



## Intentional injury and violent death after intimate partner violence. A retrospective matched-cohort study

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### ABSTRACT

The incidence of intimate partner violence (IPV) varies according to IPV definitions and data collection approaches. The criminal Justice system assesses IPV through a review of the evidence gathered by the police and the court hearings. We aimed to determine the association between IPV, as identified in criminal Justice disposition records, and subsequent healthcare-identified intentional injury inflicted by others, including violent death. We conducted a retrospective population-based matched-cohort study using linked multisectoral databases. Female adult Manitoba residents identified as victims of IPV in provincial prosecution and disposition records 2004 to 2016 ( $n = 20,469$ ) were matched to three non-victims ( $n = 61,407$ ) of similar age, relationship status and place of residence at the date of the IPV incident. Outcomes were first healthcare use for intentional injury and violent death, assessed in Emergency Department visits, hospitalizations and Vital Statistics deaths records. Conditional Cox Regression was used to obtain Hazard Ratios (HR) with 95% confidence intervals (CI). The risk of intentional injury was 8.5 per 1000 women among non-victims of IPV and 55.8 per 1000 women among IPV victims. The Hazard Ratios associated with IPV were 3.8 (95% CI: 3.4, 4.3) for intentional injury and 4.6 (95% CI: 2.3, 9.2) for violent death, after adjustment. IPV victims experienced half the risk of subsequent intentional injury if the accused received a probation sentence. Our findings suggest that Justice involvement represents an opportunity for intersectoral collaborative prevention of subsequent intentional injury among IPV victims.

### 1. Introduction

Intimate Partner Violence (IPV), defined as physical, sexual, or psychological violence by a current or former intimate partner or spouse, affects 30% of women globally. Its prevalence varies from 16% in East Asia to 65% in Central Sub-Saharan Africa (Devries et al., 2013) and between population subgroups within nations, such as visible and ethnic minorities (Daoud et al., 2013; Petrosky et al., 2017) and materially-deprived women (Campbell, 2002; Miller and McCaw, 2019). While both women and men can be victims of IPV, women are more frequently and severely victimized, with over 40% of murders of women in North America and high-income countries being committed by

intimate partners (Campbell, 2002; Stöckl et al., 2013). A recent U.S. survey indicates that 37% of women have experienced IPV in their lifetime and 23% have experienced severe physical violence by an intimate partner (Smith et al., 2017). A history of IPV is a major risk factor for female homicide (Campbell et al., 2007) with about 55% of female deaths being IPV-related and 11% experiencing violence in the month preceding the death (Petrosky et al., 2017).

Due to its complexity and sensitive nature, measurement of IPV is challenging in research studies and its incidence varies according to the definitions and data collection approaches (Kelly and Johnson, 2008; Ali et al., 2016). Despite the crucial role that the healthcare system serves in identifying and supporting victims of IPV (American College of

*Abbreviations:* IPV, Intimate partner violence; ICD-9-CM, International classification of diseases, 9th revision, clinical modification; ICD-10-CA, International statistical classification of diseases and related health problems, tenth revision, Canada; MCHP, Manitoba Centre for health policy; ED, Emergency department.

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Obstetricians and Gynecologists, 2012) IPV is not comprehensively captured in healthcare information systems because of the almost exclusive focus on the physical recovery of the injured patient (victim) and lack of provision to collect information on perpetrators and the context of the violence. Healthcare information systems rarely go beyond the identification of intentional injuries based on diagnoses, without being able to distinguish injuries perpetrated by intimate partners from those perpetrated by others, or identify forms of abuse or violence that are risk factors for intimate partner homicide but do not necessarily result in physical injuries, such as harassment and controlling behaviors.(Stark, 2007) The criminal justice system also deals with the more severe region of the spectrum of intimate partner abuse and violence. Criminal justice and health data tend to represent a subset of IPV called Intimate Terrorism (Johnson, 1995, 2008) that encompasses severe, repeated violence based in a desire of the perpetrator to control the victim. Wider samples of the community, by contrast, are primarily comprised of Situational Couple Violence, which tend to involve less severe forms of violence stemming from a desire to control a particular situation.(Johnson, 1995, 2008) The severity of cases of intimate terrorism results in their greater likelihood of coming to the attention of the police and/or the health care system. However, from a data collection perspective, the criminal justice system generates more comprehensive and reliable data on IPV cases than healthcare information systems. This is because it undertakes a more systematic assessment of alleged domestic violence and IPV incidents to arrive at a decision on the charges, through a review of the evidence gathered by the police and from the victim, accused and witnesses during the court process. From a public health perspective, knowledge on the characteristics of IPV cases in the criminal justice may help predict and prevent subsequent intentional injuries that are treated in healthcare settings such as Emergency Departments (ED) and hospitals, including homicides.

