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Intimate Partner Violence and Neighborhood Income: A Longitudinal Analysis

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Abstract

This investigation used a longitudinal design to examine the relationship between neighborhood-level income, individual-level predictors, and police-reported intimate partner violence in 5,994 urban couples followed over 2 years. At the baseline abuse incident, intimate partner violence rates were highest in the poorest neighborhoods (13.8 per 1,000 women in the lowest income quartile, followed by 12.1, 8.2, and 5.0 in the respective higher income quartiles). However, in the longitudinal analysis, weapon use at the baseline abuse event was a much stronger predictor of repeat abuse (incident rate ratios ranging from 1.72 for physical abuse to 1.83 for non-physical abuse) than neighborhood income.

Keywords

intimate partner violence; longitudinal; risk factors

Introduction

Approximately 25% of women across nationally representative samples in the United States experience intimate partner violence in their lifetime (Tjaden & Thoennes, 2000). A wide body of research has been undertaken to explain risk factors for intimate partner violence perpetration and victimization across all levels of the social ecology (Bronfenbrenner, 1979). At the *individual level*, where most research has been focused, studies have emphasized early childhood victimization experiences (Avakame, 1998a, 1998b; Desai, Arias, Thompson, & Basile, 2002; McCloskey, 1996), perpetrator substance abuse (Cunradi, Caetano, Clark, & Schafer, 1999; Cunradi, Caetano, & Schafer, 2002; Fals-Stewart, Golden,

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Declaration of Conflicting Interests

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& Schumacher, 2003; Fals-Stewart, Leonard, & Birchier, 2005), victim pregnancy (Campbell et al., 2003; Cokkinides, Coker, Sanderson, Addy, & Bethea, 1999; McFarlane, Parker, Soeken, & Bullock, 1992; McFarlane & Wiist, 1997; Nemeth, Bonomi, Lee, & Ludwin, 2012; O'Campo et al., 1995), and adherence to traditional gender roles (Avakame, 1998a, 1998b; Li, Kirby, Hwang, Lagory, & Goldenberg, 2010; McCloskey, 1996; Nemeth et al., 2012; Pence & Paymar, 1993). At the *relationship level*, research has focused on discordant intimacy/emotional needs (Allison, Bartholomew, Maysseless, & Dutton, 2008; Bartholomew & Allison, 2006; Bartle & Rosen, 1994; Bond & Bond, 2004), communication breakdown (Allison et al., 2008; Nemeth et al., 2012), and discordant drinking patterns in couples (Leadley, Clark, & Caetano, 2000).

At the *community level*, a growing body of research has focused on structural features of communities (e.g., concentrated poverty), social processes (e.g., norms and sanctions concerning the use of violence), and available resources that could be linked to violence occurrence (Block & Skogan, 2001; Browning, 2002; Burke, O'Campo, & Peak, 2006; Cunradi et al., 2002; Fox & Benson, 2006; Frye & Wilt, 2001; Grisso et al., 1999; Li et al., 2010; Mears, Carlson, Holden, & Harris, 2001; Miles-Doan & Kelly, 1997; O'Campo, Burke, Peak, McDonnell, & Gielen, 2005; O'Campo et al., 1995; Pearlman, Zierler, Gjelsvik, & Verhoek-Oftedahl, 2003).

Cross-sectional studies of community-level structural factors associated with intimate partner violence occurrence showed relatively consistent findings: elevated intimate partner violence rates in urban neighborhoods characterized by poverty/low income (Fox & Benson, 2006; O'Campo et al., 1995; Pearlman et al., 2003), high unemployment (Cunradi et al., 2002; O'Campo et al., 1995), low educational achievement (Grisso et al., 1999; Pearlman et al., 2003), residential stability (Li et al., 2010), and elevated rates of intimate partner homicide in socioeconomically disadvantaged neighborhoods (Browning, 2002). A small longitudinal study found a non-significant increase in subsequent police- or court-reported intimate partner violence for women who resided in low-income neighborhoods and who were involved initially in an assault case in which an arrest occurred, a protection order was issued, or both (Mears et al., 2001).

