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Gender and Injury Risk in Incidents of Assaultive Violence

Robert Apel, Laura Dugan and Ráchael Powers

This study investigates the situational characteristics that determine the presence and severity of injury in incidents of assaultive violence. The analysis uses merged data from the National Crime Victimization Survey and the Supplementary Homicide Reports for the years 1992-2008, in order to model the determinants of victim injury. The analysis includes all incidents of attempted or completed, non-sexual assault against victims 12 years of age or older. Injury severity is classified into one of four possible levels: no injury, minor injury, serious injury (requiring doctor, hospital, or emergency room care), and lethal injury. Special attention is given to the way in which gender modifies the influence of situational elements on the presence and degree of victim injury. While the results suggest that the situational determinants of injury are by and large uniform for male and female victims, important gender differences are observed in the salience of relational distance.

Keywords injury; NCVS; SHR; gender; relational distance; heteroscedastic logit model

Introduction

Violent and intentional injuries constitute a substantial public health problem for individual victims (e.g. disability) as well as for their families and

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communities, not to mention the burden placed on society at large with respect to medical costs and lost worker productivity (Committee on Injury Prevention and Control, 1999; Committee on Trauma Research, 1985). Furthermore, these costs are not borne equally across gender lines, as research findings suggest that women are more likely to be injured in assaults, particularly at the hands of a current or former intimate partner, and forced to utilize medical resources as a consequence (Tjaden & Theonnes, 2000a). Understanding the determinants of injury in violent encounters, and how these determinants vary along gender lines, therefore holds considerable promise for minimizing the risk and cost of injury to victims and to society.

In this study, our objective is to assess how victim gender modifies the determinants of injury in violent situations. The findings have implications for perspectives on the degree of gender symmetry or gender asymmetry in the level and severity of injury. We consider differences by victim gender because of its prominence in prior studies of injury. For example, many prior studies are limited to only male offenders or to only female victims, presumably because many authors view the determinants of injury by men and against women as sufficiently different to warrant separate consideration. We begin this study with a review of past studies of violent injury, defining injury broadly to encompass a range of non-lethal and lethal forms. We then turn our attention to the potential role that gender plays as a situational moderator in these studies. After describing the data and analytic strategy for the current study, we summarize the empirical results and discuss their implications for future injury studies.

Injury Risk in Assaultive Encounters

In this section, we review the theoretical and empirical literatures with respect to the determinants of victim injury. Injury is conceptualized to encompass minor injury, serious injury requiring medical attention, and lethal injury. Three broad sets of injury correlates are reviewed——demographic, relational, and situational. Each is considered in turn.

Demographic Correlates of Injury

Expectations concerning the demographic determinants of injury are rooted in traditional theories of criminal violence. Namely, the factors that determine an individual's experience with violence——as an offender or victim——are likely to be the same factors that govern the outcomes of violence. It has been long known that there is considerable homogeneity in populations of victims and offenders (Gottfredson, 1981; Singer, 1981). For example, young people, males, and minorities are generally more prone to violence perpetration, and these same demographic groups are also more prone to violent victimization (for review, see Sampson & Lauritsen, 1994). Theories of criminal behavior

propose that these demographic groups are dispositionally prone to violent behavior for a wide variety of reasons, including weaker informal social controls, deficits in self-control, and more aversive strains, among many others (Agnew, 1992; Gottfredson & Hirschi, 1990; Hirschi, 1969). Theories of criminal victimization propose that these demographic groups are differentially exposed to violent victimization by virtue of lifestyles or routine activities that put them in close contact with other crime-prone persons, in high-risk places and at high-risk times (Cohen & Felson, 1979; Cohen, Kluegel, & Land, 1981; Hindelang, Gottfredson, & Garofalo, 1978).

It can be hypothesized, therefore, that young people, males, and minorities——because of their violence proneness——will be more prone to inflicting injury on their victims in violent encounters. Hypotheses with respect to victims' demographic characteristics are less straightforward. On the one hand, it can be hypothesized that young, male, and minority victims will be more prone to being injured in violent encounters, because they might be viewed as more antagonistic by offenders, by virtue of the fact that they themselves are violence-prone individuals. On the other hand, it might also be hypothesized that elderly and female victims will be at higher risk of experiencing injury in violent incidents because of their generally greater vulnerability with respect to physical size and strength relative to their attackers (see Felson, 1996).

By and large, the empirical literature confirms that young people, males, and minorities are indeed most likely to be the offenders and victims of injurious violence with assaultive circumstances (Bachman, Saltzman, Thompson, & Carmody, 2002; Felson, 1996; Felson & Messner, 1996; Hashima & Finkelhor, 1999; Hausman, Spivak, Roeber, & Prothrow-Stith, 1989; Hindelang et al., 1978; Kleck & McElrath, 1991; Tark & Kleck, 2004). Yet there are notable qualifications to these generalities. For one, female victims of intimate partner violence appear to be more susceptible to injury than male victims of intimate partner violence (Sorenson, Upchurch, & Shen, 1996; Thompson & Kingree, 2006; Tjaden & Theonnes, 2000b), so the foregoing associations tend to hold only when different kinds of assault incidents are pooled together. Secondly, when lethal outcomes are the focus of study (compared to serious but nonlethal assaults), older victims tend to be at higher risk of lethal injury than younger victims (Chu & Kraus, 2004; Weaver et al., 2004), confirming the relevance of age-related vulnerability to injury in serious assaults. Thirdly, the foregoing generalities are most defensible at the bivariate level, as correlations tend to weaken and oftentimes disappear in multivariate models in which other demographic and situational characteristics are controlled (Nielsen, Martinez, & Rosenfeld, 2005; Skogan & Block, 1983).

Relational Correlates of Injury

An additional set of hypotheses concern the victim-offender relationship as a determinant of injury. Black (1976, p. 40) defines relational distance as "the

degree to which [individuals] participate in one another's lives." Relational distance is an important indication of social distance, and can be defined by the nature of family ties or personal associations. The relational distance between two or more disputants can be conceived as a continuum, ranging from intimate partners to strangers. Close relational distance between individuals tends to imply more frequent and intimate contact, as well as accessibility to each other's personal spaces. Black (1976, 1983) also suggests that formal, legal channels are largely unavailable to redress grievances between disputants who are relationally close, which can motivate them to resort to "self-help" as a form of conflict resolution.[1]

Due in part to the existence of a prior and potentially long-standing relationship between antagonists, therefore, it can be inferred that disputes between family members, and especially between intimate partners, will be governed by a stronger control motive (see Felson & Messner, 2000). An implication is that strangers are expected to rely least on the use of injury to resolve disputes, whereas closer relational distance will motivate assailants to injure their victims, and to do so more severely. Consistent with these theoretical expectations, virtually all injury studies demonstrate a generally inverse correlation between relational distance and the probability of injury, as well as the severity of injury (Bachman & Carmody, 1994; Bachman et al., 2002; Chu & Kraus, 2004; Felson & Messner, 1996; Heller, Ehrlich, & Lester, 1983; Hindelang et al., 1978; Tark & Kleck, 2004; Weaver et al., 2004; Zimring, 1972). Specifically, intimates or family members, close friends, and casual acquaintances are far more likely to inflict at least minor injury in violent encounters compared to strangers. Intimates, family members, and casual acquaintances are particularly likely to inflict serious injury or death.

Situational Correlates of Injury

Expectations concerning situational decision-making can be derived from a variety of interactionist perspectives (see Kennedy & Forde, 1999; Luckenbill, 1977; Tedeschi & Felson, 1994). A notable similarity of such perspectives is the presumption that violent situations have emergent properties that influence outcomes independently of the characteristics and backgrounds (i.e. the dispositions) of the involved individuals. A distinguishing characteristic of many situational perspectives is the implicit contention that injurious or lethal intent is often not formed in anticipation of a violent confrontation, but rather

1. Relational distance also tends to covary with other structural features of interpersonal disputes, namely status equality, functional interdependence, and immobility (see Black, 1990), which can independently exacerbate the use of injurious violence against intimate partners. Status equality refers to the relatively equal social standing of disputants. Functional interdependence refers to the presence of long-standing emotional or familial ties that bind disputants together. Immobility refers to the fact that disputants share social and physical space and are therefore unable to completely avoid one another.

emerges during the course of the transaction. An *a priori* assumption, then, is that many (if not most) assaults are potentially injurious, and that the likelihood of injury in any particular assault can be influenced by such situational contingencies as the setting (e.g. timing, location, presence of bystanders), the victim's behavior (e.g. compliance vs. resistance, self-protection), and the presence and instrumentality of weapons (not to mention the offender's proficiency with a brandished weapon), among other factors (see Block, 1977; Harries, 1989, 1997).

