Journal of Interpersonal Violence
1–12

DOI: 10.1177/0886260517729404
journals.sagepub.com/home/jiv
SAGE

Risk Factors in Domestic Homicides: Identifying Common Clusters in the Canadian Context

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Abstract

Little research has attempted to examine risk factor combinations when examining intimate partner violence. A variety of risk factors have been identified in domestic homicides, and it is recognized that risk of lethality may increase with the presence of more rather than less risk factors. This relationship is not necessarily linear, however. The objective of this study was to identify whether particular risk factor combinations are common in cases of domestic homicide. The study comprised 183 deaths that occurred between 2002 and 2012 and were reviewed by the Domestic Violence Death Review Committee, Office of the Chief Coroner of Ontario, Canada, with particular focus on the presence/absence of 40 empirically based risk factors. The analyses identified three distinct risk factor clusters that differed primarily by victim–perpetrator relationship and the likelihood of perpetrator suicide or attempts to commit suicide. Cases involving perpetrators currently in legal marriages or cohabitating with their victims were most common among the Non-Depressed/Non-Violent Cluster followed by the Depressed/Violent Cluster. In contrast, the majority of those in the Non-Depressed/Violent Cluster were estranged from their victims and the least likely to attempt/commit suicide. The study demonstrates that particular risk factor combinations are common in cases of domestic homicide. Future

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research should expand the number of risk factors examined, increase the sample size to further test cluster validity, and compare lethal and non-lethal intimate partner violence and homicide to allow for an examination of the clusters more unique to lethality. Prevention initiatives should emphasize the heterogeneity of domestic homicides and target specific interventions.

Keywords
domestic violence, homicide, predicting domestic violence

Introduction

Little research has attempted to examine risk factor combinations when examining violent or other social behaviors (Lim et al., 2012; Ward & Beech, 2014). Therefore, despite the proliferation of research on risk factors in cases of intimate partner violence (IPV) in recent decades, we know little about the way in which particular combinations of risk factors may co-occur. A variety of risk factors have been identified IPV-related deaths, and it is recognized that lethality may increase with the presence of more rather than fewer risk factors (see Brown, Cohen, Johnson, & Salzinger, 1998). However, this relationship is not necessarily linear, although largely treated as such. For example, a case with two risk factors that regularly co-occur may be as or more lethal than a case with multiple different risk factors. Underscoring the need for this research, a recent global epidemiological review of IPV called for a better understanding of the influence of risk factors combined (Stöckl, Devries, & Watts, 2014). To begin to address this knowledge gap, this article examines the following research question:

> **Research Question 1:** Are particular risk factor combinations common in cases of intimate partner homicide?

Prior Research

When predicting risk of sexual offending, Ward and Beech (2014) argued that particular sets of characteristics, social situations, or symptoms together may increase the risk of offending behavior. Only when these sets of factors are identified and described can adequate causal explanations be put forth. Their argument is applicable to ongoing efforts to identify risk factors for other behaviors. For example, Bagley and Ramsay (1997) identified six distinct clusters among male youth suicides in Canada from 1980 to 1986. The first

and largest comprised males aged 20 to 24, with no psychiatric disturbances/histories of illegal drug use, but frequent interpersonal crises. Another cluster captured males with disruptive childhood histories, parental separation, suicide attempts, unstable relationships, and prior criminal activity.

Similarly, Choo, Diederich, Song, and Ho (2014), examining risk factor combinations among individuals who attempted suicide, found those with a history of attempts and particular psychiatric diagnoses (e.g., mood disorders, schizophrenia) were more likely to attempt suicide. Furthermore, individuals with more symptoms of psychotic illness, reports of adverse life events (e.g., unemployment, divorce), experiences with negative feelings, and alcohol use were associated with higher risks of repeated attempts. Finally, Lim et al. (2012) examined what risk factor clusters caused the most deaths and the largest Global Burden of Disease (GBD) worldwide. Using data from 1990 to 2010, they demonstrated that a combination of "dietary risk factors and physical inactivity were responsible for the largest disease burden" (p. 2240). By examining independent and combined effects of 67 risk factors, they provided a more comprehensive analysis than previous global or national studies examining risk factors in a linear fashion.