Browning's (2002) *cross-sectional study* further augmented an understanding of community features associated with intimate partner violence occurrence by testing social disorganization theory using data from 199 urban couples. Social disorganization theory posits that structural disruption within a community (e.g., concentrated poverty, high residential mobility) diminishes the community's ability to regulate the occurrence of crime because the necessary social bonding/connections, mutual trust, and norms of reciprocity (willingness to help each other) are impaired (Frye & Wilt, 2001; Sampson & Groves, 1989; Sampson, Raudenbush, & Earls, 1997; Shaw & McKay, 1942). Browning's study found that neighborhood collective efficacy—or the extent to which people in the community trust one another, help each other, and feel responsible for one another—was negatively associated with both intimate homicide rates and non-lethal assault, particularly when community tolerance for violence was low. Moreover, collective efficacy had a positive effect on the likelihood that women disclosed conflict in their intimate relationships to social supports, including friends, family, and their partner's family; thus, a critical mechanism linked to

neighborhood social control and intimate partnership functioning is through communication with social supports. *In a 1-year longitudinal study*, Block and Skogan (2001), in contrast, found no association between similar measures of neighborhood social control and connections to networks on risk of recurrent violence and violence-free days for 210 abused urban women.

O'Campo and Burke undertook two qualitative studies to further expand a theoretical understanding of community processes that could influence intimate partner violence occurrence (Burke et al., 2006; O'Campo et al., 2005). Through in-depth conversations with women, their studies uncovered community social processes and resources that could protect against violence perpetration, such as the presence of gathering places including churches, playgrounds, and violence shelters and the presence of community enrichment resources (e.g., access to public health facilities, community centers, women's groups, and recreation centers for children). Communities characterized by structural disadvantage (e.g., concentrated poverty) may be less likely than other communities to have both the informal social controls (e.g., norms of reciprocity; Frye & Wilt, 2001; Sampson & Groves, 1989; Sampson et al., 1997; Shaw & McKay, 1942) and the formal controls (e.g., access to public health facilities, availability of violence shelters; Burke et al., 2006; O'Campo et al., 2005) to help regulate intimate partner violence occurrence.

Despite promising information from prior studies on how neighborhoods influence intimate partner violence occurrence, prior studies have not reported on how neighborhood conditions affect abuse *frequency and types of violence (physical or non-physical)* over time among abused women who have already had contact with police. This information is necessary to add to our understanding of how neighborhoods influence intimate partner violence chronicity over time. Both the frequency and types of violence are known to influence who calls police for intimate partner violence and are independently associated with adverse health consequences (Bonomi, Anderson, Reid, et al., 2009; Bonomi, Anderson, Rivara, & Thompson, 2009; Bonomi, Holt, Martin, & Thompson, 2006; Bonomi, Thompson, et al., 2006; Coker et al., 2002; Duterte et al., 2008). Non-physical abuse—which is often omitted from studies of neighborhood characteristics and intimate partner violence occurrence—is a stressful form of violence for victims. For example, “interference with reporting,” a type of non-physical abuse recorded in many police administrative databases, refers to situations in which the perpetrator/offender attempts to obstruct the victim from making contact with police or other law enforcement. We analyzed a qualitative dataset from a metropolitan prosecution division and found that “interference with reporting” was stressful for victims (Bonomi, Gangamma, Locke, Katafiasz, & Martin 2011; Nemeth et al., 2012).

The present investigation used data from a large metropolitan U.S. sample involved in a first-time male-to-female perpetrated intimate partner violence event reported to police from 1999 to 2001 (the index abuse event) to estimate: (a) age-adjusted intimate partner violence rates by neighborhood income levels and (b) the count of police-reported non-physical and physical intimate partner violence occurrences over a 2-year period following the index abuse event, as a function of neighborhood-level income and individual-level predictors. The study provides additional information on how neighborhoods influence violence outcomes in

women over time. In our study involving police administrative data, we used neighborhood income data available through the U.S. Census, rather than interviewer-obtained measures, such as neighborhood collective efficacy (Browning, 2002). As with other studies that rely upon publicly available administrative data to characterize neighborhoods (Cunradi et al., 2002; Fox & Benson, 2006; Grisso et al., 1999; Mears et al., 2001; O'Campo et al., 1995; Pearlman et al., 2003), income in our study possibly functioned as a proxy measure for lack of community controls for regulating partner violence.