Of special interest in this study is the possible role of three situational contingencies: multiple victims, multiple offenders, and offender weapon use. Multiple victims and/or multiple offenders represent third parties that have the potential to influence injury outcomes. Felson (1993) proposes that third parties can serve as guardians in some types of violence (predatory violence), but as antagonists in other kinds of violence (dispute-related violence). In the former case, the presence of third parties can deter the use of injurious violence, as they serve as witnesses who can notify legal authorities and identify perpetrators. In the latter case, the presence of third parties can legitimize the use of injurious violence as they "take sides" in a dispute, or as they constitute an audience in front of whom would-be offenders attempt to "save face" (Felson, 1993).

The presence of multiple victims or offenders can thus have divergent effects on injury outcomes. On one hand, nothing is known empirically about how the focal victim fares when there are other individuals victimized in the same incident. On the other hand, the empirical findings with respect to group offending are inconclusive. For example, several studies find that numerical superiority of offenders in assaultive violence is associated with increased risk of injury and death to victims (Chu & Kraus, 2004; Felson & Messner, 1996; Hindelang et al., 1978; Tark & Kleck, 2004), although this correlation may not hold when other situational variables are controlled (Kleck & McElrath, 1991; Nielsen et al., 2005).

The salience of weapon use by assailants also has divergent theoretical expectations. The predominant perspectives differ principally in their assumptions about the degree of injurious or lethal intent implied by weapon possession in violent confrontations (for review, see Cook, 1991; Kleck & McElrath, 1991). Wolfgang (1958), for example, asserts that an offender's weapon choice is an indication of his or her underlying intent, so that an individual entering a violent confrontation in the possession of a gun has lethal intent. Zimring (1968, 1972), on the other hand, classifies a majority of gun homicides in Chicago as ambiguously motivated, meaning that victim death does not result from an offender's deliberate, single-minded intention to kill at all costs. He concludes that most homicides arise from "weapon instrumentality" (his term) rather than from "assassin mentality" (our term). That is, lethality is closely associated with the deadliness of the particular weapon used in the attack as opposed to strictly homicidal intent on the part of the offender (for additional evidence, see Phillips & Maume, 2007; Wells & Horney, 2002).

Empirically, weapons are much more likely to result in at least minor injury when present in violent confrontations and guns, in particular, are closely linked to serious injury (e.g. injury requiring medical care) and lethal injury (Bachman & Carmody, 1994; Chu & Kraus, 2004; Felson & Messner, 1996; Felson & Steadman, 1983; Hindelang et al., 1978; Nielsen et al., 2005; Tark & Kleck, 2004; Weaver et al., 2004; Wells & Horney, 2002; Zimring, 1968). Intimate partners may be especially likely to inflict injury upon their victims when weapons are present (Bachman et al., 2002).[2] Among victims attacked by strangers, on the other hand, Kleck and McElrath (1991) find that guns are inversely associated with the likelihood of injury, while knives and other weapons are positively associated with injury (see also Skogan & Block, 1983). However, when they pool lethal assaults with injurious, non-lethal assaults, they find that the use of guns and knives is positively associated with victim death.

Gender Moderation of Injury Determinants

One question that remains conspicuously unanswered by the injury research tradition concerns the degree to which the situational determinants of injury are general or gender specific. Simply put, are gender-specific injury models necessary for theory and research? A casual reading of the literature leaves the distinct impression that they are. For example, empirical studies tend to be limited to the use of injurious violence by male offenders (Felson & Steadman, 1983; Wells & Horney, 2002), or the study of injury incurred by female victims (Bachman & Carmody, 1994; Bachman et al., 2002; Thompson, Saltzman, & Johnson, 2001, 2003; Tjaden & Theonnes, 2000b). Presumably, this gender specificity arises because scholars view the determinants of injury by male and female offenders, or to male and female victims, as sufficiently different to warrant separate consideration. However, this presumption, if we have characterized it accurately, is never clearly articulated nor properly tested. In fact, in no existing study (of which we are aware) are gender differences in the determinants of injury explicitly compared.

Empirically, there are clear gender differences worthy of consideration. Research has long shown that victims of family violence, intimate partner violence, and rape or sexual assault are overwhelmingly female. Furthermore, women appear to be especially vulnerable to injury in incidents of intimate assault (Bachman & Carmody, 1994; Bachman et al., 2002; Tjaden & Theonnes, 2000b). Meta-analytic reviews of laboratory and survey studies demonstrate that men are more aggressive than women (Bettencourt & Miller, 1996; Eagly & Steffen, 1986), and that women are more likely to sustain injury than men,

2. This assertion may be true only for assaultive violence, however, as indicated by studies which include broader offense types than assault. Offender gun use in robbery appears to lower injury risk, presumably because of the overwhelming coercive power that such possession entails (Tark & Kleck, 2004). Similarly, the risk of injury tends to be inversely related to the lethality of the weapon used in incidents of sexual assault (Skogan & Block, 1983).

including injury requiring medical treatment, at the hands of their heterosexual partners, although effect sizes tend to be quite small (Archer, 2000, 2002). Yet findings such as these speak only to gender differences in the prevalence of violence and injury; they do not speak to whether gender moderates the situational determinants of injury outcomes. In a similar fashion, most of the theorizing about gender concerns differences in the dispositional determinants of violent victimization (for review, see Felson, 2002; Kruttschnitt, 1996), as opposed to gender differences in the situational determinants of injury *per se*.

There are compelling reasons to anticipate that victim gender exerts no moderating influence on the situational determinants of violent injury. According to one such view, the victim's gender is a proxy for physical susceptibility to injury, while the assailant's gender is a proxy for the propensity to use injurious violence. Simply put, "big people hit little people" irrespective of the circumstances surrounding the use of violence (Felson, 1996, 2002). The fact that intimate partners produce higher incidence of injury against female victims is due to the fact that the offenders in these encounters are overwhelmingly men, and men have greater physical capacity than women for inflicting injury, all else equal. Victim gender is therefore an incidental rather than precipitating factor for injury in violent disputes. According to this view, once differences in physical susceptibility to injury (e.g. size, weight, strength) are controlled, any gender differences in injury likelihood should disappear. A related implication——the primary interest of this study——is that the situational determinants of injury should be common to both male and female victims. In other words, following estimation of gender-specific injury models, tests of gender differences in the influence of situational characteristics on injury severity should yield no such differences.

By the same token, there are other reasons to expect that gender might indeed modify the influence of situational variables on violent injury, providing justification for gender-specific theories and injury models. According to some perspectives, the motivation for violence against women qualitatively differs from the motivation for violence against men. Namely, female violent victimization is motivated by a desire for control, broadly defined. For example, violence targeted at women arises in a sociohistorical context of patriarchy (Dobash & Dobash, 1979; Martin, 1976) or in disputes stemming from efforts to exert reproductive control over women (Daly, Wilson, & Weghorst, 1982; Smuts, 1992). This implies that men use injurious violence as a form of control whereas women, as the objects of societal control, use violence reactively and protectively. Theoretically, the motivation for violence and injury is therefore asymmetric.

From this perspective, tests of gender differences in the influence of situational characteristics on injury severity should demonstrate qualitative differences for female and male victims. For example, the possibility of motivational asymmetry suggests that one injury determinant that could vary across gender in predictable ways is the victim-offender relationship. Male intimate partners should be more likely to resort to the use of injurious violence

as a means of manipulating and controlling the behavior of their spouses and girlfriends. In other words, the behavior of a male offender toward his female intimate partner will be governed by a stronger control motive than the behavior of a female offender toward her male intimate partner, resulting in higher rates of all forms of injury in the former kinds of disputes.