Despite the proliferation of risk factor research focusing on IPV and homicide, this work has been largely descriptive. One exception is work by Campbell et al. (2003) who examined risk factors for femicide in abusive relationships using an 11-city, case-control study. Their multivariate analysis demonstrated that pre-incident risk factors increased the risk of lethality (e.g., perpetrator access to a gun, previous threats with a weapon, perpetrator's stepchild present in the home, and estrangement) *especially* in situations where the perpetrator had also been a controlling partner. As such, the combination of controlling behavior and other risk factors increased lethality. In addition, a study examined the existence of various subtypes of familicide using U.S. data and identified four categories based on particular factors such as perpetrator age, relationship type, and suicide (Liem & Reichelmann, 2014). They concluded that, although a relatively rare event, such cases were a heterogeneous phenomenon which is important in terms of prevention strategies. Most recently, Myhill and Hohl (2016) used a 27-question risk assessment tool completed by police officers after domestic violence incidents in England and Wales to identify clusters of risk factors associated with coercive control. They find coercive control severe physical violence are often present in domestic violence incidents coming to the attention of police. Beyond these studies, to our knowledge, there has been little systematic examination of how risk factors work together. The goal of the current study is to begin to address this gap in knowledge.

Method

Study Design, Setting, and Data

The research design comprised a retrospective study of homicide cases for which a domestic violence involvement factor was identified by the Office of the Chief Coroner of Ontario, Canada, and reviewed by its Domestic Violence Death Review Committee (hereafter referred to as the Ontario DVDRC). Case reviews began in 2003 and, for the current study, focused on reviews that occurred in the years 2002 to 2012. The total sample comprised 183 domestic violence related deaths. Domestic violence related deaths are defined by the Ontario DVDRC as "homicides that involve the death of a person, and/or his or her child(ren) committed by the person's partner or ex-partner from an intimate relationship" (Office of the Chief Coroner of Ontario, 2014, p. 4). All homicide cases that fall within the parameters of this definition are reviewed once the case is closed, and all related proceedings are complete.

During the review, detailed data are collected about victims and perpetrators, their relationship, and the events prior to the homicide, including the presence or absence of 40 well-known risk factors. For each case, one committee member codes for presence or absence of each risk factor. The case details are presented to the full committee at which time the existence of each risk factor is decided upon by the full committee. Therefore, reliability is high given that eight to 10 individuals must be in agreement and are guided by definitional criteria.[1] Detailed information on risk factors in these data represent a key strength of the study.

Data Analyses

Systematic analysis of the aggregate of domestic violence review committee findings can help to improve overall screening methods and interventions to protect victims (Wilson & Websdale, 2006). Categorical principal components analysis (CATPCA) is used to assess relationships among risk factors and to identify groups of risk factors common to similar cases. These groups of variables are subsequently referred to as components. The analysis was limited to 10 risk factors to ensure the sample size was sufficient to conduct the analysis. Following the CATPCA, the variables making up each component were added together to create two indices which were then analyzed using a two-step cluster analysis. The cluster analysis identifies groups of cases that share similar characteristics. Below, the results are split into three sections. The "Descriptive Results" section looks at the descriptive information for all 183 deaths. The

"CATPCA Analysis" section describes the CATPCA and results. The "Cluster Analysis" section discusses the results of the cluster analysis.

Results

Descriptive Results

Victim/perpetrator characteristics. In this sample, which included heterosexual couples only, the victims were female in 92% and the perpetrators were male in 91% of the cases. The average age of victims was 40 years old, ranging from 15 to 85 years. The average age of perpetrators was 43 years, ranging from 17 to 89 years. The most common type of relationship was legal spouse (33%), followed by common-law partner (22%), estranged legal spouse (19%), estranged dating (14%), and, finally, estranged common-law and current dating unions in 6% each of the remaining cases.