More specifically, criminal prosecution and disposition databases in the province of Manitoba, Canada provide information on the victim, the accused, and characteristics of the IPV case, including physical violence, the outcome of a charge (i.e., disposition) and conviction. To quantify the risk of female intentional injury and violent death following IPV identified in the criminal justice system, and related factors, we conducted a population-based retrospective matched-cohort study using linked administrative justice, healthcare and social databases available in the province of Manitoba.

## 2. Methods

### 2.1. Study design, setting & participants

Manitoba is a central Canadian province with 1.3 million residents in an area slightly smaller than Texas. This is a retrospective matched-cohort study that uses linked health, justice and social databases accessed at the Manitoba Population Research Data Repository. The Repository maintains intersectoral linked data of all Manitoba residents, who are covered by the publicly funded and free of charge provincial health insurance plan. The data are de-identified before they arrive at the Repository and all datasets have a scrambled version of the Personal Health Identification Number, which allows for person-level anonymous linkage across all datasets. The study population includes Manitoban women aged 18–64 in the period 2004–2016.

The Exposed group was composed of women who appeared as victimized by a male intimate partner with a domestic violence-related charge in prosecution and disposition records. Same-sex unions were not considered due to low numbers and lack of validation studies on the quality of sex and gender data. IPV victimization data are available since January 1, 2002. A woman's first IPV victimization since January 1, 2004 was chosen as the index date to ensure that all women had no history of IPV in the past two years. Women were excluded if they had a health service contact for assault in the two years prior to the index date. This washout period was set up to increase the probability of capturing

incident rather than prevalent cases, since more than two thirds of female victims of domestic violence are re-victimized within a year (Rand and Saltzman, 2003). All women were followed until the first occurrence of intentional injury or violent death. Subsequent occurrences were not considered, as the focus of the study is on incidence. Participants were censored if lost to follow-up (i.e., moving out of Manitoba), died of other causes or reached the end of study period.

### 2.2. Variables and data sources

#### 2.2.1. Intimate partner violence

IPV was assessed through justice prosecution (PROsecution Information and Scheduling Management System) and disposition (Criminal Courts Automated Information Network) databases. An episode of IPV was present when an eligible woman appeared as a victim of a domestic violence incident in a linked prosecution-disposition record where the accused was a male with a disposition record asserting the outcome of the domestic violence charge related to the victim. Prosecution records identify the victim and the accused based on information initially provided by Winnipeg Police Services or the Royal Canadian Mounted Police and subsequently updated during court appearances. Disposition records are cross-referenced to prosecution records and contain the charges and corresponding sentences that apply to the accused. The linkage rate of the disposition records with the Manitoba Health Insurance Registry is 96.1%.(Manitoba Centre for Health Policy, 2018) To remove cases of domestic violence that were not IPV, incidents in which the victim was a parent, a child, or a sibling of the accused were excluded, retaining records where the accused was a male who may be a spouse, common-law or dating partner. The sex and age of the victim and accused, their place of residence and relationship status were ascertained in the Manitoba Health Insurance Registry, a roster of all Manitoba residents covered by the universal provincial healthcare plan. Potential perpetrators of IPV may have been accused of multiple charges at the same IPV incident or at a subsequent incident. To remove duplicates, we retained only one charge made "against a person" directly related to the IPV incident and excluded administrative violations, such as breaking curfews, or offences against the law, such as speeding, that applied to the same individual. IPV-related variables included physical violence, defined by the presence of any physical violence in the IPV incident as determined in court proceedings, whether the accused was convicted for IPV, whether the accused was a youth (between the ages of 12–17), and whether the accused received a probation sentence.

