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DOES NEIGHBORHOOD ENVIRONMENT DIFFERENTIATE INTIMATE PARTNER FEMICIDES FROM OTHER FEMICIDES?

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Abstract

We examined the association between neighborhood-level factors and intimate partner femicide (IPF) using Wisconsin Violent Death Reporting System (WVDRS) data and Wisconsin Coalition Against Domestic Violence (WCADV) reports, in concert with neighborhood-level information. After controlling for individual characteristics, neighborhood-level disadvantage was associated with a decreased likelihood of IPF status, as compared to other femicides, while neighborhood-level residential instability was associated with an increased likelihood of IPF status. Neighborhood plays a role in differentiating IPFs from other femicides in our study area. Our findings demonstrate the importance of multilevel strategies for understanding and reducing the burden of intimate partner violence.

Keywords

intimate partner femicide; neighborhoods; residence characteristics

INTRODUCTION

Intimate partner femicide (IPF) is the murder of a woman by her intimate partner. In the United States, 30-50% of murdered women are killed by a current or former intimate partner (Campbell, Glass, Sharps, Laughon, & Bloom, 2007; Fox & Benson, 2006). Risk factors for IPF include race, socioeconomic status, and foreign country of birth (Campbell et al., 2003; Frye et al., 2008), and IPF is often an event preceded by a history of intimate partner violence (IPV) (Campbell et al., 2003). Risk factors for IPV, in turn, include younger age

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(O'Campo et al., 1995), shorter duration of relationship (Van Wyk, Benson, Fox, & DeMaris, 2003), marital status as unmarried or cohabiting (Jones et al., 1999; Van Wyk, et al., 2003), alcohol use (Li et al., 2010), and lower socioeconomic status (Van Wyk, et al., 2003). Rates vary by race and ethnicity (Cunradi, Caetano, Clark, & Schafer, 2000; Jones, et al., 1999) and geography (Alhabib, Nur, & Jones, 2010; Kramer, Lorenzon, & Mueller, 2004; Lanier & Maume, 2009). Factors known to put abused women at risk for IPF include abuser unemployment, firearm access, having lived with the abuser, previous threats by the abuser, and the woman's leaving or attempting to leave the relationship (Campbell et al., 2003).

Intimate partner violence research has focused on individual-level risk factors. Recent work, drawing primarily from social disorganization theory, has suggested environmental influences may also be relevant (Benson, Fox, DeMaris, & van Wyk, 2003; Browning, 2002; Cunradi et al., 2000; Li et al., 2010). Social disorganization theory has been traditionally used to explain rates of violent crime in urban settings (Sampson & Groves, 1989), arguing that those who reside in disadvantaged neighborhoods have weakened social bonds with their neighbors, limiting their ability to collectively maintain social control and resulting in high levels of crime, including violence (Benson et al., 2003). Although the linkages between social disorganization and crime are established, the application of social disorganization theory to understanding intimate partner and domestic violence is more recent (Raghavan, Mennerich, Sexton, & James, 2006).

Neighborhood-level factors that have been explored include neighborhood deprivation and residential instability (Li et al., 2010). Results of investigations of the relationship between neighborhood disadvantage and individual risk of intimate partner violence have been mixed (Benson, Wooldredge, Thistlethwaite, & Fox, 2004; Cunradi, 2010; Cunradi et al., 2000; Li et al., 2010; O'Campo et al., 1995; Van Wyk et al., 2003). Residential stability, traditionally hypothesized to have a stabilizing effect in neighborhoods that could reduce violent crime rates, has been found instead to be associated with increased risk, leading researchers to question the meaning of residential instability in an age when it may be associated with higher levels of education and ability to be mobile (Benson et al., 2003; Li et al., 2010).

Despite increased attention to the linkages between neighborhood environment and intimate partner violence, few studies have examined the role of neighborhood context in influencing femicides committed by intimate partners. Similar to the findings of ecological analyses of the relationship between IPV and neighborhood disadvantage (Miles-Doan, 1998; Miles-Doan & Kelly, 1997), some ecological analyses have suggested an association between neighborhood disadvantage and IPF (Browning, 2002; Madkour, Martin, Halpern, & Schoenbach, 2010). One study compared intimate partner femicides to other femicides in New York City, finding that the individual-level characteristics of foreign country of birth and young age were the strongest predictors of the perpetrator being an intimate partner (Frye et al., 2008). The only neighborhood-level measure found to be significantly (negatively) associated with IPF status was neighborhood per capita income, which only achieved marginal significance in two of the five models tested; other social disorganization theory factors tested were negatively associated with IPF status, but only slightly and nonsignificantly, indicating that the presumed influence of neighborhood disorganization

was similar in magnitude for both types of femicide (Frye et al., 2008). The relationship between disadvantage and intimate femicide in nonurban settings has received very little attention (Madkour et al., 2010). Overall, previous work has been constrained by an urban focus, limited availability of individual-level characteristics, and limited consideration of femicide.