Method

Sample and Data Collection

The study was conducted in Seattle, Washington, a metropolitan area comprising roughly two million residents. Study procedures were approved by the institutional review boards of the University of Washington and the Ohio State University (location of the first author during the study analysis). Eligible subjects included 6,266 Seattle-resident couples (age 18 and older) involved in a male-to-female perpetrated intimate partner violence incident reported to the Seattle Police Department during 1999–2001. The first occurrence of police-reported intimate partner violence during 1999–2001 denoted the index abuse event. Using a unique tracking number, each couple was followed over a 2-year period from the time of the index abuse event to track repeat police-reported intimate partner violence involving the same perpetrator and victim. While the first occurrence of police-reported intimate partner violence during 1999–2001 was used as the index event and extensive hand-checking of couples to verify these data, it is possible that couples may have had a prior police-reported intimate partner violence offense in a city other than Seattle. It was beyond the scope of our study to search the police databases of all surrounding cities to identify violence occurrences involving the nearly 6,000 couples.

Data on individual-level characteristics of victims and perpetrators were assembled from the Seattle Police Department's Domestic Violence Unit database. The database captured data on victims and perpetrators at the time of the index abuse event reported to police and at each subsequent reported incident. Data were collected by police in an incident report form, which includes spaces to record characteristics of the perpetrator and victim (e.g., "W/M/01/01-1901" would indicate White male born on January 1, 1901), the event location, and details of each abuse episode (e.g., who was present, what transpired during the event). Data collected in the incident report forms were entered by Seattle Police Department staff into the Domestic Violence Unit database.

Seattle police staff recorded information about the census tract in which the abuse event occurred. Using these census tract designations, we linked neighborhood data from the 2000 U.S. census to the abuse database. A total of 272 couples were missing or had unclear information on census tract designation; these couples were excluded from the analysis, reducing the analytic sample from 6,266 to 5,994. Perpetrators and victims within couples who were missing information on census tract designation were more likely to be Caucasian than other individuals. Individuals excluded from the analysis did not differ on other demographic factors or the study outcomes.

The number of police-reported intimate partner violence occurrences (non-physical and physical abuse types, defined below) involving the same couple in the 2 years following the index abuse event was calculated.

Outcome Variables

For the baseline analysis focused on describing first-time police-reported abuse events by neighborhood income level, the outcome variable included *any police-reported intimate partner violence*, regardless of the type (physical or non-physical). For the longitudinal analysis involving the number of intimate partner violence reports made to Seattle police during the 2-year period following the index abuse event, we examined two types of abuse:

- *Non-physical abuse only*, which included theft, criminal trespassing, custodial interference, disturbance, harassment, menacing, property damage, stalking, suspicious circumstances, threats, violation of no contact order, warrant, and interference with reporting. These assault types cover the range of non-physical assault violations and are critical to consider. For example, “interference with reporting” refers to situations in which the perpetrator/offender attempts to obstruct the victim from making contact with police or other law enforcement during a dispute; we analyzed a qualitative dataset from the Seattle Prosecution Division and observed that this type of offense is stressful for victims (Bonomi et al., 2011; Nemeth et al., 2012).
- *Physical abuse*, which included assault, homicide, rape, reckless endangerment, and unlawful imprisonment. If women experienced both physical and non-physical abuse, which is the case for many victims (Bonomi et al., 2011; Nemeth et al., 2012), they were by default included in the physical abuse group.

Neighborhood-Level Exposures

Census tract level per capita income was used as an indicator of neighborhood socioeconomic composition. Census tracts have been used to describe neighborhood-level characteristics, including income, associated with intimate partner violence (Cunradi, Caetano, Clark, & Schafer, 2000; Cunradi et al., 2002; Herrenkohl, Hawkins, Abbott, & Guo, 2002; Mears et al., 2001; O’Campo et al., 1995; Pearlman et al., 2003; Sampson & Groves, 1989). Census tracts were the available unit within this existing secondary administrative dataset from the Seattle Police Department. Prior studies have shown that census tracts (comprising roughly 4,000 residents) are as empirically sensitive as census block groups (a smaller unit typically comprising 600 to 3,000 residents) in explaining geographic variations in critical health indicators, such as low birth weight, infections, tuberculosis, violence, mortality rates, and cancer incidence rates (Krieger et al., 2002; Krieger, Chen, et al., 2003; Krieger, Waterman, Chen, Soobader, & Subramanian, 2003).