#### 2.2.2. Outcomes

We defined the study outcomes in different, although related, ways. First, any intentional injury was defined through acute health service use (hospitalization or ED visit) for assault or violent death. Second, we distinguished intentional injury according to the location of the healthcare presentation (i.e., emergency department visits, hospitalizations) and deaths only. ED data were available for the Winnipeg Regional Health Authority, with a catchment area encompassing the City of Winnipeg and surrounding areas, covering approximately 70% of the Manitoba population. ED data included various databases summarizing the main diagnoses of the patient records. The Urgent Care database had ICD-9-CM or ICD-10-CA codes. The National Ambulatory Care Reporting System identifies assault through chief complaint fields, while for E-Triage, and Emergency Department Information Systems we used text-based searches for assault and related strings. Hospital data were available province-wide for the whole study period, and coded according to the International Classification of Diseases, 9th Revision, Clinical Modification (ICD-9-CM), codes E960-E969, and the International Statistical Classification of Diseases and Related Health Problems, Tenth Revision, Canada (ICD-10-CA), codes X85-Y09, Y87.1, T74.0-T74.9. Violent death was assessed in Vital Statistics mortality records using ICD-10 codes. Appendix Table 1 provides coding details.

Covariates were measured at the time of the index date, defined as

the date of the first IPV incident in the study period according to justice records, and included number of children a woman had at the index date, neighbourhood income quintile, whether the woman was foreign-born, receiving income assistance, number of residential moves (postal code changes) and whether a woman was convicted of a crime in the past two years.

### 2.3. Statistical analysis

We tabulated characteristics of IPV victims and non-victims, and calculated standardized differences. We used conditional cox regression to estimate hazard ratios (HR) between IPV and intentional injury and violent death, with 95% confidence intervals (CI), accounting for the matched design. Three women with no known history of IPV in the two years preceding the index date were matched to every IPV victim on age, region of residence, and relationship status (i.e., spouse of the accused or not). A 3:1 control to case ratio was chosen to increase statistical power and prevent losses of cases when a matched control is lost to follow up. (Hennessy et al., 1999; Wacholder et al., 1992) Thus, when a non-victim became an IPV victim during follow-up time, the woman was censored as unexposed, reclassified as exposed and matched to three new non-victims. Individuals were censored when they experienced the outcome, died from other causes, were lost to follow up (at the time they left the province based on healthcare coverage cancellation), or at the end of the study period. We ran unadjusted models and models adjusted for the covariates described above. In secondary analysis, IPV-specific variables were used to stratify IPV victims into categories based on differential exposure to physical violence, and whether or not the accused was convicted for IPV, received a probation sentence, and was a youth. In a sensitivity analysis, we restricted the outcome to intentional injuries captured in hospitalizations and deaths, which were available province-wide, and did not count ED visits, which were only available for the Winnipeg metropolitan area, the largest urban conglomeration in the province. Statistical analyses were conducted with SAS 9.4 (SAS Institute, Cary, NC). Programing code was peer-reviewed by an experienced analyst at the Manitoba Centre for Health Policy (MCHP).

### 2.4. Data access, ethics

The data used for this study were from the Manitoba Population Research Data Repository housed at the MCHP, University of Manitoba. Use of the data for this study was approved by the Research Ethics Board of the University of Manitoba and the Health Information Privacy Committee of Manitoba.

## 3. Results

There were 51,687 women aged 18–64 years between 2004 and 2016 that were identified in the Justice data as victims of any crime and had not experienced intentional injuries in the previous two years. We sequentially excluded 1965 women who were not Manitoba residents, 29 women not covered by the provincial health insurance during the study period, 285 women who experienced intentional injuries in the two years prior to the start of the follow-up and 28,939 women who were not victims of domestic violence episodes or were victims of domestic violence episodes that were not IPV (i.e., the accused were not an intimate partner but a child, parent or sibling of the victim). After exclusions, there were 20,469 residents exposed to IPV. Three unexposed women who had not experienced the outcome in the previous two years were matched to every exposed woman on region of residence, age and relationship status, giving a total analytic sample of 81,876 women.