We examine how victims of intimate partner femicide differ from other femicide victims, and assess the role of neighborhood environment in differentiating the two types of femicide. Our study area includes the full spectrum of urban to rural geographic settings, and we examine individual-level characteristics – including marital status – which have not always been available or examined by previous researchers.

METHODS

Data Sources

We analyzed data from the Wisconsin Violent Death Reporting System (WVDRS) for 2004-2008. WVDRS is part of the National Violent Death Reporting System, a population-based active surveillance system that links multiple data sources to provide a census of violent deaths that occur within the borders of participating states. Violent deaths are defined as deaths resulting from “the intentional use of physical force or power against oneself, another person, or against a group or community” (Centers for Disease Control and Prevention, 2008); only homicides were included in the present analysis.

Although WVDRS contains codes indicating whether or not a death was “intimate partner violence” or “jealousy” related, it does not specify whether the perpetrator of the violence was the woman's intimate partner. In some cases, femicides coded as being related to intimate partner violence may not be deaths of a woman killed by her intimate partner. To accurately identify intimate partner femicides, we also consulted data and reports available from the Wisconsin Coalition Against Domestic Violence (WCADV).

Table 1 compares the WVDRS and WCADV data sources to illustrate the potential for misclassification bias of IPF. We examined femicides that at least one of the data sources indicated may be a femicide committed by an intimate partner. A total of 113 femicides were examined, and 87 WVDRS femicides were determined to be IPFs. Of these, 76 were coded as IPV-related in WVDRS, while 11 were not. In addition, there were 10 femicides coded in WVDRS as IPV-related that were determined through review of WCADV records not to be IPFs, but to be related to IPV. Finally, an additional 4 IPF deaths were identified in WCADV records that could not be identified in the WVDRS database.

Figure 1 illustrates the process undertaken to accurately identify IPFs and other femicides for the purposes of this analysis. We began with a dataset including all WVDRS femicides of women age 16 or older that occurred within the state's borders during the time period 2004-2008 (n=216). A total of 87 deaths were confirmed to be IPFs through verification with WCADV records. We identified 107 deaths as other femicides and excluded an additional 22 deaths from our analysis because it was unclear whether an intimate partner was the perpetrator, or because the deaths were intimate partner violence related, but the

intimate partner was not the perpetrator. We limited our dataset only to Wisconsin residents. Our final dataset included 85 IPF and 102 other femicide deaths. To complete multivariable analyses of neighborhood level factors, we eliminated one additional IPF death (n=84) and two other femicide deaths (n=100) due to missing address information.

Geocoding

Neighborhood was defined as the US Census Tract. We geocoded the residential addresses for all femicide victims and linked these point locations to the neighborhood within which they fell. A total of 209 of the 216 femicides were Wisconsin residents. We were able to assign 84 IPFs and 100 other femicides to neighborhoods. A combination of Esri ArcMap 10 and Google Maps™ mapping services were used for geocoding and neighborhood assignment.

Measures

We explored variables at several levels. At the victim level, we explored victim's age, race/ethnicity, marital status, education level, country of birth, and whether she was known to be pregnant at the time of death or within a year prior to death. We also explored characteristics of the femicide. We examined weapon type, the number of penetrating wounds inflicted with a gun or knife, whether the victim was suspected to have used alcohol prior to the femicide, and whether the femicide took place in the home.

At the neighborhood level, we explored two measures often studied in relating neighborhood context to intimate partner violence risk: an index of concentrated disadvantage, and a measure of residential instability. We developed a Concentrated Disadvantage Index, as employed previously by other investigators (Benson et al., 2004; Li et al., 2010), including US Census 2000 variables: proportion on public assistance, proportion below the poverty line, proportion single-parent households, and proportion unemployed. Further, we measured residential instability as the proportion of individuals living in a different house five years ago, also based on US Census 2000 estimates.