While a sizable number of studies have been conducted to assess the relationship between neighborhood socioeconomic disadvantage and intimate partner violence, the field, to date, has no “gold standard” for representing disadvantage. Correlations between our neighborhood income variable (retained in the analysis) and other neighborhood socioeconomic indicators we initially considered were moderate to high: .47 (male

employment rates) and .69 (adults with high school education). Some, such as Sampson et al. (1997), have chosen to calculate a socioeconomic index when high correlations between neighborhood component factors (e.g., poverty, education) are present; however, the factor loadings of their individual components were quite high (approaching 0.95), indicating that the components were measuring very similar constructs. In our analysis, to ensure parsimonious models, to avoid problems of collinearity and to facilitate interpretation, we retained income as our indicator of neighborhood disadvantage.

In our analysis, quartiles based on the distribution among study subjects were created for the income variable, with higher quartiles indicating higher income brackets. Because dividing income into groups smaller than quartiles, such as deciles, would result in very small differences between the groups, we used quartiles to define groups with meaningful income differences.

We did not have access to other measures that might mediate the association between neighborhood income and intimate partner violence—such as community social ties, trust, norms of reciprocity, and available resources (Browning, 2002; Burke et al., 2006; Frye & Wilt, 2001; O’Campo et al., 2005; Sampson & Groves, 1989; Sampson et al., 1997; Shaw & McKay, 1942). As noted, social disorganization theory posits that high levels of structural disruption within a community (e.g., concentrated poverty) diminish the community’s ability to regulate the occurrence of crime because the necessary social bonding to restrict crime occurrence is impaired (Frye & Wilt, 2001; Sampson & Groves, 1989; Sampson et al., 1997; Shaw & McKay, 1942). In our study using police administrative data, we were dependent upon data available through the U.S. Census (e.g., income), rather than interviewer-obtained measures, such as neighborhood social controls. As with other studies that rely upon public administrative data, income possibly functioned as a proxy measure for lack of community controls for regulating intimate partner violence.

Individual-Level Exposures

We included the following individual-level exposures (collected at the index abuse event) available through the Seattle Police Department database, all of which have been shown to be significantly associated with intimate partner violence occurrence and/or recurrence: victim and perpetrator race/ethnicity (Caetano, Cunradi, Clark, & Schafer, 2000; Cunradi et al., 1999; Thompson et al., 2006); perpetrator drug/alcohol use (Cunradi et al., 1999; Cunradi et al., 2002; Fals-Stewart et al., 2003); victim pregnancy (Campbell et al., 2003; Cokkinides et al., 1999; McFarlane et al., 1992; McFarlane & Wiist, 1997; Nemeth et al., 2012; O’Campo et al., 1995); abuse type (physical and/or non-physical); weapon involvement (guns, rifles, knives, or vehicles; Campbell et al., 2003; Moracco, Runyan, & Butts, 2003); victim injury (Bonomi, Anderson, Reid, et al., 2009; Kernic, Wolf, & Holt, 2000); and arrest of the perpetrator (Berk, Campbell, Klap, & Western, 1992; Dunford, Huizinga, & Elliot, 1990; Hirschel, Hutchison, & Dean, 1992; Pate & Hamilton, 1992; Sherman & Berk, 1984; Sherman et al., 1991). For example, victim pregnancy is one of the strongest predictors of intimate partner violence, for increasing violence severity, and for intimate femicide (Campbell et al., 2003; Cokkinides et al., 1999; McFarlane et al., 1992; McFarlane & Wiist, 1997; Nemeth et al., 2012; O’Campo et al., 1995). Likewise, perpetrator

drug/alcohol use is a consistent predictor of intimate partner violence (Cunradi et al., 1999; Cunradi et al., 2002; Fals-Stewart et al., 2003).

Analysis

Age-adjusted first-time police-reported intimate partner violence rates were estimated by neighborhood income quartiles, using pooled data from the 2000 U.S. census as the denominator and abuse reports from our dataset as the numerator. First, age-specific intimate partner violence rates for each combination of income and age were calculated using data from the year of the index abuse event and the 2 years following the event. The denominator was based on all census tracts served by the Seattle Police Department, regardless of whether a case of police-reported intimate partner violence was identified from that census tract. Next, these rates were combined across income quartiles using the age distribution of female Seattle residents residing in a census tract served by the Seattle Police Department as the standard population. We adjusted for age to prevent confounding, ensuring that any associations between income and partner violence were not in fact due to age, which could occur if age is related to both partner violence and income. The extant literature documents a clear association between age and violence occurrence (Tjaden & Thoennes, 2000); by adjusting for age, we eliminated the potential effect of differential age distributions across census tracts.