Incident characteristics. Consistent with patterns nationally, stabbing was the most common cause of death in just over one third of the cases (34%), followed by shooting (22%), strangulation (15%), and beating (11%) with miscellaneous "other" categories representing the remaining cases (17%). More than one third of the cases ended with the perpetrator suicide immediately or soon after (36%) or attempts to commit suicide (8%). The majority of homicides involved single victims (89%); multiple victims, usually children, were involved in 10% of the cases.

Risk factors. As shown in Figure 1, almost three quarters (73%) of the perpetrators had a history of domestic violence, making it the most common risk factor, followed by actual/pending separation (70%). Other common risk factors were perpetrator's obsessive behavior (54%), perpetrator depression (50%), prior threats/attempts to commit suicide (49%), escalation of violence (48%), victim's intuitive sense of fear (45%), prior threats to kill the victim (43%), perpetrator unemployed (40%), and perpetrator attempts to isolate the victim (39%). These risk factors have consistently remained among the top risk factors for domestic violence–related homicides in Ontario.

CATPCA Analysis

A CATPCA was conducted to identify any risk factor combinations that enhanced lethality in the sample of cases. To run this analysis, variables that were subject to missing information were treated as an indicator that the risk factor was not present. If an individual was known to have had a history of

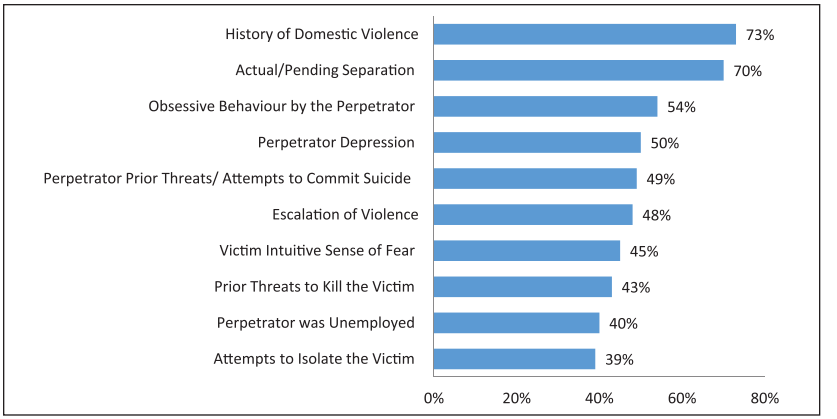

Figure 1. Most common risk factors identified in Ontario domestic violence death reviews.

domestic violence, they were scored "1" for history of domestic violence. If an individual was determined not to have had a history of domestic violence or information was missing, they were scored "0." Using CATPCA to group variables into more meaningful themes or risk conditions identifies interrelating clusters of variables, assuming that there are higher order themes (i.e., components) that explain observed patterns among variables. Variables that relate highly often occur together in the phenomenon being examined (Dancey & Reidy, 2007) and represent more meaningful themes (Joliffe, 2002).

As part of the CATPCA, parallel analysis was conducted to determine the number of components (i.e., groups of variables) in the data (Hayton, Allen, & Scarpello, 2004).[2] As shown in Table 1, the analysis identified two components accounting for 44% of the variance. The first component included history of domestic violence, actual/pending separation, perpetrator's obsessive behavior, escalation of violence, victim's intuitive sense of fear, and prior threats to kill the victim. This factor accounted for 30% of the variance which is considered a good result (Linting & van der Kooij, 2012).

The second component included perpetrator depression, prior threats/attempts of suicide, and perpetrator unemployment. This factor accounted for 14% of the variance which is considered a poor result (Linting & van der Kooij, 2012). However, as the parallel analysis suggested a two-component solution and it is considered the most appropriate method for determining the appropriate number of components (Hayton et al., 2004), the second factor was retained. In CATPCA, outliers can negatively affect variable fit and are typically excluded (Linting & van der Kooij, 2012). As such, the factor

Table 1. Component Loadings.