We also included a measure of urbanicity/rurality, as we considered that urban versus rural location may modify the effect of neighborhood-level characteristics. Census Tract Rural-Urban Commuting Area (RUCA) codes (U.S. Department of Agriculture Economic Research Service, 2000; WWAMI Rural Health Research Center, 2011) were used to determine whether a victim resided in a rural versus an urban area. We dichotomized femicides according to “metro” and “non-metro” residence; we define “metro” as the “metro” category (RUCA codes 1-3) and “non-metro” as the combination of the “micro,” “small town,” and “rural” designations (RUCA codes 4-10).

Statistical Analysis

We undertook descriptive and one-risk-factor-at-a-time analyses of all femicides to compare IPFs (n=85) versus other femicides (n=102). Given the small sample size, Fisher's exact test was used to compare the characteristics of IPF victims with other femicide victims. Odds ratios were calculated to examine differences among variable categories.

Multivariable logistic regression analyses were performed to determine whether neighborhood-level characteristics predicted IPF status, while controlling for individual-level characteristics of interest. We limited this analysis to the 84 IPF and 100 other femicide deaths for which neighborhood-level information was available. We first constructed an individual-level model, and then proceeded to consider neighborhood-context. We began with the individual-level predictors age, race, marital status, education and birth country. Individual-level variables were maintained if significant at the alpha = .05 level. While not significant, race is an interest of the study and was included in subsequent models. Level of education was also included to control for individual socioeconomic status. We then considered concentrated disadvantage, residential instability, and metro/non-metro geographical setting at the neighborhood level. We incorporated both neighborhood disadvantage and residential mobility as binary measures, divided into the top decile of disadvantage and instability, respectively, as compared to the bottom 90%. Collinearity among disadvantage, instability and metropolitan/non-metropolitan was explored but not detected. Results of analyses of neighborhood disadvantage and instability separately showed similar effect directions and sizes as models considering them simultaneously. We sought to examine possible effect modification of metropolitan versus non-metropolitan setting on disadvantage and instability, but found that no neighborhoods in the highest decile of either disadvantage or instability were non-metropolitan, indicating that effects found for these variables apply to metropolitan neighborhoods only. A statistical significance (alpha) level of .05 was specified. STATA/IC 11 was used for all statistical analyses.

RESULTS

Descriptive and One-Risk Factor-At-A-Time Analyses

Analyses indicated that IPF victims differed in some ways from other femicide victims (Table 2). Overall, significant differences between the two groups were found with regard to race, marital status, level of education, whether the femicide took place in the home, suspected alcohol use by the victim, and neighborhood disadvantage (alpha=.05).

At the individual level, marital status was the most important predictor of IPF status, with married women at almost three times higher odds of being killed by an intimate partner. Race was significantly different, with Black women at higher odds than White women of being IPF deaths. Age, level of education, country of birth, and pregnancy were not significantly different.

Regarding the femicide event, location of death differed significantly, with victims killed by intimate partners at higher odds of being killed in the home than other femicide victims. The victim's suspected alcohol use prior to the femicide differed significantly, but only due to the variation in the proportion of “unknown” status; non-IPF deaths were at significantly higher odds of falling into the unknown category. Number of penetrating wounds and weapon type were not significantly different.

At the neighborhood level, the index of concentrated disadvantage was significantly different, with victims in neighborhoods in the top decile of disadvantage having lower odds of being IPFs than femicide victims in other neighborhoods. Non-significant trends

indicated that women in rural neighborhoods and highly unstable neighborhoods may have higher odds of being IPF victims than women in urban and low instability neighborhoods. Because of the limited sample size, we were unable to characterize the pattern of influence across the full spectrum of deprivation and instability.

Multivariable Analyses

The results of the individual-level model, Model 1, are shown in Table 3. While controlling for age, race and level of education, marital status was the strongest predictor of IPF status, with married victims at higher odds of being IPFs. While not significant, our results suggest a possible association between education and IPF.

Model 2 included the index of concentrated disadvantage as a binary variable with the top decile of disadvantage compared to the remaining neighborhoods, in addition to the individual-level predictors; we also included the indicator of metro/non-metro residence to ensure that the disadvantage index measured the construct of interest, and not simply urbanicity. While controlling for individual characteristics and metro/non-metro location, neighborhood concentrated disadvantage was not significantly associated with IPF status. Non-metro residence was also non-significant. Additionally, we modeled the effect of neighborhood disadvantage without controlling for urbanicity/rurality (results not shown), and found a similar result for disadvantage.