Yet a third possibility is that both of these assertions are true to varying degrees (Johnson, 1995; Johnson & Ferraro, 2000). In other words, there is neither complete gender symmetry nor complete gender asymmetry in the determinants of injury. Gender symmetry will be observed for some situational variables with respect to some injury outcomes, whereas gender asymmetry will be observed for others. There are two distinct possibilities that come immediately to mind. First, some situational determinants of injury will differ in degree rather than in kind for female and male victims of violence. This suggests that gender-specific injury models might be necessary for some (but not all) situational variables. For example, disputes involving intimate partners will be more likely than disputes involving relationally distant individuals to result in victim injury, irrespective of victim gender. However, intimate disputes will be especially likely to lead to injury among female victims compared to male victims.

Second, the situational determinants of injury will be gender neutral for some injury outcomes, but gender specific for other injury outcomes that differ in their severity. This suggests that gender-specific injury models might be necessary at certain points along the injury continuum, but not along the whole continuum. For example, intimate partners might be equally likely to lethally injure male and female victims, but differ in measurable ways in their proclivity to use sub-lethal forms of injury. Namely, because many sub-lethal disputes between intimates involve "common couple violence" (Johnson, 1995), and many male intimate partners often resort to violence as a form of control (Felson & Messner, 2000), there will be gender asymmetry in sub-lethal injury, but gender symmetry in lethal injury, when the offender is an intimate partner.[3]

Motivation for the Present Study

Our interest in this study centers on the degree of injury incurred by victims in violent encounters, and in the way that victim gender modifies the determinants of injury. We conceptualize non-lethal and lethal injury from a perspective that locates them at different points on a common underlying continuum. For such a study, it is desirable to have a range of violent incidents that cover

3. Other hypotheses concerning gender symmetry/asymmetry in the situational determinants of injury are possible to make, but would be less strongly grounded in existing theories. We thus focus our attention here on relational distance.

the full injury continuum, as the same situational factor may have different predictive power at different points along the injury continuum. The possibility of such "non-linearity" necessitates as broad a conceptualization of the injury outcome as possible and the ability to distinguish various levels of injury severity.

In our study, we employ a method inspired by Kleck and McElrath (1991) as well as Felson and Messner (1996) by pooling incidents of assaultive violence from two data sources——the National Crime Victimization Survey (NCVS) and the Supplementary Homicide Reports (SHR). Our universe of assaultive incidents is broader than these two earlier studies in one respect, because we include non-injured victims (compare to Felson & Messner, 1996) as well as all victim-offender relationships (compare to Kleck & McElrath, 1991). We also select SHR incidents that cover the same period as the NCVS incidents, rather than limiting our attention to a single year.

Yet our universe of incidents is narrower than these two earlier studies in other respects, because we limit our attention to incidents of non-sexual assault. From a practical standpoint, this is because victim gender is a key moderating variable in the empirical models. Quite simply, only a handful of males were victims of rape or sexual assault in the NCVS during the years under study. This eliminates the possibility of estimating gender-specific models of sexual assault in order to compare the determinants of injury in such cases. From a conceptual standpoint, our interest is in the kinds of incidents encompassing "pure assaults" as defined by Felson and Messner (1996), that do not involve other felonious circumstances such as robbery, in which injury outcomes are likely to be governed by different situational dynamics.

Our study thus builds on previous efforts to understand the situational precursors of violent injury, but represents a departure from these efforts. First, we use the most recent data available from the NCVS and the SHR, pooling incidents during the 17-year period spanning 1992-2008. This is important in light of the redesign efforts undertaken in the NCVS beginning in 1992, especially where estimates of violence against women are concerned (Bachman & Taylor, 1994), and to which we return below. Second, we turn our attention to all incidents of non-sexual assault in order to conceptualize level of injury in violent encounters as a four-category response variable: no injury, minor (non-lethal) injury, serious (non-lethal) injury, and lethal injury. We then use a set of logistic regression models to examine what incident-level characteristics predict the presence and severity of injury in violent encounters (see Kleck & McElrath, 1991). Third, we estimate our injury models separately by the gender of the victim, and then perform proper statistical tests for differences in the influence of situational characteristics on the level of injury. Our goal is to assess the degree to which incident characteristics are uniquely predictive of injury severity depending on the victim's gender.

Data and Methods

We merge incidents of non-lethal violence from the NCVS with incidents of lethal violence from the SHR for the years 1992-2008, the most recent years available at the time of this analysis. Both data sets were obtained from the National Archive of Criminal Justice Data, housed in the Inter-University Consortium for Political and Social Research at the University of Michigan.

The first data set used——the NCVS——is a household-based survey designed to document the victimization experiences of all non-institutionalized civilians age 12 or older. Begun in 1973, the survey employs a rotating panel design that entails interviewing age-eligible respondents in sampled households every six months for a total of seven interviews.[4] Approximately 50,000 households are interviewed each year, providing estimates of victimization based on about 100,000 individuals. The survey inquires about incidents of victimization in the preceding six months, and in instances where respondents report victimization, a lengthy follow-up module gathers detailed information on the circumstances surrounding the incident. In 1992, a redesigned version of the NCVS instrument was introduced, which is especially important considering our interest in gender because it incorporated improvements in screening questions that produced enhanced estimates of domestic violence (Bachman & Taylor, 1994). From the NCVS data, we limit our attention to incidents of simple and aggravated assault. We do not explicitly exclude verbal assaults, threatened assaults, and attempted assaults, nor do we exclude "series" crimes.[5] These selection criteria leave us with 35,615 violent, non-lethal incidents.

The second data set employed——the SHR——is a supplement to the Federal Bureau of Investigation's Uniform Crime Reporting Program. Based on monthly reports of criminal homicide that are compiled and voluntarily submitted by local law enforcement agencies, the SHR provides incident-level information on location, weapon use, crime circumstances, victim and perpetrator demographics, and the victim-offender relationship. The data provide coverage of approximately 92% of all homicides. From the SHR data, we limit attention to homicidal incidents that involve assaultive circumstances (e.g. lover's triangles, brawls, arguments, gang killings). We retain lethal incidents involving more than one victim, but randomly select a single individual to serve as the "focal victim" to ensure compatibility with the NCVS. To create further comparability with the NCVS, we exclude all homicides in which the victim was younger than 12 years of age, those classified as negligent manslaughter or jus-

4. NCVS staff treat the first interview of each newly sampled household as a "bounding interview" and exclude it from the data. Thus for all intents and purposes each household is interviewed six times in three years.

5. "Series" crimes are repeat victimizations that are of the same type and that occur six or more times during the six-month reference period. For series crimes, only the details of the most recent incident are reported by the victim, as victims often have difficulty distinguishing the characteristics of discrete incidents. Series crimes constitute only 5% of the NCVS incidents chosen for inclusion in the analysis.

tifiable homicide, and those that occurred outside the continental United States (see Felson & Messner, 1996, for similar exclusions). In all, there are 97,166 incidents of lethal violence available for analysis from the SHR.

To facilitate statistical analysis using the merged NCVS-SHR data, we employ normed sampling weights. We use the (data-year) incident weights provided in the NCVS and assign a weight of 1.0 to each of the homicide incidents from the SHR prior to norming. The universe of incidents to which we generalize encompasses all threatened, attempted, or completed incidents——non-lethal and lethal——of non-sexual assault against victims 12 years of age or older between 1992 and 2008.