		Dimension	
		1	2
1.	History of domestic violence	.645	−.068
2.	Prior threats to kill the victim	.608	−.057
3.	Prior attempts to isolate the victim	.608	−.221
4.	Escalation of violence	.681	−.047
5.	Obsessive behavior displayed by perpetrator	.703	.041
6.	Actual or pending separation	.607	.007
7.	Victims intuitive sense of fear of perpetrator	.628	−.324
8.	Perpetrator was depressed (global measure)	.172	.707
9.	Perpetrator had prior threats attempts suicide	.262	.660
10.	Perpetrator unemployed	.234	.513

solutions were examined for outliers, defined as component values greater than 3.0 or less the −3.0. No outliers were found, meaning all variables could be retained in this analysis.

Next, the two components identified above were each converted into an index. Each variable in the factor was added to one another and then divided by the total number of variables to create an index variable. The values of the scores on these indices ranged from 0 to 1 with "0" indicating a case did not have any of the risk factors present and a "1" indicating the case had all of the risk factors present. The first component contained variables primarily focused upon violent behaviors and was, therefore, called the Violence Index (see Items 1 to 7 in Table 1). As shown in Table 2, this index had a mean of 0.53 and a standard deviation of 0.31, demonstrating that, on average, each offender had committed 53% of the items listed in the Violence Index, but the deviation indicates significant variation across cases. The second component contained variables relating to depression, suicide, and unemployment and, as such, was called the Depression Index (see Items 8 to 10 in Table 1). This index had a mean of 0.45 and a standard deviation of 0.35, indicating that the average offender committed 45% of the items in the Depression Index but, again, there was significant variation across cases.

Cluster Analysis

The two indices were then explored using two-step cluster analysis. Results identified three clusters and with a good cluster quality score of 0.5 (Mooi & Sarstedt, 2011). Individual cases were classified into the three clusters

Table 2. Indices Values.

	M	*SD*
Violence Index	0.53	0.31
Depression Index	0.45	0.35

Table 3. Significant Differences in Cluster Characteristic.

	% of Cases	Victim *M* Age*	Still Married, Common Law or Dating*	Estranged Relationship*	Suicide, Includes Attempts†
Non-Depressed/Non-Violent Cluster	34	44	79%	21%	48%
Depressed/Violent Cluster	34	40	60%	40%	48%
Non-Depressed/Violent Cluster	32	36	43%	57%	33%

†$p < .1$. *$p < .05$.

referred to as Non-Depressed/Non-Violent Cluster, Depressed/Violent Cluster, and Non-Depressed/Violent Cluster. These clusters were compared using *t* tests and cross-tabulations to determine if significant differences existed. Significant results are discussed below and shown in Table 3.

Non-Depressed/Non-Violent Cluster. The first cluster was comprised of perpetrators with low scores on the Depression Index (0.16) and the Violence Index (0.25). As these offenders had little history of violence or depression, they were called the Non-Depressed/Non-Violent Cluster. This cluster comprised 34% of the perpetrators. The mean victim age was 44 years and 48% of perpetrators had committed or attempted to commit suicide.[3] A total of 79% of this group were currently married, common law, or dating at the time of the homicide and 21% were estranged.

Depressed/Violent Cluster. The second cluster comprised perpetrators with high scores on the Depression Index (0.85) and moderate scores on the Violence Index (0.53), meaning perpetrators were depressed and violent, thus labeled the Depressed-Violent Cluster. This group also comprised 34% of the cases and the victims were, on average, 40 years old, and similar to the previous cluster, 48% of perpetrators committed/attempted suicide. A total of 60% of this group was currently in a relationship and 40% were estranged.