The majority of women were young adults, were not in a spousal relationship and resided in Winnipeg (Table 1). IPV victims were more likely to reside in lower income neighborhoods, have a higher number of children, be receiving income assistance, have moved in the two years prior to the start of follow up, and have been convicted for a crime than

**Table 1**  
Characteristics of the study population.

Matching variables	Non-victims		IPV victims	
	N	%	N	%
Age at index date, years				
18–24	22,118	36.0	7372	36.0
25–34	19,580	31.9	6529	31.9
35–44	12,441	20.3	4144	20.3
45–54	5788	9.4	1930	9.4
55–64	1480	2.4	494	2.4
Woman had a spouse at the index date	8616	14.0	2872	14.0
Region of residence				
Central	3717	6.1	1239	6.1
North Eastman	2571	4.2	857	4.2
South Eastman	1488	2.4	496	2.4
Interlake	3498	5.7	1166	5.7
Nor-man	2688	4.4	896	4.4
Parkland	2913	4.7	971	4.7
Burntwood	9231	15.0	3077	15.0
Churchill	120	0.2	40	0.2
Brandon	2598	4.2	866	4.2
Assiniboine	2304	3.8	768	3.8
Winnipeg	30,108	49.0	10,036	49.0
Public trustee	171	0.3	57	0.3
Adjusting variables				
Neighbourhood income quintile at index date				
Q1 (lowest)	14,837	24.2	9119	44.6
Q2	12,524	20.4	4502	22.0
Q3	10,492	17.1	2772	13.5
Q4	11,347	18.5	2440	11.9
Q5 (highest)	12,207	19.9	1636	8.0
Number of children at index date				
No children	34,264	55.8	4745	23.2
1–2 children	19,117	31.1	9089	44.4
3–4 children	6374	10.4	4650	22.7
5+ children	1652	2.7	1985	9.7
Received income assistance at the time of IPV	4405	7.2	6162	30.1
Moved residences within 2 years of index date				
No moves	47,354	77.1	12,325	60.2
1–2 moves	13,645	22.2	7372	36.0
3–7 moves	408	0.7	772	3.8
Foreign-born	2932	4.8	531	2.6
Women convicted in the previous 2 years	544	0.9	786	3.8
IPV-related variables				
IPV episode involved physical violence	–	–	18,871	92.2
Accused was convicted of physical violence	–	–	7885	38.5
Accused was a youth	–	–	235	1.2
Accused received a probation sentence	–	–	3479	17.0

non-victims. Among IPV cases, 92% of them involved physical violence but only in 39% the accused was convicted of physical violence. The top two charges in the cases where physical violence was not present were threats and harassment. The most common disposition among the non-convicted was a stay of charges (data not shown).

Among IPV Victims, the risk of any intentional injury was 55.8 per 1000 women, compared to 8.5 per 1000 among non-victims (Table 2). After adjustment, the HR for any intentional injury associated with IPV was 3.79 (95% CI: 3.37–4.25). The risk of violent death was 1.3 per 1000 women among victims of IPV and 0.3 per 1000 among non-victims (adjusted HR: 4.56; 95% CI: 2.30–9.16). After adjustment, there were no substantial differences in the association according to whether the injury was treated in an Emergency Department, in hospitals or was lethal. However, among IPV victims, 9% of injury hospitalizations and 26% of deaths occurred within one week of the date of the IPV incident but most injuries occurred after one year of the IPV incident.

Table 3 is restricted to IPV victims and stratifies the IPV exposure into different dimensions to account for heterogeneity of risk. Victims whose IPV episode involved physical violence were more likely to experience subsequent intentional injury (aHR: 1.74; 95% CI: 1.33, 2.29) compared to victims whose IPV episode did not. However, there was not an increased risk of injury among victims whose accused partner

**Table 2**  
Hazard ratios for Intentional Injury and Violent death associated with prior IPV victimization.

	Non-victims (N = 61,407)		IPV victims (n = 20,469)		Victims vs. non-victims	
	No. events	Incidence rate (per 1000 women)	No. events	Incidence rate (per 1000 women)	HR (95% CI)	AHR <sup>a</sup> (95% CI)
Any intentional injury	521	8.5	1142	55.8	6.68 (6.02–7.41)	3.79 (3.37–4.25)
Emergency-visits only	225	3.7	556	27.2	7.54 (6.46–8.80)	4.20 (3.52–5.00)
Hospital-only	281	4.6	560	27.4	6.07 (5.26–7.00)	3.38 (2.88–3.96)
Violent death	16	0.3	27	1.3	5.12 (2.76–9.51)	4.56 (2.30–9.16)

<sup>a</sup> Adjusted for number of children, neighbourhood income quintile, residence changes, receipt of income assistance, foreign-born and conviction in the 2 years prior to the start of the follow up.