Level of Injury

The response variable of interest——*Victim Injury*——is a polytomous variable that identifies the degree of injury that a victim experiences in each violent incident. In incidents of non-lethal violence from the NCVS, the nature of the injury, if any, is reported by the victim (or the victim's proxy) and includes such injuries as cuts and bruises, broken bones, loss of consciousness, and knife or gunshot wounds. The victim also reports whether she or he was injured to an extent that medical care was necessary, including treatment at the scene of the attack, at home or at a friend's house, in a doctor's office or health clinic, or in an emergency room or hospital. If treatment was delivered at a hospital, the victim reports the duration of his or her stay. We classify all SHR incidents as resulting in the same level of injury——lethal injury or death. Our scale of victim injury employs the following coding rules:

Victim injury
- = 0 if no injury is reported (no injury);
- = 1 if the victim reports an injury that required no medical attention in a doctor's office, hospital, or emergency room (minor injury);
- = 2 if the victim reports an injury that required a visit to a doctor's office, hospital, or emergency room (serious injury);
- = 3 if the victim was killed (lethal injury).

A higher value on this variable thus implies that the victim suffered more severe injury as a consequence of the encounter.[6]

6. Note that our non-lethal injury coding scheme departs from that used by NCVS staff. The NCVS classifies as serious injuries: (1) all completed rapes; (2) all incidents that result in gunshot or knife wounds, broken bones, loss of teeth, internal injuries, or loss of consciousness; and (3) all injuries that require two or more days of hospitalization.

Table 1 Distribution of the level of injury in incidents of violence, 1992-2008

	Unweighted estimates		Sample-weighted estimates		
Injury index	*f*	%	*f*	%	Population-weighted estimates
0 No injury	26,167	20.5	100,599	75.8	83,707,523
1 Minor non-lethal injury	6,923	5.2	26,151	19.7	21,759,890
2 Serious non-lethal injury	1,525	1.1	5,915	4.5	4,921,497
3 Lethal injury	97,166	73.2	117	0.1	97,166
Total	132,781	100.0	132,781	100.1	110,486,076

Note. The sample-weighted estimates use normed sampling weights which sum to the sample size. The population-weighted estimates use the raw sampling weights which sum to the population but maintain the same proportional representation as the normed sampling weights. Percentages do not necessarily sum perfectly to 100 because of rounding error.

The distribution of injury is provided in Table 1. Several estimates are shown. The unweighted estimates show that, proportionally, 73% of our observations are from the SHR. The sample-weighted estimates, on the other hand, adjust for the fact that the NCVS incidents are a sample of all violent, non-lethal assaults while the SHR incidents represent virtually the entire population of all lethally violent assaults. By our definition of injury, 24% of all acts of assaultive violence result in some kind of injury, most of which (81%) are minor and less than one-half percent of which (0.4%) are lethal. Weighting up to the population, our data encompass 110.5 million total incidents of assaultive violence between 1992 and 2008, with about 26.8 million incidents of injurious violence during the 17-year span (or almost 1.6 million per year).

Other Incident Characteristics

In order to model the determinants of the presence and severity of injury, we include measures of victim and offender demographics that are available in both the NCVS and SHR. First, we include a number of measures of the sociodemographic characteristics of victims and offenders (where known). These include dummy variables for victim gender, race/ethnicity[7] (White, African-American, Native American, Asian or Pacific Islander), and age (12-19, 20-29, 30-39, 40-49, 50 or older). For offenders, we include dummy indicators for gender, race (White, African-American, other), and age (under 15, 15-20, 21-29, 30 or older).

Second, we measure relational distance, which summarizes the nature of the relationship between the victim and offender. In order to capture this relationship, we construct a set of dummy indicators for the following relationship types: (1) spouse or ex-spouse, including a common-law spouse; (2) non-married intimate partner, including a boyfriend or girlfriend as well as an ex-boyfriend or ex-girlfriend; (3) immediate family member, including a parent or step-parent, sibling, or child; (4) non-immediate family member, including an in-law or "other" relative; (5) close acquaintance, including a friend or ex-friend, schoolmate, roommate, or neighbor; (6) distant acquaintance, including a work associate or "other" known offender; and (7) stranger. Rather than exclude these individuals outright, we also include an eighth, residual category for victims who are missing data on relational distance (they do, after all, contribute valid data to other situational characteristics). In instances where multiple offenders are present, the relational distance indicators are not mutually exclusive.

7. Beginning with the 2003 survey, the NCVS adopted an enhanced coding scheme that allowed victims to self-identify multiple racial/ethnic categories. For these years, we coded race in a non-mutually exclusive manner, allowing respondents to claim affiliation with multiple racial groups. We included a separate dummy variable flagging these respondents in the empirical models. Only a small proportion of our NCVS victims (3.2%) identify themselves as multiracial.

Third and finally, we are able to control for three additional incident circumstances that are measurable in both the NCVS and SHR. These include binary indicators for multiple victims, multiple offenders, and weapon use (gun, knife, blunt object, other weapon, no weapon). For any individuals missing information on the aforementioned variables, we impute values of "0" for the original variable and then flag these cases with a set of dummy indicators that are also included in the empirical models. We do, however, evaluate the sensitivity of the results to the way in which we treat missing cases. Descriptive statistics on all variables (including the percentage of missing cases) are provided in Appendix A.

Analytic Plan

Our analytic strategy entails the estimation of a sequence of three logistic regression models, an approach inspired by Kleck and McElrath (1991) and Felson and Messner (1996). We conceptualize injury as a continuum with identifiable thresholds based on the severity of injury incurred by the victim. First, we estimate the unconditional probability that the victim receives any injury as a result of the encounter:

Model A: Pr(Minor or Serious or Lethal Injury vs. No Injury)

Second, we restrict our attention to injured victims (Victim Injury $\geqslant 1$) and estimate the conditional probability that the victim is either seriously injured or killed given at least minor injury:

Model B: Pr(Serious or Lethal Injury vs. Minor Injury)

Third, we limit the sample to incidents in which the victim is at least seriously injured (Victim Injury $\geqslant 2$) and estimate the conditional probability that he or she is killed given at least serious injury:

Model C: Pr(Lethal Injury vs. Serious Injury)

With these sequential logit models, therefore, we intend to examine the factors which determine whether the type of injury incurred by victims crosses the threshold to the next highest level of severity. An advantage of this approach is that we can estimate the models separately by victim gender, and then formally assess differences in the predictive power of characteristics of victims, offenders, and situations. The most straightforward way to conduct such comparisons is by way of a test for the equality of coefficients across maximum likelihood models estimated from independent samples, á la Brame, Paternoster, Mazerolle, and Piquero (1998). However, Allison (1999) points out that the results of such tests can be seriously distorted in binary response models when the residual variance differs across groups. Specifically, in

contrast to linear models, unequal residual variance in binary response models poses a problem of inconsistency rather than just inefficiency. In other words, artifactual gender differences may be detected (type I errors) and true gender differences may go undetected (type II errors) because of heteroscedasticity. In light of these potential pitfalls, we supplement our logistic regression models with heteroscedastic logit models in order to test cross-group coefficient differences.[8,9]

Results

In Table 2, we provide the multivariate results from three sequential logit models of injury in assault incidents. The models shown are for any injury (column A), serious or lethal injury given at least minor injury (column B), and lethal injury given at least serious injury (column C). The corresponding multinomial logit model is provided in Appendix B.

We observe an inverse association between relational distance and injury in the logit coefficients headed by column A (the reference category is stranger victimization). Individuals victimized by married or unmarried intimate partners experience the highest risk of injury, while individuals victimized by strangers are least likely to suffer any injury (all of the relational distance coefficients are positive). For clarity, the odds ratio for injury by spouses or ex-spouses is 4.3 ($e^{1.458} = 4.297$), which signifies that the odds of injury at the hands of a spouse are over three times the odds of injury experienced at the hands of a stranger.[10] This conforms to virtually all prior injury studies, and in fact we observe a fairly linear (inverse) relationship between relational distance and injury in our merged NCVS-SHR data. Among individuals who receive

8. The heteroscedastic logit model is in the larger class of heterogeneous choice models (see Alvarez & Brehm, 1995). To estimate these models, we rely on the Stata protocol "oglm" (Williams, 2006). Interested readers may consult Williams (2009) for a recent application.