We next estimated the number of times police incident reports were filed for *physical* and *non-physical* types of abuse (dependent variable) over a 2-year period between the same victim and perpetrator involved in the index abuse event, using neighborhood-level income and individual-level characteristics as predictor variables. As noted, quartiles based on the distribution among study subjects were created for the income variable, with the lowest income quartile used as the reference category. Generalized estimating equation (GEE) regression methods (Lipsitz, Fitzmaurice, Orav, & Laird, 1994; Zeger & Liang, 1986; Zeger, Liang, & Albert, 1988) were used to account for the potential correlation between individuals nested within census tracts. An independence working covariance structure was assumed and robust variance estimates were calculated. Because our outcome was a count variable (number of intimate partner violence occurrences), the GEE models used a log link (the canonical link for the Poisson distributed data) to estimate incident rate ratios (IRRs). Due to over-dispersion of the outcome variables—13% of women reported *physical intimate partner violence* and 19% reported *non-physical intimate partner violence* over the 2-year follow-up period—we allowed additional variability in our outcome by estimating the dispersion parameter. Hierarchical linear modeling (HLM) methods are commonly used to explore the impact of neighborhood-level and individual-level factors on individual-level outcomes. To determine whether our results differed when HLM (vs. GEE) was used, we ran HLM models using the same set of predictor variables (neighborhood-level income and the individual-level characteristics of perpetrators and victims described earlier). We found virtually identical results when HLM and GEE methods were used. GEE parameter estimates are robust to the misspecification of the working correlation matrix (Cologne, Carter, Fujita, & Ban, 2008), which is not intuitively obvious for these data. In contrast, the estimates from HLM are more sensitive to model misspecification and can fail to be consistent due to distributional assumptions (although the resulting bias is often small;

Litiere, Alonso, & Molenberghs, 2007). As the HLM and GEE results were similar and as such the GEE approach was sufficient to account for the possible influence of correlation of individual-level characteristics within census tract and the true correlation structure of the data is unknown, this more conservative approach was selected.

Results

Individual and Neighborhood Characteristics

Table 1 presents characteristics of women and perpetrators and the neighborhoods where the index abuse event occurred. A total of 85% of victims and 78% of male perpetrators were below age 45, and less than half were Caucasian. Approximately 22% of couples were married. One hundred twenty-two census tracts were represented, with an average of 49 couples per tract (range = 1–233 couples). The mean per capita income across tracts was US \$30,590.

Characteristics of the Index Abuse Event Reported to Police

A total of 57% of the index abuse events involved physical intimate partner violence (vs. non-physical abuse only); 5% involved a knife, gun, or vehicle as a weapon; and 44% resulted in victim injury (Table 2). One fifth (20%) of perpetrators were noted by police officers as using alcohol or drugs at the index abuse event, and 48% were arrested.

Age-Adjusted Police-Reported Abuse Rates for Neighborhood Income Quartile

Age-adjusted first-time police-reported intimate partner violence rates were highest in the lowest income quartile census tracts; the rate was 13.8 per 1,000 women in the lowest neighborhood income quartile, followed by 12.1, 8.2, and 5.0, respectively, for the successively higher income quartiles (Table 3).

Factors Associated With Police-Reported Abuse Over Time

Although there was a clear trend in the underlying first-time police-reported abuse rates by census tract income (Table 3), the rates of re-abuse did not differ substantially by income level. In adjusted models, individuals in our sample made 15% to 30% more reports of *physical abuse* and 6% to 18% more reports of *non-physical abuse* over the 2-year follow-up period if they resided in higher income neighborhoods compared with the lowest income neighborhood quartile (Table 4). However, all but one confidence interval included 1.00, indicating only marginal significance. Of note, our multivariable analyses showed that after controlling for neighborhood income, individuals made 72% to 83% more calls during the follow-up period for *physical* and *non-physical* abuse if a weapon was involved in the index abuse event.