Non-Depressed/Violent Cluster. The final cluster captured perpetrators with low scores on the Depression Index (0.34) and high scores on the Violence Index (0.84). This cluster comprised the remaining 32% of the cases. The mean age of the victims was significantly younger than the Non-Depressed/Non-Violent Cluster at 36 years. These perpetrators had a lower likelihood of committing/attempting suicide (33%). The largest relationship group in this cluster was estranged at 57% followed by 43% in current, legal/common-law/dating relationships.

Discussion

The analysis identified three risk factor clusters that differed primarily by the victim–perpetrator relationship. Specifically, cases involving perpetrators who were currently in legal marriages as well as cohabitating with or dating their victims were most common among the Non-Depressed/Non-Violent Cluster followed by the Depressed/Violent Cluster. In contrast, the majority of those in the Non-Depressed/Violent Cluster were estranged from their victims. This finding is consistent with prior research demonstrating that the victim–perpetrator relationship is critical to understanding the context and dynamics of homicide, particularly intimate partner homicide (e.g., Campbell et al., 2003; Dawson & Gartner, 1998). This fact has recently been underscored by an international epidemiological review of IPV that identified relationship status and quality as significant factors that could increase or decrease the risk of violence (Stöckl et al., 2014). Measured variably across studies, marital status, relationship duration, and number of children were common indicators of relationship quality with higher rates of violence shown among cohabiting women and in shorter relationships (Stöckl et al., 2014).

The Non-Depressed/Violent Cluster, in which estrangement was most common, was also least likely to involve perpetrators who committed/attempted suicide. Actual/pending separation has been well-documented as a risk factor, but we know little about how its presence varies across perpetrators. The more minimal role played by depression demonstrated here as well as the lower likelihood of suicide highlight that such cases may require more targeted and specific interventions.

Limitations and Future Directions

While one strength of this study is the detailed documentation of the presence or absence of risk factors by the full DVDRC committee, the fact that information was not known for some of risk factors has the

potential to distort results. To account for this possibility, the analysis was limited to 10 risk factors to maintain sample size and to keep missing information to a minimum; however, this could result in other equally important risk factors being ignored. Despite these limitations, the study represents one of the first to systematically examine how risk factors may work together in intimate partner homicide cases, responding to the recent call for more work in this area (Stöckl et al., 2014). Because the sample consisted of only homicides, however, we were not able to assess whether these clusters actually increased lethality and this is a priority for future research.

The information generated from the above analysis remains important for intervention and policy development. Liem and Reichelmann (2014) have shown the heterogeneity of familicide, and it is also clear that domestic homicides in general are not a homogeneous category. They should not be treated as such when designing prevention initiatives. To further explicate types of domestic homicides, future research should expand the number of risk factors examined, increase sample sizes to further test the validity of clusters, and explore the potential role of other emerging clusters. This would provide a more nuanced understanding of the way in which particular risk factor combinations may increase lethality. Larger samples and more targeted data collection would also enhance the ability to capture the role of varying social identities (e.g., race/ethnicity, class, sexual orientation, etc.) which would build knowledge about how diversity impacts trends and patterns in lethal violence and how particular groups of homicide may be associated with varying identities. Due to missing data on some of these variables as well as very small numbers, we were not able to address diversity in any meaningful way beyond gender. A logical starting point, building on the current study, is to examine how relationship status, depression, and prior violence might vary across cases, leading to different risk factor combinations. Perhaps equally, if not more, important is to determine if such clusters increase lethality which would require a comparative sample of both lethal and non-lethal cases of IPV.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

Notes

1. A list of risk factors and definitions is available in Ontario Domestic Violence Death Review Committee (DVDRC) reports published by the Office of the Chief Coroner; see http://www.mcscs.jus.gov.on.ca/english/DeathInvestigations/office_coroner/PublicationsandReports/DVDR/DVDR.html
2. The SPSS Syntax Code to conduct the parallel analysis was provided by O'Connor (2000) in an appendix.
3. The chi-square cross-tabulation value comparing committed or attempted suicide in the three clusters narrowly missed being statistically significant at the .05 level. It is being retained for this discussion as future analysis should verify this relationship.

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