**Table 3**  
Hazard ratios for Any Intentional Injury among IPV victims.

	No. events	No. of women	Rate (per 1000 women)	HR (95% CI)	AHR <sup>a</sup> (95% CI)
IPV episode involved physical violence					
No	54	1598	33.8	1.00	1.00
Yes	1088	18,871	57.7	1.85 (1.41, 2.44)	1.74 (1.33, 2.29)
Accused was convicted of physical violence					
No	706	12,584	56.1	1.00	1.00
Yes	436	7885	55.3	0.98 (0.98, 1.11)	0.99 (0.88, 1.11)
Accused was a youth					
Not youth	1121	20,234	55.4	1.00	1.00
Youth	21	235	89.4	1.64 (1.06, 2.52)	1.62 (1.05, 2.49)
Accused received a probation sentence					
No	1033	16,990	60.8	1.00	1.00
Yes	109	3479	31.3	0.50 (0.41, 0.61)	0.57 (0.46, 0.69)

<sup>a</sup> Adjusted for number of children, neighbourhood income quintile, residence changes, receipt of income assistance, foreign-born and conviction in the 2 years prior to the start of the follow up.

was convicted of physical violence compared to victims whose partner was not convicted. Women victimized by a youth partner were at higher risk (aHR: 1.62; 95% CI: 1.05, 2.49). Victims whose accused partner was given a probation sentence were at lower risk of subsequent injury (aHR: 0.57; 95% CI: 0.46, 0.69) compared to those whose partner did not receive a probation sentence. Comparisons with non-victims of IPV are shown in [Appendix Table 2](#).

**Table 4**  
Hazard ratios for Intentional Injury resulting in hospitalization or death among IPV victims.

	No. events	No. of women	Rate (per 1000 women)	HR (95% CI)	AHR <sup>a</sup> (95% CI)
IPV episode involved physical violence					
No	27	1598	16.9	1.00	1.00
Yes	559	18,871	29.6	1.90 (1.29, 2.79)	1.73 (1.17, 2.54)
Accused was convicted of physical violence					
No	371	12,584	29.5	1.00	1.00
Yes	215	7885	27.3	0.92 (0.78, 1.09)	0.92 (0.78, 1.09)
Accused was a youth					
Not youth	577	20,234	28.5	1.00	1.00
Youth	9	235	38.3	1.37 (0.71, 2.64)	1.40 (0.72, 2.70)
Accused received a probation sentence					
No	529	16,990	31.1	1.00	1.00
Yes	57	3479	16.4	0.52 (0.39, 0.68)	0.55 (0.42, 0.73)

<sup>a</sup> Adjusted for number of children, neighbourhood income quintile, residence changes, receipt of income assistance, foreign-born and conviction in the 2 years prior to the start of the follow up.

Analyses restricted to hospital and death data showed similar patterns of associations overall and according to victims' characteristics ([Table 4](#)). The similar direction and strength of the associations suggests that the main findings are not substantially affected by the inclusion or incompleteness of ED data, with the possible exception of the association with youth perpetration, which was affected by a small number of events after exclusion of ED visits. Comparisons with non-victims of IPV are shown in [Appendix Table 3](#).

#### 4. Discussion

This population-based study shows that compared to non-victims, women identified in the criminal Justice system as IPV victims were four times more likely to subsequently experience intentional injuries or violent death. The association did not substantially vary according to the data sources reflecting the severity of the injuries (ambulatory visits, overnight hospitalizations, deaths). Furthermore, the presence of physical violence and a youth partner in the IPV victimization was associated with higher risk of intentional injury, whereas a probation sentence on the accused was associated with half the risk of subsequent injury among IPV victims.