Discussion

In our study focusing on a large metropolitan area in the United States, intimate partner violence rates were highest in the poorest neighborhoods, a finding that is consistent with prior studies (Browning, 2002; Fox & Benson, 2006; O'Campo et al., 1995; Pearlman et al., 2003). However, we did not find support for the relationship between re-abuse and

neighborhood income over time. Rather, after controlling for neighborhood income, weapon use at the time of an initial abuse event was a much stronger predictor of subsequent police-reported violence than neighborhood income.

One prior study found non-significant higher hazard rates of subsequent police- or court-reported *physical intimate partner violence* in a cohort of abused women if they resided in lower income (compared with higher income) census blocks (Mears et al., 2001). Mears and colleagues conducted their study in a large urban county in Texas (United States) and sampled abuse cases in which an arrest occurred, a protection order was issued, or both. Our study was based on the index abuse events that included all police-reported intimate partner incidents in Seattle, regardless of whether the incident resulted in police or court action. In addition, the abuse outcomes of the two studies differed. Mears et al. (2001) considered re-victimization to be any physical violence reported to police within 2 years after the initial protection order or arrest, while we measured and independently examined the *number* (count) of physical and non-physical abuse occurrences reported to police over 2 years. Despite these methodological differences, the two studies reported comparable findings.

Our use of police administrative data posed some limitations. First, misclassification was a potential limitation, if police officers did not consistently and accurately record information when responding to intimate partner calls. For example, it is possible that police underestimated the violence that occurred. Second, our use of police data likely overrepresented severe abuse cases (Bonomi, Holt, et al., 2006; Duterte et al., 2008; Houry et al., 2004). Third, it is possible we missed subsequent intimate partner violence not reported to police; for example, we could not determine whether women migrated differentially out of neighborhood areas, which may have influenced data capture rates. Fourth, we did not have access to critical measures within social disorganization theory and in other theoretical studies—such as community social ties, trust, norms of reciprocity, and available resources (Burke et al., 2006; Frye & Wilt, 2001; O’Campo et al., 2005; Sampson & Groves, 1989; Sampson et al., 1997; Shaw & McKay, 1942)—that could help explain why neighborhood income was associated with intimate partner violence. Social disorganization theory posits that structural disruption within a community (e.g., concentrated poverty) diminishes the community’s ability to regulate the occurrence of crime because the necessary social bonding/connections, mutual trust, and norms of reciprocity are impaired. Prior studies found that collective efficacy—or the extent to which people in the community trust one another, help each other, and feel responsible for one another—within neighborhoods mediated the relationship between neighborhood poverty and lethal abuse (Browning, 2002). As with other studies that rely upon public administrative data to characterize neighborhoods (Cunradi et al., 2002; Fox & Benson, 2006; Grisso et al., 1999; Mears et al., 2001; O’Campo et al., 1995; Pearlman et al., 2003), income in our study possibly functioned as a proxy measure for lack of community controls for regulating partner violence. Finally, we relied upon census tracts rather than census blocks to represent our community-level income indicator. While there could be small differences in study outcomes if we used census block groups rather than census tracts, prior studies have shown that census tracts (comprising roughly 4,000 residents) are as empirically sensitive as census block groups (a smaller unit typically comprising 600 to 3,000 residents) in explaining geographic variations in critical health indicators, such as low birth weight,

infections, tuberculosis, violence, mortality rates, and cancer incidence rates (Krieger et al., 2002; Krieger, Chen, et al., 2003; Krieger, Waterman, et al., 2003).

These limitations notwithstanding, our study of nearly 6,000 couples suggests that while neighborhood poverty was associated with initial intimate partner violence rates, it did not determine repeat abuse reported to police. After accounting for neighborhood income, weapon use at the time of the index abuse event was a much stronger predictor of subsequent police-reported violence, with women making 72% to 83% more calls to police in the 2-year follow-up period if a weapon was involved in the index abuse event. This finding is consistent with prior studies showing increased calls to police in intimate disputes involving weapons (Bonomi, Holt, et al., 2006). Weapon use is also a predictor of intimate femicide (Campbell et al., 2003; Moracco et al., 2003), and therefore should be considered a critical risk factor for professionals interacting with and designing interventions for women with histories of intimate partner violence. Future studies should consider probing to determine how violent events involving weapons differ qualitatively from those that do not involve weapons.

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Table 1Characteristics of Victims, Perpetrators, and Neighborhoods ($n = 5,994$).

