship" cases were not stranger cases, anywhere from 3,721 to 8,862 SHR homicides could have been stranger killings. This possibility implies the need for weights anywhere from 1 to 2.3816 (8862/3721) to adjust for such undercoverage. Multiplying times the 1.102 weight gives minimum and maximum weights of 1.102 and 2.625. Both weights were tried in estimation for the victim death analysis, but because homicides are so small a fraction of assaults with injury (only about 1%), the different weights produced only negligible differences in estimates. Results reported here are based on the larger weight. Note that we necessarily assume that stranger homicides known by police to involve strangers are basically similar to stranger cases that police do not know to involve strangers.

Distinguishing Victims and Offenders. Many assaults involve mutual combat, with both parties attacking and defending and both bearing some moral and perhaps even legal responsibility for the violence. It has frequently been argued that the principle distinction between persons identified in NCS violent incidents as victim and offender is that the "victim" in the incident is the one who happened to be interviewed by the NCS interviewer (e.g., Block 1981). For purposes of assessing the impact of weaponry on assault outcomes, it is not essential to know whether the *R* bore some responsibility for the violence and was to some extent an aggressor. Rather, we simply assess the impact of weaponry in the hands of the so-called "offender," regardless of that person's blameworthiness, on the outcome of the event for the so-called "victim." For convenience, we dropped the quotation marks in the text and used the conventional terminology to refer to the participants.

Missing Data. There were few missing data in the NCS samples, so our attacks on victims and victim injury analyses would be little affected by deletion of cases with missing data. However, large numbers of SHR cases have missing data. Listwise deletion would eliminate as much as a third of the sample, potentially

producing serious sample bias in the victim death analysis. A different approach was therefore used. All missing data were recoded to zero for all variables. For each variable where recoding was done, another variable (the "unknown" variable) was created — a dummy indicator variable coded 1 when data were missing on that variable for a given case, 0 otherwise (Cohen & Cohen 1983:281-89). For example, if the weapon type was missing, each weapon dummy would be coded 0, and the unknown weapon used variable would be coded 1 for that case, indicating that weapon type was missing. Thus no cases were deleted because of missing data. The "missing data" variables were included in equations along with the rest of the variables and were retained if their coefficients were significant. Their coefficients reflect whether cases with missing data on a given variable were different regarding the dependent variable, indicating a nonrandom missing data pattern.

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