9. We also estimate a variety of other statistical models for sensitivity purposes. First, we estimate a model designed to take into account the fact that our sequential logit models are censored at each subsequent step, where the censoring is determined by the level of injury incurred by the victim. These are sample selection models in which a function of the fitted probabilities from the first step (the inverse Mills ratio) is included as a covariate in subsequent steps. While the model predicting at least serious injury (Model B) qualitatively differs (e.g. the only significant correlates of at least serious injury are African-American offenders and adolescent victims), the model predicting lethal injury (Model C) yields findings that are very similar to those reported in Table 2. In our case, however, this approach is severely limited by the absence of exclusion restrictions, which can yield biases that are worse than models without the selection correction. Second, we estimate a multivariate probit model, which models the sequential injury outcomes simultaneously. The results were substantially similar to the sequential logit models. Third and finally, we estimate multinomial logistic regression, which models the determinants of injury across all levels and also provides contrasts of predictors by injury level. We provide results from the multinomial logit model for all respondents in Appendix B. The multinomial logit models produce qualitatively similar results to the sequential logit models.

10. Subtracting one from an odds ratio and multiplying by 100 gives the percentage increase (decrease) in the odds of injury given a unit increase in the regressor. So for example, an odds ratio of 4.3 implies that the odds of injury at the hands of a spouse or ex-spouse are 330% higher than the odds of injury at the hands of a stranger.

Table 2 Sequential logistic regression models of injury severity

Independent variable	Model A: minor, serious, lethal vs. none	Model B: serious, lethal vs. minor	Model C: lethal vs. serious
Relational distance			
Spouse/ex-spouse	1.458 (.065)***	−0.463 (.146)***	2.231 (.414)***
Boy/girlfriend	1.482 (.063)***	−0.246 (.136)	1.731 (.358)***
Immediate family	1.098 (.073)***	−0.438 (.173)*	1.113 (.637)
Non-immediate family	0.483 (.095)***	0.122 (.201)	1.815 (.305)***
Close acquaintance	0.319 (.045)***	−0.378 (.104)***	0.669 (.362)
Distant acquaintance	0.102 (.048)*	−0.172 (.111)	2.879 (.239)***
Situational characteristics			
Multiple victims	0.199 (.040)***	−0.033 (.086)	−2.571 (.345)***
Multiple offenders	0.265 (.042)***	0.296 (.091)***	−1.476 (.265)***
Had gun	−0.687 (.065)***	0.712 (.128)***	4.248 (.178)***
Had knife	0.018 (.057)	0.813 (.106)***	1.869 (.255)***
Had blunt object	0.536 (.062)***	0.580 (.116)***	0.005 (.305)
Had other weapon	0.629 (.057)***	0.541 (.105)***	−0.411 (.458)
Victim demographics			
Male	−0.212 (.076)**	−0.021 (.165)	1.763 (.350)***
African-American	0.188 (.048)***	0.240 (.103)*	0.236 (.257)
Native American	0.230 (.099)*	0.367 (.190)	−0.785 (.417)
Asian/Pacific Islander	−0.052 (.105)	0.221 (.214)	0.812 (.446)
Teens (12-19)	0.435 (.054)***	−0.426 (.127)***	−1.199 (.326)***
Twenties (20-29)	0.271 (.052)***	−0.120 (.116)	−0.636 (.301)*
Thirties (30-39)	0.050 (.053)	0.139 (.120)	−0.135 (.274)

Table 2 (*Continued*)

Independent variable	Model A: minor, serious, lethal vs. none	Model B: serious, lethal vs. minor	Model C: lethal vs. serious
Forties (40-49)	0.010 (.057)	0.099 (.130)	0.366 (.255)
Offender demographics			
Male	−0.129 (.048)**	0.055 (.115)	0.469 (.345)
African-American	0.082 (.039)*	0.315 (.089)***	−0.337 (.256)
Other race	0.066 (.045)	0.150 (.100)	−1.319 (.319)***
Adolescent (⩽14)	−0.007 (.051)	−0.955 (.153)***	−0.487 (.547)
Teenager (15-20)	0.020 (.041)	−0.062 (.096)	0.796 (.247)***
Young adult (21-29)	0.100 (.037)**	−0.029 (.083)	0.381 (.246)
Male victim × male offender	0.288 (.088)***	0.273 (.201)	−0.523 (.469)
Pseudo R^2	.0568	.0730	.4229

Note. All estimates are weighted. Coefficients and standard errors are provided. The models also include a constant and dummy indicators for missing data (not shown).
*$p < .05$, **$p < .01$, ***$p < .001$ (two-tailed tests).

some kind of injury (column B), on the other hand, serious or lethal injury is most likely to be incurred by strangers, as almost all of the relational distance coefficients are negative and several are statistically significant. The estimates in column C, which condition on serious or lethal injury, indicate that strangers are among the least likely to kill their victims, as the relational distance coefficients are once again positive. The odds of lethal injury are high at the hands of an intimate partner or family member, and are unusually high at the hands of a distant acquaintance.

This pattern of results suggests that relational distance exerts one relationship with injury at the endpoints of the injury continuum, but a different effect in the middle of the continuum. Intimate partners are the most likely to injure their victims, and their injuries tend to be concentrated at the minor end as well as the lethal end of the injury continuum. Strangers are the least likely to injure their victims, but when they do inflict injury, they tend to injure victims seriously enough to require professional medical attention but stop short of lethality. We return to this set of findings for further discussion in a later section.

Among the situational characteristics, at the low end of the injury continuum, individuals victimized in a group are significantly more likely to be injured (Model A), but their injuries tend to be minor or serious (Models B and C). Similarly, group offending is associated with a significantly higher risk of injury (Model A), but multiple offenders stop short of inflicting lethal injury; their injuries tend to be serious rather than minor or lethal (Models B and C). These findings confirm the antagonistic role that third parties have in interpersonal disputes that are sub-lethal. Single victims and single offenders, on the other hand, are most likely to be involved in lethal encounters, suggesting that third-party intervention deters offenders from lethal violence.

Weapon use emerges as a significant determinant of injury at several points along the injury continuum. Offenders with guns are significantly less likely to inflict injury (Model A), but when they do, the injury is more likely to be serious and especially deadly (Models B and C). Victims facing knife-wielding offenders are neither more nor less likely to suffer injury (Model A), but injured victims are particularly susceptible to serious and lethal injuries (Models B and C), similar to victims facing gun-wielding offenders. Offenders using blunt objects or other weapons have a significantly higher probability of inflicting any injury (Model A), and that injury is far more likely to be minor or serious rather than lethal (Models B and C). Generally, among weapon-related incidents, there is an inverse correlation between the lethality of the weapon and the risk of any injury (Model A)——the least lethal weapons (blunt objects, other weapons) tend to result in at least minor injury. At the other extreme, moreover, there is a clear positive correlation between the lethality of the weapon and the risk of a lethal outcome (Model C)——the most lethal weapons (guns, knives) tend to result in death. This pattern implies an unusual combination of "assassin mentality" and "weapon instrumentality" in assaultive confrontations, but at different locations on the injury continuum.

Because the gender of the victim and offender are included as a product term, we return to a description of the findings at the end of this section. African-American victims are likely to experience a more severe injury outcome in two of the three models considered; that is, they are more likely than their White counterparts to be injured and at least seriously injured (Models A and B). Native Americans have a significantly higher probability of any injury (Model A), but do not differ from White victims in the probability of serious or lethal injury (Models B and C). Victims who are Asian or Pacific Islander have injury risk comparable to White victims (Model A). Victims in their teens and 20s are also at a significantly higher risk of injury (compared to victims 50+), with victim age exhibiting a generally linear, inverse relationship with any injury (Model A). Conditional on injury, however, younger victims tend to have lower risk of serious and lethal injury (Models B and C). In fact, when lethal injury is compared to serious, non-lethal injury, victim age has a roughly linear and positive relationship with lethality (Model C).