In Model 3, neighborhood disadvantage was removed from Model 2 and replaced by the binary measure of residential instability, comparing the top decile of instability versus the remaining neighborhoods. Residential instability was a significant predictor of IPF status, but metro/non-metro residence remained non-significant. The effect for instability, without controlling for metro/non-metro status (results not shown), was similar.

In the final model, Model 4, we included both neighborhood disadvantage and residential stability as binary variables. Both disadvantage and instability were significantly different. Disadvantage was negatively associated with IPF status, with femicides in the top decile of disadvantage at significantly reduced odds of being IPF deaths. Residence in a neighborhood characterized by high instability was significantly positively associated with IPF status, with femicides in the top decile of instability at approximately 5 times higher odds of being IPF deaths. Metro/non-metro residence was still non-significant.

Models 1-4 are shown in Table 3. Measures of percent correctly classified and area under the curve (AUC) indicate that Models 3 and 4 constitute the best fit. The Hosmer-Lemeshow goodness of fit test (Hosmer & Lemeshow, 1989) indicated a satisfactory model fit for all models.

DISCUSSION

Intimate partner femicides differ in some important ways from other femicides. Unadjusted analyses indicate that women killed by an intimate partner in Wisconsin are more often married than women killed by other perpetrators. While this finding is intuitive, it should be noted that our analysis relies on marital status as determined by official records. When

controlling for other factors, marital status was the strongest individual-level predictor of IPF status. This is interesting when considering that previous work has found unmarried or cohabiting status as a risk factor for intimate partner violence (Jones et al., 1999; Van Wyk et al., 2003), although a direct comparison is not possible between our population (of femicides) and the general female population. More work remains to be done to examine and clarify the relationship between marital status and intimate femicide. For example, marital status may play a different role in intimate partner violence as compared to intimate femicide. Marriage may decrease the likelihood that a woman leaves a violent relationship, thus providing opportunity for the violence to escalate. In contrast, violent non-marital relationships may be dissolved earlier, before the violence reaches the femicide event. It is also important to consider that relationship status – while married – includes relationships that are unstable or in some stage of estrangement or separation. It is known that the end of a relationship can be a period of high risk for IPF (Campbell et al., 2003). When possible, differences between current and former relationships, and non-marital intimate relationships, should be considered to provide a more comprehensive understanding of the importance of relationships in affecting risk.

Race and ethnicity is an important consideration in intimate partner violence research. In the present study, murdered Black women represent a higher proportion of women killed by a non-intimate partner perpetrator (36%) than a perpetrator who is an intimate partner (20%). White women and women born outside of the U.S. represent a higher proportion of IPF deaths than they do non-intimate partner femicides. While we found some differences among intimate partner and other femicides, it is important to note that our analysis is conditional on a femicide taking place, and cannot specify risk of IPF or other femicide for specific population groups; instead, our analysis highlights differences among two types of femicide to inform prevention and policy strategies to reduce each type. Of particular note, although Black women represented a lower proportion of IPF deaths than other femicide deaths in our study, Black women are disproportionately represented in both groups as compared to the proportion of Black women statewide (6.2% in 2009) (U.S. Census Bureau). As shown in Table 4, rates of intimate partner femicide, other femicide, and all femicide are markedly higher for Black women than White women in Wisconsin. Interestingly, when controlling for other factors, victim's race was a non-significant predictor of intimate partner violence in this study.

Our results suggest that neighborhood environment plays a role in differentiating IPFs from other femicides. In this study, lower levels of disadvantage and higher levels of neighborhood instability were found to be associated with IPF status, while controlling for both factors, metro/non-metro location, and individual-level predictors age, race and marital status. Our findings suggest that socioeconomic disadvantage may be more closely linked to femicides by non-intimate partner perpetrators, while disruption in neighborhood social cohesion – as measured by the proportion of people who were in a different house five years prior – may be more closely linked to femicides by intimate partner perpetrators. Previous work has suggested that residential instability may increase risk of intimate partner violence due to weakened social ties (Van Wyk et al., 2003), lack of communication (Burke, O'Campo, & Peak, 2006), norms for nonintervention and keeping to one's own business (Benson et al., 2004; Browning, 2002), or because neighbors without ties to each other may

not be alert or vigilant in response to intimate partner violence occurring in the neighborhood (Burke et al., 2006). Residential instability could also be an indication of unstable intimate relationships, including those unstable due to intimate partner violence, and would be associated with higher likelihood of IPF given the dangers associated with ending and leaving a violent relationship.