Our study has limitations. First, the use of administrative data that are not collected for research purposes limited analytic options. Emergency Department data were only complete for the Winnipeg Regional Health Authority during the whole study period. However, analyses restricted to hospitalizations did not substantially affect our findings. Second, the study population was restricted to female victimization and male accusation, and therefore our findings cannot be directly generalizable to male victimization or non-binary relationships. Although we accounted for various potential confounders, including immigration status, we were unable to consider ethnic origin, mainly Indigenous women. Third, unlike the Justice data, healthcare data does not provide information on the perpetrators. Therefore, it cannot be assumed that the accused involved in the IPV episode were the perpetrators of the healthcare-identified injury or death. Fourth, our measure of IPV based on criminal Justice records is likely to underestimate the true incidence of IPV in the population by capturing more serious IPV episodes involving the police and the justice system. Family civil courts also deal with domestic trouble but we did not have access to these cases. Some women classified as non-victims in this study may have suffered IPV victimization not captured by the criminal Justice system, which may result in an underestimation of the observed associations. For example, many homicide victims in the U.S. do not seek help from the justice system prior to their murder. ([Logan and Lynch, 2014](#); [Moracco et al., 1998](#); [Vittes and Sorenson, 2008](#)) Intentional injuries may also be underreported in healthcare data or misclassified as non-intentional. Lastly, the exposure was defined at the first incident of IPV in the study period and subsequent IPV episodes occurring before the intentional injury were not considered. A first incident in the study period after a 2-year washout period of non-victimization may not be the first IPV incident a woman experienced and therefore some cases may be prevalent rather than incident.

A correlation between justice-identified IPV and intentional injuries is not surprising, as documented by previous studies. ([Campbell et al.,](#)

2007; Hoelle et al., 2015; Kothari and Rhodes, 2006) Our study not only confirms this association using a large sample at the population-level but also quantifies prospectively the risk of intentional injuries after an IPV incident overall, and according to the type of healthcare provider, which partially reflects the severity of the injury. Interestingly, the association did not substantially differ if the injury was treated in an Emergency Department, required an overnight hospitalization or was lethal. This finding suggests that the severity of injuries following an IPV incident may be difficult to predict. Although physical violence was positively associated with subsequent injury among IPV victims in our study, those who were only exposed to threats or harassment still had higher risk of injury than non-victims. This observation may reflect a larger and more pervasive pattern of coercive control<sup>12</sup> that may eventually manifest in physical violence. Moreover, conviction of physical violence was not associated with lower risk of subsequent injury among IPV victims. A British study found that, among victims of assault attending hospitals and followed through the court process, injury severity was not associated with convictions in the criminal justice system.(Shepherd, 1997) The authors argued that this finding reflects reliance of the criminal justice process on the victims to make a complaint. In our study, in most of the IPV cases in which the accused was not convicted the sentence was a stay of charges rather than non-guilty, which suggests that the prospects of successful prosecution were weak at the moment but a conviction potential was not ruled out. During the study period the province of Manitoba adhered to a domestic violence zero-tolerance policy,(Manitoba Department of Justice, 2015) meaning that upon reasonable and probable grounds the police must lay a charge of assault. Once charges are laid, if there is no reasonable likelihood of conviction (in many cases due to the victim's refusal to testify or cooperate with the assailant's prosecution), the Crown Attorney may enter a stay of proceedings, which provides the flexibility to recommence the proceedings if circumstances change. It is known that many IPV victims do not cooperate with the criminal prosecution of their abusive partners for different reasons, such as fear of retaliations to her children, to expose her children to the agitation and instability caused by the justice system involvement, and inability to terminate the relationship with their assailants due to economic dependence and childcare responsibilities.(Shepherd, 1997; Rhodes et al., 2010; Cerulli et al., 2014) These mechanisms may prevent women from obtaining appropriate social and legal support and confine them in violent relationships, with potential escalation that may help explain both the increased risk of subsequent physical injury observed in our study and a high proportion of stay of charges, despite a zero-tolerance policy.

In the absence of information on the perpetrators in the healthcare data, it cannot be assumed that the perpetrator of the injury is the accused of the IPV case. However, prior research suggests that this may be a frequent scenario. For example, one study showed that within 10-years about half of domestic violence offenders were re-arrested.(Richards et al., 2014) Within one year of a previous offence one third of batterers were arrested on another domestic violence charge (Ventura and Davis, 2005) and in the context of a domestic violence court, 19.5% of offenders had a previous domestic violence arrest in the previous year.(Collins et al., 2019).