Among the offender demographics, African-American offenders are significantly more likely to inflict injury and then at least serious injury (Models A and B), but are equally likely as White offenders to inflict lethal injury (Model C), once other incident characteristics are controlled. Offenders of an "other race" have an injury risk that is equal to White offenders along most of the injury continuum (Models A and B), but where lethal injury is concerned, they are significantly less likely to inflict lethal injury rather than serious injury (relative to White offenders) (Model C). Young adult offenders (21-29) are significantly more likely than adult offenders (30+) to inflict injury (Model A), while adolescent offenders (14 or younger) are the least likely to inflict at least serious injury (Model B), and teenaged offenders (15-20) are the most likely to kill their victims (Model C).

The fact that African-American and Native American victims, as well as younger victims, suffer disproportionate rates of sub-lethal injury provides some confirmation of the antagonism or "violence proneness" hypothesis. The same is true for African-American offenders, as well as younger offenders. That is, minorities and young people, because they are generally more prone to the use of violence themselves, are consequently more prone to being injured (but not necessarily killed) when they are assaulted. On the other hand, the higher lethality observed among older victims and by younger offenders clearly supports the "vulnerability" hypothesis.

The interpretation of injury risk by gender requires care, because the indicators for gender of the victim and offender are interacted.[11] The "main

11. Interaction terms in logit models are less straightforward to interpret than in linear models. They are complicated by the fact that the sign, magnitude, and significance of the product term do not necessarily correspond directly to the sign, magnitude, and significance of the marginal effect of the interaction. In fact, the product term and marginal effect can actually be of opposite sign. Ai and Norton (2003) present a method of estimating and interpreting the nature of interaction effects in non-linear models (see also Norton, Wang, & Ai, 2004). We apply this method to our data, in order to ensure that we have correctly interpreted the victim-assailant gender interaction term.

effect" of victim gender represents a contrast between incidents of female-on-male assault relative to incidents of female-on-female assault. The "main effect" of offender gender represents a contrast between incidents of male-on-female assault relative to incidents of female-on-female assault. To recover the contrast for male-on-male assault relative to female-on-female assault, the two main effects and interaction effect are to be summed together. The results from Model A suggest an interesting and unexpected pattern. The lowest injury risk is observed in female-on-male assaults, whereas the highest injury risk is observed in male-on-male and female-on-female assaults (the sum of the two main effects and the interaction effect does not significantly differ from zero). Intermediate injury risk is observed in assaults involving a male offender and female victim. In Model B, the risk of serious or lethal injury is indistinguishable by the gender of the victim and offender. In Model C, the risk of lethal injury is highest in incidents involving male victims, especially female-on-male assaults, all else equal.

Interestingly, when the interaction term is omitted, gender of the victim and assailant are unrelated to the likelihood of any injury (Model A). Victim gender is correlated with at least serious injury (Model B) as well as lethal injury (Model C), such that male victims have the most serious injury outcomes. Assailant gender, however, is unrelated to any of the injury outcomes when the interaction is omitted.

Models of Injury Severity by Victim Gender

We are next interested in what situational determinants, if any, distinguish injury among female and male victims of violence. We estimate the same sequential logit models separately for male and female victims, identifying those predictors that are significant in their respective models as well as those that have different predictive efficacy for the two genders. The latter is indicated by the significance of gender-interaction terms in heteroscedastic logit models, in which all interactions are entered jointly. The results from these models are presented in Table 3. Models A, B, and C are defined as before.

With respect to relational distance, in Model A the only discernible pattern among male victims is that known offenders are significantly more likely than strangers to inflict at least minor injury, with a mild tendency for injury risk to be highest at the hands of intimates and family members. For female victims, on the other hand, the overall inverse correlation between relational distance and the probability of injury is preserved——spouses or ex-spouses are by far the most likely to injure their female partners. The results also indicate that the male-female difference in the effect of relational distance on the probability of injury is significant for married and unmarried intimate partners, as well as for close acquaintances. The coefficients demonstrate that the risk of injury at the hands of an intimate partner (compared to a stranger) is qualitatively higher for female victims than it is for male victims. In fact, the logits (log-odds) for

Table 3 Sequential logistic regression models of injury severity, by victim gender

Independent variable	Model A: minor, serious, lethal vs. none		Model B: serious, lethal vs. minor		Model C: lethal vs. serious	
	Male victims	Female victims	Male victims	Female victims	Male victims	Female victims
Relational distance						
Spouse/ex-spouse	0.788***	1.473***	−1.258***	−0.338	3.917***	2.326***
Boy/girlfriend	0.864***	1.532***	−0.537	−0.196	2.418***	2.125***
Immediate family	0.945***	1.122***	−0.411	−0.484*	0.783	2.860***
Non-immediate family	0.662***	0.304*	0.081	0.112	1.788***	2.856***
Close acquaintance	0.448***	0.147*	−0.430***	−0.354*	0.972*	0.154
Distant acquaintance	0.118	0.072	−0.124	−0.289	2.989***	3.796***
Situational characteristics						
Multiple victims	0.226***	0.176**	−0.084	0.066	−3.142***	−1.054***
Multiple offenders	0.398***	0.056	0.276*	0.383*	−1.901***	−1.218***
Had gun	−0.700***	−0.659***	0.846***	0.548**	4.887***	4.022***
Had knife	0.044	0.010	0.841***	0.761***	2.311***	1.616***
Had blunt object	0.557***	0.540***	0.653***	0.395	0.245	−0.159
Had other weapon	0.668***	0.586***	0.435**	0.721***	−0.930	0.392
Victim demographics						
African-American	0.211**	0.162*	0.255	0.182	0.119	0.411
Native American	0.224	0.269	0.638**	0.068	−1.107*	−0.662
Asian/Pacific Islander	0.014	−0.152	0.257	0.186	0.827	0.647
Teens (12-19)	0.534***	0.282***	−0.456**	−0.445*	−1.199**	−1.364*
Twenties (20-29)	0.310***	0.213**	−0.053	−0.252	−0.471	−1.139*

Table 3 (*Continued*)

Independent variable	Model A: minor, serious, lethal vs. none		Model B: serious, lethal vs. minor		Model C: lethal vs. serious	
	Male victims	Female victims	Male victims	Female victims	Male victims	Female victims
Thirties (30-39)	0.093	−0.014	0.163	0.106	−0.221	−0.045
Forties (40-49)	−0.045	0.049	0.178	0.025	0.435	0.351
Offender demographics						
Male	−0.158	−0.224***	0.155	0.012	0.403	1.227***
African-American	0.050	0.127*	0.254*	0.396**	−0.300	−0.139
Other race	0.002	0.161*	0.260*	−0.027	−1.181**	−1.275*
Adolescent (⩽14)	−0.003	−0.015	−0.862***	−1.074***	−0.542	−1.025*
Teenager (15-20)	0.019	0.029	−0.058	−0.040	0.995**	0.357
Young adult (21-29)	0.193***	0.004	−0.148	0.144	0.774**	−0.271

Note. All estimates are weighted. For economy, only coefficients are provided. The models also include a constant and dummy indicators for missing data (not shown). Shaded coefficients denote those that are significantly different between males and females in a heteroscedastic logit model ($p < .05$).
*$p < .05$, **$p < .01$, ***$p < .001$ (two-tailed tests).

females are almost twice the magnitude of the logits for males. Nor is this an artifact of male offenders' greater capacity to inflict injury against physically vulnerable females, as the gender of the assailant is controlled in this model. Casual acquaintances, on the other hand, are significantly more likely to inflict injury on male victims than on female victims. In other words, assailants who are friends (current or former), roommates, schoolmates, or neighbors tend to resort more to the use of injurious violence against male victims.

No gender differences in the influence of relational distance are observed for the probability of serious or lethal injury in Model B. Yet if we consider lethal outcomes (Model C), female victims face higher risk of lethal injury at the hands of family members compared to male victims. Interestingly, intimate partners inflict lethal injury (as opposed to non-lethal but serious injury) at equal rates, irrespective of whether the victim is male or female.

There are notable effects of two additional injury determinants which differ by victim gender. First, multiple offenders are more likely to injure their victim, but this is true only for male victims (Model A). Injury risk among female victims is just as likely when they are attacked by multiple offenders as single offenders. Male victims might thus be perceived as more antagonistic when faced with numerical superiority, and be injured as a consequence. Second, offenders in their 20s are significantly more likely to inflict injury than older (30+) offenders when their victims are male, whereas the injury likelihood is equivalent when their victims are female (Models A and C).