Interestingly, metro/non-metro status did not play a significant role in differentiating IPF and other femicide deaths, although it is important to note that the effects found for both disadvantage and instability only apply to metropolitan neighborhoods in the study area; no neighborhoods in the top decile of either disadvantage or instability were non-metropolitan neighborhoods. Also, it is important to note that Wisconsin census tracts containing femicides have slightly higher levels of disadvantage (median = −.08, range = −1.56, 9.75) and residential instability (median = 0.45, range= 0.28, 0.96) than all Wisconsin census tracts, which have lower levels of disadvantage (median = − .57, range = −1.66, 9.75) and instability (median = 0.41, range = 0.0, 0.96).

Our analysis is subject to limitations. The small sample size limited possible analytic approaches, affected our ability to detect more subtle differences between IPFs and other femicides, and limited our exploration of alternative neighborhood definitions, which could be important (Flowerdew, Manley, & Sabel, 2008). We analyzed victim data from 2004-2008 with census data from 2000; this temporal mismatch could theoretically introduce error. Our measures, while the best available, are not the best possible. Measurement of race and ethnicity is a complex endeavor that should be carefully considered in epidemiological analyses of this type. In addition, marital status – while an important predictor of IPV status and an important vriable to control for in exploring the importance of neighborhood-level factors – does not encompass the complexity of relationship status, which is clearly an important factor in intimate partner violence and femicide research. The ability to consider dating status would greatly enhance research on this topic. Our measures of disadvantage and instability, while commonly used, are not the only neighborhood predictors that could be considered. A wide range of additional variables has been considered, as available, in previous work, including measures of collective efficacy derived from neighborhood survey information (Browning, 2002). Our sample was limited to Wisconsin residents, limiting generalizability. Finally, we were unable to detect significance when our neighborhood predictors were studied as categorical variables, suggesting that the associations found may be complex and require further investigation.

Our study has a number of strengths. It is one of the first to explicitly consider the influence of both neighborhood- and individual-level characteristics on intimate partner femicide, and especially to do so in a study area including a range of geographical contexts, from urban to rural settings. Consideration of nonurban settings should be a primary future research direction for studies considering environmental context for intimate partner violence, as it is well known that rural and urban experiences of intimate partner violence differ (Peek-Asa et al., 2011). In addition, we made a concerted effort to avoid problems of misclassification of IPF deaths, which have affected other studies on this topic (Campbell et al., 2007). As shown in Table 1, utilizing one data source alone would have resulted in significant misclassification of IPF deaths; it is likely that other analyses of this type are subject to the

same constraints. To our knowledge, the only previous study examining both individual- and neighborhood-level factors in differentiating IPF from other femicide deaths did not control for marital status or level of education (Frye et al., 2008). Marital status was the most important individual-level predictor in the present study, demonstrating that measures of relationship status are critical to analyses of this nature.

Prevention/intervention programming and policy changes targeted to reduce rates of different types of femicide should consider observable differences between IPF victims and other femicide victims. Our findings emphasize the importance of moving toward multilevel strategies to reduce risk; strategies must recognize not only the individual-level differences among types of femicide victims, but also the different geographical contexts in which they live. This study suggests clinical implications for those who screen for IPV and intervene to improve health and safety among IPV survivors. Providers should consider the social and spatial context of IPV survivors' lives in considering strategies to protect them. An understanding of these contextual factors, including potential harms and assets (e.g., whether a woman has access to social connections and support in her neighborhood) may alert practitioners to the need for extra care and caution in safety planning, especially when a decision is made to end the relationship. Additional research is needed to identify other neighborhood-level factors that may be important in affecting intimate partner violence risk (O'Campo, Burke, Peak, McDonnell, & Gielen, 2005) to inform community-level interventions to reduce violence.