Individual characteristics	<i>n</i> (%)
Perpetrator	
Age	
18–24	995 (16.6)
25–34	2,099 (35.0)
35–44	1,580 (26.4)
>44	1,044 (17.4)
Missing	276 (4.6)
Race/ethnicity	
White	2,360 (39.4)
Black	1,992 (33.2)
Asian/Pacific Islander	405 (6.8)
Hispanic	176 (2.9)
Indian/Native American	99 (1.7)
Missing	962 (16.0)
Victim	
Age	
18–24	1,535 (25.6)
25–34	2,132 (35.6)
35–44	1,460 (24.4)
>44	867 (14.4)
Race/ethnicity	
White	2,802 (46.8)
Black	1,465 (24.5)
Asian/Pacific Islander	518 (8.6)
Hispanic	114 (1.9)
Indian/Native American	122 (2.0)
Missing	973 (16.2)
Pregnant at the time of abuse index event	155 (2.5)
Relationship status	
Married	1,309 (21.8)
Dating/engaged	3,679 (61.4)
Separated	174 (2.9)
Divorced	264 (4.4)
Child in common	568 (9.5)
Neighborhood Characteristics	
<i>M</i> (<i>SD</i>)	
Per capita income	US\$30,590 (US\$11,504)

Table 2Characteristics of the Index Abuse Event ($n = 5,994$).

	<i>n</i> (%)
Intimate partner violence type	
Physical	3,443 (57.5)
Non-physical	2,551 (42.5)
Weapon involved (i.e., knife, gun, vehicle)	312 (5.2)
Victim injured	
No complaint	3,380 (56.4)
Non-visible	614 (10.2)
Visible, minor	1,927 (32.2)
Visible, severe	73 (1.2)
Perpetrator drug or alcohol use noted	1,204 (20.0)
Perpetrator arrested	2,893 (48.3)

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Table 3
 Age-Adjusted Intimate Partner Violence Rates for Income Quartile Using the Female Seattle Population as the Standard Population.

Expected number of IPV cases	Age group								Total expected cases	Adjusted rate 3 year	Annual adjusted rate per 1,000
	18-21	22-24	25-29	30-34	35-39	40-44	45+				
1. <19,200	714	1,074	2,324	1,854	1,718	1,121	1,262	10,068	0.041		13.8
2. 19,200-24,300	1,393	859	1,769	1,525	1,338	892	1,028	8,804	0.036		12.1
3. 24,301-30,150	1,029	595	927	889	995	730	771	5,936	0.024		8.2
4. >\$30,150	641	425	665	614	508	330	488	3,671	0.015		5.0

Note. IPV = intimate partner violence.

Table 4 Neighborhood Income and Individual Factors Associated With Repeat Police-Reported Intimate Partner Violence.

	Non-physical			Physical		
	Poisson	GEE		Poisson	GEE	
	IRR	IRR (95% CI) ^a		IRR	IRR (95% CI) ^a	
Individual level						
Victim pregnant	1.43	1.43 [0.98, 2.08]		1.10	1.10 [0.7, 1.75]	
Married	1.02	1.02 [0.87, 1.21]		0.89	0.89 [0.74, 1.08]	
Physical IPV	0.90	0.90 [0.74, 1.09]		1.04	1.04 [0.83, 1.28]	
Weapon used	1.83	1.83 [1.43, 2.36]		1.72	1.72 [1.29, 2.30]	
Victim injury	1.13	1.13 [0.95, 1.35]		0.96	0.96 [0.78, 1.19]	
Neighborhood level						
Per capita income						
1st quartile	1.00	1.00 [reference]		1.00	1.00 [reference]	
2nd quartile	1.18	1.18 [1.00, 1.38]		1.20	1.20 [1.00, 1.43]	
3rd quartile	1.15	1.15 [0.97, 1.36]		1.30	1.30 [1.01, 1.67]	
4th quartile	1.06	1.06 [0.89, 1.26]		1.15	1.15 [0.93, 1.43]	

Note. All models are adjusted for victim and perpetrator race/ethnicity and age, and perpetrator substance use and police arrest at the time of IPV event. Poisson = Poisson model identifying census tract as cluster variable; GEE = generalized estimating equation; IRR = incident rate ratio; CI = Confidence interval; IPV = intimate partner violence.

^aStandard error based on sandwich estimator.