Sensitivity Analyses

A variety of follow-up models were estimated to evaluate the sensitivity of the foregoing findings to the inclusiveness of assault types. First, NCVS "series" crimes were excluded, leaving only assaults in which victims were best able to recall the circumstances surrounding each incident reported. The findings were unchanged.

Second, because NCVS victims can be victimized more than once within and across interviews, there is concern that some observations are not independent of one another. While this does not affect the consistency of the parameter estimates, serial correlation can bias variance estimates downward. This would lead to inflated tests of statistical significance. We therefore randomly selected a single incident from victims who reported multiple victimizations. Compared to Table 2, only three variables were no longer statistically significant——African-American offenders (Model A), young adult offenders (Model A), and African-American victims (Model B). The findings in Table 3 were unchanged.

Third, NCVS threatened assaults and verbal assaults were removed, leaving only attempted and completed assaults in which there is a non-zero likelihood of victim injury. This sensitivity analysis pertains only to Model A, and in most instances, removal of these incidents resulted in non-significance of coefficients that were previously statistically significant. For example, compared to Table 2,

the coefficients conforming to gun use, African or Native American victims, and 21-29 year old offenders were no longer significant. Compared to Table 3, the basic pattern of results was preserved, although the gender difference for young adult offenders was no longer significant. One additional variable also differed significantly between male and female victims——male offender.

Fourth, we evaluated the sensitivity of our findings to how we handled missing data. This is especially important where relational distance is concerned, as 16% of the sample is missing information on the relationship between victim and offender (see Appendix A).[12] In the models in Tables 2 and 3, respondents missing data were treated as a separate group and were flagged with dummy variables. In the sensitivity model, we performed multiple imputation of missing values (see Little & Rubin, 2002; Rubin, 1987).[13] Missing values were imputed using information available on all covariates, including the dependent variable. Five imputed data-sets were created, and the coefficients and standard errors were compiled across the data-sets. Compared to Table 2, there were few differences, mostly due to statistically significant variables that became marginally significant, for example, male victims and offenders (Model A), African-American victims (Model B), and 20-29 year old victims (Model C). Additionally, several variables that were not significant in Table 2 became so when missing cases were imputed, including knife use and 30-39 year old victims in Model A, as well as Native American victims in Model B. Compared to Table 3, the only differences concerned Model C, in which case the gender differences in the coefficients conforming to non-immediate family and young adult offenders were no longer statistically significant.

To summarize, across these various sensitivity specifications, the measures that were generally the most sensitive to model specification were victim race and offender demographics (gender, race, age). Among the results reported in Table 2, therefore, the most stable pertained to relational distance and situational characteristics (multiple victims, multiple offenders, weapon use), as well as victim age and gender. When consideration was given to gender differences, the most stable such differences pertained to relational distance, especially in the model for any injury (Model A).

12. Missing cases for relational distance, victim demographics, multiple victims, and weapon use were distributed fairly evenly across the NCVS and SHR data sets (e.g. SHR 18.8% vs. NCVS 16.1% for relational distance). On the other hand, missing data were much more prevalent for multiple offenders and offender demographics in the SHR compared to the NCVS (e.g. SHR 14.3% vs. NCVS 1.9% for multiple offenders). An anonymous reviewer was concerned that the prevalence of missing data for relational distance in our SHR data set appears to be much lower than in other studies using the SHR. We would note that our attention is limited exclusively to homicides with non-sexual, assaultive circumstances, which have more complete data. For example, when we examine the remaining incidents in the SHR, 38.5% of cases have missing data on relational distance.

13. The user-written Stata program "ice" was employed to impute missing cases (Royston, 2005a, 2005b).

Discussion

One of the more interesting set of findings from this analysis concerns the influence of relational distance on injury risk in violent confrontations, as shown in Table 2. Offenders who have no history or prior relationship with their victims are disproportionately likely to employ no injury or serious injury, but are unlikely to employ minor or lethal injury. This is consistent with the presumption that strangers take pains to avoid injuring their victims, but when injury is deemed necessary to achieve compliance, these assailants use unambiguous, overwhelming force. They have little desire or incentive to kill their victims, however, and only wish to overpower their defenses. It is therefore likely that victim death can be construed as an accidental outcome of confrontations that escalate beyond the original intention of the offender (see Block, 1977; Felson & Messner, 1996).

Offenders who are (or were at one time) intimately related to their victims, on the other hand, are disproportionately likely to employ minor injury but also lethal injury, and are unlikely to employ no injury or serious injury. At first glance, this harmonizes with research findings concerning the control motive in intimate partner violence. One such possibility is that minor and lethal injuries arise in two distinct types of intimate partnerships. Most nonlethal injuries are not serious enough to require hospital or emergency room care, and these types of injuries might be incurred by victims of "common couple violence," or relatively isolated incidents of mutual violence that lack a discernible pattern and tend not to escalate over time (Johnson, 1995; Johnson & Ferraro, 2000). Yet in our merged data, violence by intimates does carry a credible threat of lethality, and lethal injury might be likely to be incurred by victims of "intimate terrorism," which entails a much stronger control motive and can escalate over time from less to more severe forms of injury (Johnson, 1995; Johnson & Ferraro, 2000).

It is also possible that the minor injuries incurred by victims of intimate partner violence actually conceal more serious injuries. This is to say that intimate partners might actually injure their victims more seriously than is apparent in our data, but their victims are fearful of seeking hospital or emergency room care and potentially implicating their partners. The possibility that victim intimidation could deter medical help-seeking among those injured by their intimate partners (or the reporting thereof to interviewers) is entirely consistent with a control motive to some intimate partner violence. Victims of stranger assault, on the contrary, might seek medical attention not necessarily because their injuries are genuinely more serious than injuries received at the hands of an intimate partner, but because the threshold for medical help-seeking might be lower for victims injured at the hands of a stranger.

The analysis also indicates that the strength of the correlation between relational distance and injury severity differs by victim gender. Female victims are substantially more likely than male victims to suffer injury at the hands of

an intimate partner, although this higher risk is limited to minor injury. This cannot be explained by the greater physical capacity of men to produce injurious outcomes, because the gender of the offender is controlled. This finding is also consistent with research on the control motive in intimate relationships, in which males use injury (or the credible threat thereof) as a way to coerce their partners. Yet there appears to be gender equality for serious and lethal forms of injury in these partnerships.

We therefore do find some support for a certain degree of gender asymmetry in the determinants of injury where relational distance is concerned. Specifically, when current or former intimate partners are involved in violence, offenders (especially male offenders) are far less likely to exercise restraint against female victims. Close relational distance therefore exacerbates the probability of female injury, over and above the unusually high risk of injury incurred at the hands of these types of offenders in the first place (as observed in Table 2). That said, the findings in this study do not support the "strong" version of the gender asymmetry perspective, which is that violence against men and women are qualitatively different in terms of process and outcome.

The findings therefore provide support for a mixed perspective that is friendly to both the possibility of gender symmetry as well as gender asymmetry. First, greater intimacy is associated with differences in degree rather than in kind. Intimate offenders produce higher rates of injury, irrespective of whether their victims are male or female. This harmonizes with a gender symmetry perspective. Yet injury rates are qualitatively higher if victims are female than if they are male, which is consistent with a gender asymmetry perspective. Second, greater intimacy appears to matter only at the minor end of the injury continuum. The use of lethal violence (conditional on at least serious injury) at the hands of intimate partners does not differ for female and male victims once other situational contingencies are controlled. This is consistent with a gender symmetry perspective. Yet sub-lethal forms of injury are far more likely when victims are female compared to when they are male, as anticipated by a gender asymmetry perspective.

Interestingly, beyond these differences in the impact of relational distance on the degree of injury, there are few other gender differences that arise consistently. Isolated exceptions do exist for such contingencies as group offending, weapon use, and the gender and age of the assailant. Yet the most notable finding from the analysis of gender-specific models of injury is that the influence of situational characteristics is largely uniform for male and female victims, at least for non-sexual assaults.