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Purushottam (Prakash) Laud, PhD is a Professor in the Division of Biostatistics in the Institute for Health and Society at the Medical College of Wisconsin. Dr. Laud has collaborative relationships with researchers throughout the College, including its Injury Research Center and Center for Patient Care and Outcomes Research. Current collaborative projects include those in the areas of falls injury prevention, breast cancer survivorship and genetics of hypertension. His methodological research addresses Bayesian techniques for parametric as well as nonparametric inference for generalized linear and mixed effects models, models for time to event data and models for comparative effectiveness research with observational data.

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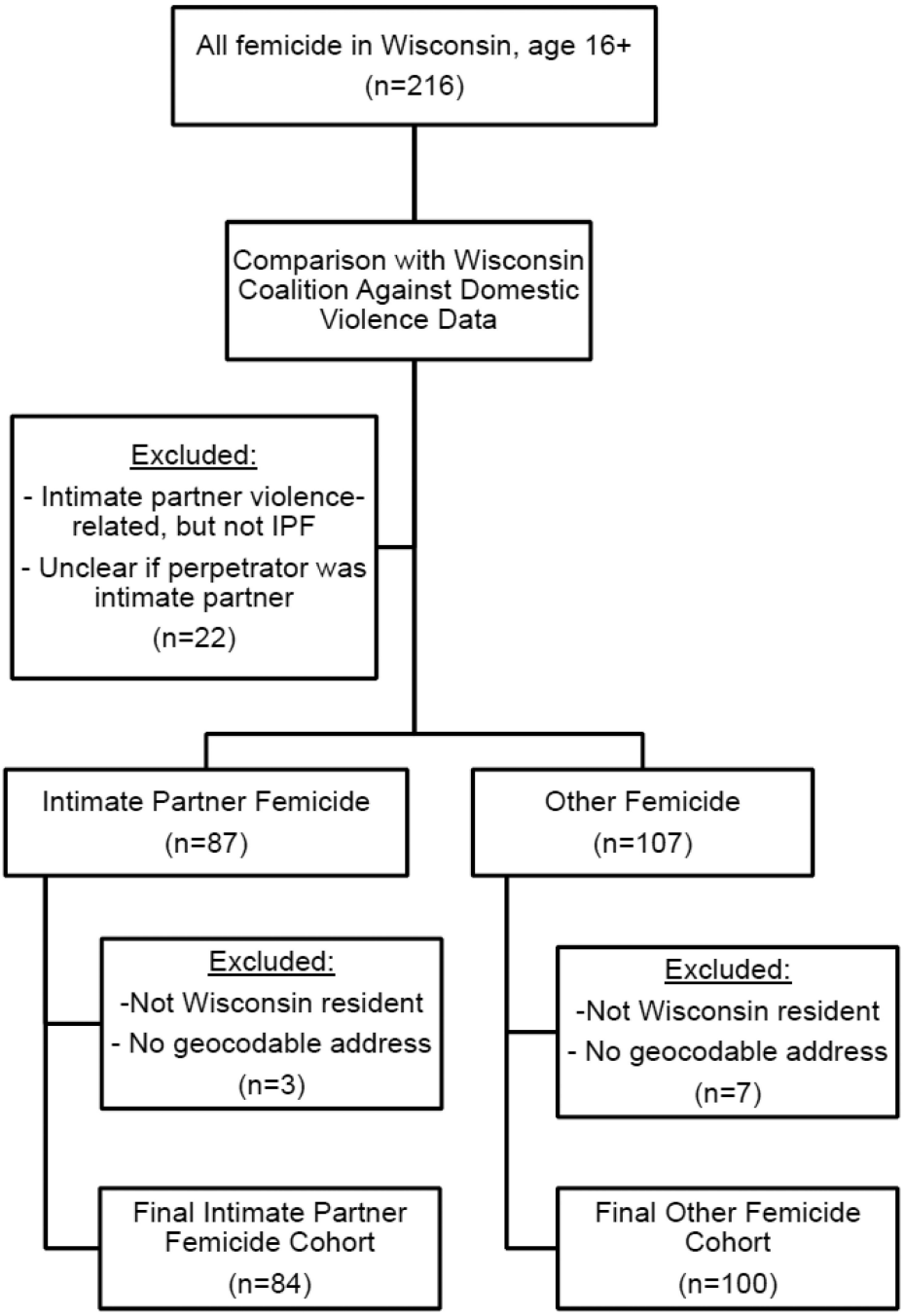

Figure 1.
Process of Identification of IPF and Other Femicide for Final Dataset. Note. IPF = intimate partner femicide.