Conclusion

In this study, we have investigated the situational determinants of injury in assaultive confrontations and considered how the victim's gender modifies these determinants. While prior researchers have observed that gender-specific

processes may govern injury outcomes, no study has given this formal empirical consideration. While gender is by no means the only moderator of the situational determinants of injury (an observation made by an anonymous reviewer), it has theoretical significance that is not as readily apparent for other potential moderators.

We are convinced that additional research attention should be devoted to the situational dynamics of violent confrontations in order to identify the "mix" of factors that put victims at risk of suffering varying levels of injury and even death. Although offenders and victims each bring their characteristics and backgrounds to violent encounters——their own dispositions, so to speak——situational factors (e.g. weapons, third parties) clearly matter and influence injury risk independent of these backgrounds. Moreover, the nuanced interaction observed between gender and relational distance provides an intriguing avenue for further empirical and theoretical clarification. A consideration of more complex interactions between gender and other situational factors has obvious appeal.

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Appendix A. Descriptive Statistics and Conditional Injury Likelihoods

Independent variable	Descriptive statistics			% Injured	Implied odds ratio
	Full sample (%)	Males (%)	Females (%)		
Relational distance (16.2% missing)					
Spouse/ex-spouse	6.1	1.7	11.7	42.8	3.109
Boy/girlfriend	7.0	2.0	13.5	47.2	3.378
Immediate family	4.1	2.6	6.0	38.8	2.634
Non-immediate family	2.6	2.0	3.4	27.1	1.544
Close acquaintance	25.2	25.1	25.2	25.9	1.452
Distant acquaintance	16.3	16.4	16.1	19.3	0.994
Stranger	35.8	45.3	23.3	19.4	(ref.)
Situational characteristics					
No. of victims (2.0% missing)					
Single victim (ref.)	84.5	83.7	85.4	24.4	(ref.)
Multiple victims	15.5	16.3	14.6	26.1	1.094
No. of offenders (3.6% missing)					
Single offender (ref.)	81.1	78.0	85.2	23.9	(ref.)
Multiple offenders	18.9	22.0	14.8	26.1	1.125
Weapon use (7.5% missing)					
Had gun	7.7	8.9	6.3	14.6	0.527
Had knife	6.7	7.5	5.6	25.5	1.055
Had blunt object	5.0	6.2	3.5	24.7	1.011
Had other weapon	5.5	5.9	5.0	36.5	1.771
Had no weapon (ref.)	69.3	65.9	73.9	24.5	(ref.)
Victim demographics					
Gender (0.0% missing)					
Female (ref.)	42.7	0.0	100.0	27.3	(ref.)
Male	57.3	100.0	0.0	22.0	0.751
Race (0.0% missing)					
White (ref.)	83.4	85.0	81.3	23.5	(ref.)
African-American	13.9	12.2	16.2	28.5	1.298
Native American	1.9	1.8	2.0	29.6	1.369
Asian/Pacific Islander	1.8	1.9	1.7	22.2	0.929
Age (3.7% missing)					
Teens (12-19)	31.6	33.7	28.9	27.6	1.835
Twenties (20-29)	27.2	27.3	27.1	26.1	1.700
Thirties (30-39)	19.0	17.7	20.8	22.0	1.358
Forties (40-49)	13.4	12.7	14.3	20.3	1.226
Fifty or older (50+) (ref.)	8.7	8.6	8.9	17.2	(ref.)

(*Continued*)

Independent variable	Descriptive statistics: Full sample (%)	Males (%)	Females (%)	% Injured	Implied odds ratio
Offender demographics					
Gender (3.2% missing)					
Female (ref.)	17.8	7.0	32.1	26.1	(ref.)
Male	82.2	93.0	67.9	24.1	0.899
Race (4.5% missing)					
White (ref.)	65.2	65.7	64.4	24.4	(ref.)
African-American	25.3	24.1	26.9	25.0	1.033
Other race	11.3	12.2	10.0	25.0	1.033
Age (6.5% missing)					
Adolescent (⩽14)	13.4	13.4	13.3	25.5	1.159
Teenager (15-20)	29.1	31.9	25.4	25.3	1.147
Young adult (21-29)	28.0	29.5	26.1	26.0	1.190
Adult (30+) (ref.)	36.1	32.9	40.3	22.8	(ref.)

Notes. All percentages are weighted. Injury percentages and odds ratios are provided only for cases with non-missing data.

Appendix B. Multinomial Logistic Regression Model of Injury Severity

Independent variable	Minor injury vs. no injury	Serious injury vs. no injury	Lethal injury vs. no injury
Relational distance			
Spouse/ex-spouse	1.540 (.068)***	**1.074 (.135)***	*2.075 (.296)****
Boy/girlfriend	1.518 (.067)***	1.325 (.122)***	***1.917 (.204)****
Immediate family	1.180 (.076)***	**0.690 (.169)***	*1.550 (.398)****
Non-immediate family	0.433 (.107)***	0.655 (.170)***	**1.213 (.273)****
Close acquaintance	0.372 (.049)***	0.052 (.095)	0.214 (.102)*
Distant acquaintance	0.137 (.052)**	−0.070 (.100)	***2.162 (.126)****
Situational characteristics			
Multiple victims	0.203 (.044)***	0.218 (.076)**	***−1.743 (.099)****
Multiple offenders	0.174 (.047)***	**0.627 (.081)***	***−0.585 (.130)****
Had gun	−0.911 (.081)***	**−0.322 (.113)****	***3.312 (.077)****
Had knife	−0.205 (.066)**	**0.645 (.093)***	***1.751 (.138)****
Had blunt object	0.392 (.070)***	**0.982 (.100)***	0.728 (.180)***
Had other weapon	0.507 (.063)***	**1.049 (.094)***	0.511 (.266)
Victim demographics			
Male	−0.203 (.082)*	−0.236 (.155)	***1.958 (.139)****
African-American	0.112 (.053)*	**0.445 (.087)***	***1.319 (.121)****

(*Continued*)

Independent variable	Minor injury vs. no injury	Serious injury vs. no injury	Lethal injury vs. no injury
Native American	0.165 (.109)	0.501 (.178)**	*−0.165 (.177)*
Asian/Pacific Islander	−0.127 (.117)	0.192 (.194)	0.513 (.371)
Teens (12-19)	0.497 (.067)***	**0.121 (.115)**	**−0.031 (.166)**
Twenties (20-29)	0.282 (.065)***	0.211 (.106)*	***0.621 (.145)*****
Thirties (30-39)	0.010 (.066)	0.171 (.107)	0.304 (.149)*
Forties (40-49)	−0.018 (.069)	0.094 (.116)	0.224 (.161)
Offender demographics			
Male	−0.117 (.052)*	−0.139 (.104)	***0.912 (.139)*****
African-American	0.032 (.042)	**0.308 (.077)*****	*−0.097 (.128)*
Other race	0.048 (.049)	0.166 (.092)	***−1.176 (.117)*****
Adolescent (⩽ 14)	0.118 (.054)*	**−0.889 (.146)*****	***−1.349 (.107)*****
Teenager (15-20)	0.045 (.044)	−0.077 (.086)	0.175 (.117)
Young adult (21-29)	0.105 (.041)*	0.067 (.073)	−0.031 (.099)
Male victim × male offender	0.227 (.096)*	0.507 (.184)**	***−0.931 (.214)*****

Notes. $N = 132{,}781$. All estimates are weighted. Coefficients and standard errors are provided. The models also include a constant and dummy indicators for missing data (not shown). Estimates in bold represent significant differences (two-tailed $p < .05$) in the coefficients for serious or lethal injury compared to minor injury. Estimates in italics represent significant differences (two-tailed $p < .05$) in the coefficients for lethal injury compared to serious injury. Estimates in bold-italics represent significant differences (two-tailed $p < .05$) in the coefficients for lethal injury compared to both minor and serious injury.
*$p < .05$, **$p < .01$, ***$p < .001$ (two-tailed tests).