Table 1

Comparison of WVDRS and WCADV data sources

		Wisconsin Violent Death Reporting System			
		Coded as IPV or jealousy related	**Coded as other femicide**	**Not included in database**	**TOTAL**
Wisconsin Coalition Against Domestic Violence	Described as intimate partner femicide (IPF)	76 (67%)	11 (10%)	4 (4%)	91
	Described as domestic or intimate partner violence related, but not IPF	10 (9%)	n/a	n/a	
	Not included in database	12 (11%)	n/a	n/a	
	TOTAL	98			113

Table 2

Characteristics of Intimate Partner Femicides versus Other Femicides

Victim Characteristics	IPF (n=85) N (%)	Other Femicide (n=102) N (%)	Crude Odds Ratio (95% CI)	p-value (Fisher's exact test)
Age				0.155
16-24	18 (21.2)	29 (28.4)	Referent	
25-34	20 (23.5)	20 (19.6)	1.61 (0.63,4.13)	
35-44	27 (31.8)	20 (19.6)	2.18 (0.88,5.39)	
45+	20 (23.53)	33 (32.4)	0.98 (0.40, 2.37)	
Race				0.047
White	49 (57.7)	48 (47.1)	Referent	
Black	17 (20.0)	37 (36.3)	0.45 (0.21,0.95)	
Other	19 (22.4)	17 (16.7)	1.09 (0.47,2.53)	
Marital status				0.012
Never Married	28 (32.9)	53 (52.0)	Referent	
Married	38 (44.7)	26 (25.5)	2.77 (1.33, 5.76)	
Divorced/Widowed	19 (22.4)	23 (22.6)	1.56 (0.68, 3.58)	
Level of education				0.090
Less than HS degree	15 (17.9)	28 (27.5)	Referent	
HS degree	35 (41.7)	47 (46.1)	1.39 (0.61,3.24)	
Some college or higher *(1 missing record)*	34 (40.5)	27 (26.5)	2.35 (0.98,5.72)	
Country of birth				0.066
USA	74 (87.1)	97 (95.1)	Referent	
Foreign or unknown	11 (12.9)	5 (4.9)	2.88 (0.87,11.00)	
Pregnant at time of death				0.384
Not within last year or unknown	78 (91.8)	97 (95.1)	Referent	
Yes, within last year	7 (8.2)	5 (4.9)	1.74 (0.45, 7.22)	

Homicide Characteristics	IPF (n=84) N (%)	Other (n=102)	Crude odds ratio (95% CI)	p-value
Homicide took place in home				0.002
No	20 (23.5)	42 (41.2)	Referent	
Yes	63 (74.1)	51 (50.0)	2.59 (1.30,5.25)	
Unknown	2 (2.4)	9 (8.8)	0.47 (0.05,2.59)	
Number of penetrating wounds				0.183
No wounds	24 (28.2)	24 (23.5)	Referent	
One wound	15 (17.7)	11 (10.8)	1.36 (0.47,4.01)	
Multiple wounds	28 (32.9)	32 (31.4)	0.88 (0.38,2.00)	
Unknown	18 (21.2)	35 (34.3)	0.51 (0.21, 1.24)	

Homicide Characteristics	IPF (n=84) N (%)	Other (n=102)	Crude odds ratio (95% CI)	p-value
Weapon type causing fatal injury				0.394
Sharp object	21 (24.7)	17 (16.7)	Referent	
Firearm	36 (42.4)	46 (45.1)	0.63 (0.27,1.47)	
Other or Unknown	28 (32.9)	39 (38.2)	0.92 (0.45, 1.85)	
Suspected alcohol use by victim				0.024
No	52 (61.2)	49 (48.0)	Referent	
Yes	18 (21.2)	17 (16.7)	1.00 (0.43,2.32)	
Unknown	15 (17.7)	36 (35.3)	0.39 (0.18,0.85)	

Neighborhood Characteristics	IPF (n=84) Mean (SD)	Other (n=100) Mean (SD)	Crude odds ratio (95% CI)	p-value
Concentrated Deprivation Index				0.017
Lowest 90%	4 (4.8)	16 (16.0)	Referent	
Highest 10%	80 (95.2)	84 (84.0)	0.26 (0.06, 0.87)	
Residential Instability				0.081
Lowest 90%	72 (85.7)	94 (94.0)	Referent	
Highest 10%	12 (14.3)	6 (6.0)	2.61 (0.85, 8.86)	

Urbanicity/Rurality	IPF (n=84) N (%)	Other (n=102) N (%)	Crude odds ratio (95% CI)	p-value
Urbanicity/Rurality				0.075
Metropolitan	59 (71.1)	84 (83.2)	Referent	
Non-metropolitan	24 (28.9)	17 (16.8)	1.95 (0.91, 4.23)	

Table 3

Models Predicting IPF Status (n=184)

Characteristic	Model 1 OR (95% CI), p-value	Model 2 OR (95% CI), p-value	Model 3 OR (95% CI), p-value	Model 4 OR (95% CI), p-value
Victim's Age	0.052	0.047	0.096	0.072
16-24	Referent	Referent	Referent	Referent
25-34	1.28 (0.50, 3.27)	1.51 (0.57, 3.97)	1.32 (0.50, 3.45)	1.60 (0.59, 4.32)
35-44	0.96 (0.34, 2.70)	1.05 (0.37, 2.96)	0.93 (0.32, 2.67)	1.03 (0.35, 3.00)
45+	0.34 (0.11, 1.03)	0.36 (0.12, 1.13)	0.37 (0.12, 1.15)	0.40 (0.13, 1.26)
Victim's Race	0.315	0.731	0.258	0.659
White	Referent	Referent	Referent	Referent
Black	0.55 (0.25, 1.20)	0.75 (0.32, 1.78)	0.50 (0.21, 1.15)	0.70 (0.29, 1.69)
Other	0.76 (0.32, 1.80)	0.76 (0.32, 1.83)	0.78 (0.32, 1.88)	0.76 (0.31, 1.84)
Victim's Marital status	0.017	0.022	0.030	0.034
Never married	Referent	Referent	Referent	Referent
Married	4.14 (1.57, 10.96)	4.06 (1.51, 10.93)	3.82 (1.41, 10.34)	3.80 (1.39, 10.39)
Divorced/Widowed	2.79 (0.95, 8.15)	2.71 (0.92, 8.01)	2.80 (0.94, 8.33)	2.69 (0.89, 8.12)
Level of education	0.600	0.605	0.540	0.558
Less than HS degree	Referent	Referent	Referent	Referent
HS degree	0.95 (0.41, 2.19)	0.85 (0.36, 2.01)	0.94 (0.39, 2.23)	0.85 (0.35, 2.07)
Some college or higher	1.37 (0.55, 3.37)	1.24 (0.50, 3.11)	1.41 (0.56, 3.55)	1.28 (0.50, 3.29)
Concentrated Disadvantage		0.114		0.038
Bottom 90%	---	Referent	---	Referent
Highest 10%		0.34 (0.09, 1.30)		0.19 (0.04, 0.91)
Residential Instability			0.025	0.010
Bottom 90%	---	---	Referent	Referent
Highest 10%			3.65 (1.18, 11.34)	5.22 (1.49, 18.24)
Urbanicity/Rurality		0.674	0.429	0.418
Metropolitan	---	Referent	Referent	Referent

Characteristic	Model 1 OR (95% CI), p-value	Model 2 OR (95% CI), p-value	Model 3 OR (95% CI), p-value	Model 4 OR (95% CI), p-value
Non-metropolitan		1.19 (0.53, 2.68)	1.39 (0.61, 3.16)	1.40 (0.62, 3.18)
Model Summary Statistics	% correctly classified: 63.0% Area Under Curve (AUC): 0.701 Hosmer-Lemeshow: p=0.475	% correctly classified: 64.7% Area Under Curve (AUC): 0.701 Hosmer-Lemeshow: p=0.705	% correctly classified: 69.0% Area Under Curve (AUC): 0.720 Hosmer-Lemeshow: p=0.524	% correctly classified: 65.8% Area Under Curve (AUC): 0.729 Hosmer-Lemeshow: p=0.665

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Table 4

Intimate Partner Femicide, Other Femicide, and All Femicide Rates by Race in Wisconsin

	White women	Black women
IPF rate (per 100,000 person-years)	0.50	3.14
Other femicide rate (per 100,000 person-years)	0.49	6.84
All femicide rate (per 100,000 person-years)	0.99	9.98

Data sources: Wisconsin Violent Death Reporting System, 2004-2008, femicides age 16+; US Census 2000, population by age, sex and race (White only and Black only), ages 15+