We also found that victims whose partners had a probation order experienced half the risk of subsequent injury hospitalization than those whose partners did not have a probation order. A probation order is a rehabilitative sentencing instrument aimed at reintegrating the offender into the community and positively influencing his future behavior. However, those who received probation orders may be different than those who did not. They may be regarded as more amenable to behavior modification, have less severe offences or fewer previous offences that may be associated with lower recidivation. Other legal instruments, such

as protection orders applied to IPV offenders were associated with reduced police incidents and emergency department visits during and after the order.(Kothari et al., 2012) Another study found that 89% of female victims of homicide did not have a restraining order.(Vittes and Sorenson, 2008) While research on offenders' recidivism has gained more traction in recent years, fewer studies have focused on the consequences of repeated victimization to victim's health and well-being. This is important since about two thirds of female victims of domestic violence are revictimized.(Rand and Saltzman, 2003; Kuijpers et al., 2012) Repeated victimization may exacerbate known consequences of IPV, such as mental health disorders including posttraumatic stress disorder, affect new relationships and health behaviors, such as addictions,(Hegadoren et al., 2006) and pose direct and indirect burden on the healthcare system. Further studies are needed to fully understand patterns of repeated victimization and their impact on women's health and the healthcare system.

The observation that IPV victims identified in the Justice system were at high risk of subsequent intentional injuries or violent death suggests that justice involvement represents an opportunity for various interventions to prevent future victimization and provide tangible resources for victims to meaningfully change the circumstances that enable repeated victimization. Cooperation between the criminal Justice System, social and healthcare services, including mental health services to both victims and offenders, is increasingly regarded as a fertile avenue to eradicate domestic violence.(Rhodes et al., 2010; Lee et al., 2018) This is a complex problem unlikely to be controlled solely by the justice system or the healthcare system, but by wider cross-sectoral collaborations that leave no space to practices that reproduce domestic violence.

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#### Credit author statement

Marcelo Urquia and Marcello Nesca conceived the study. Marcelo Urquia obtained funding, supervised its execution and edited the manuscript. Marcello Nesca analyzed the data and wrote the first draft of the manuscript. Wendy Au created the cohorts and contributed to study design and analysis. Lorna Turnbull, Marni Brownell and Douglas Brownridge contributed to interpretation and reporting of the data. All authors made critical contributions to the manuscript, approved the final version and accepted responsibility for its contents.

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**Appendix**

**Appendix Table 1**

Identification of intentional injury inflicted by others and violent death in administrative databases, Manitoba, 2002-2016

Database	ICD-9-CM	ICD-10/ ICD-10-CA	Other codes
<b>Hospitalizations</b>			
Discharge Abstracts Database (DAD) - 2002-2016	E960-E969	X85-Y09, Y87.1, T74.0-T74.9	
<b>Emergency Department Visits</b>			
Emergency Department Information System (EDIS) – 2002-2016			Used variables “ctas_chief_complaint” and “Visit_reason” including strings referring to ‘Assault’, ‘Abuse’, ‘Domestic Abuse’, ‘Domestic Assault’, ‘Domestic Violence’, ‘Domestic Dispute’, ‘sexual assault’ and ‘Sexual Abuse’, including misspellings
National Ambulatory Care Reporting System (NACRS) - 2014-2016		X85-Y09, Y87.1, T74.0-T74.9	
Urgent Care – 2002-2013	E960-E969	X85-Y09, Y87.1, T74.0-T74.9	
E-Triage – 2004-2012			Used variable “triage_complaint_desc” = ‘assault’, including ‘sexual assault’
<b>Deaths</b>			
Vital Statistics Mortality Database – 2004-2016		X85-Y09, Y87.1, T74.0-T74.9	

**Appendix Table 2**

Hazard ratios for Any Intentional Injury associated with prior IPV victimization and IPV characteristics

	No. Events	No. of women	Rate (per 1000 women)	Victims vs. non-victims	
				HR (95% CI)	AHR* (95% CI)
Non-Victims	521	61407	8.5	1.00	1.00
All victims	1142	20469	55.8	6.68 (6.02, 7.41)	3.83 (3.41, 4.30)
IPV characteristics among victims					
IPV episode involved physical violence					
No	54	1598	33.8	3.73 (2.82, 4.94)	2.30 (1.73, 3.06)
Yes	1088	18871	57.7	6.95 (6.26, 7.72)	3.97 (3.53, 4.46)
Accused was convicted of physical violence					
No	706	12584	56.1	6.72 (6.00, 7.53)	3.84 (3.39, 4.35)
Yes	436	7885	55.3	6.61 (5.82, 7.50)	3.82 (3.33, 4.38)
Accused was a Youth					
Not Youth	1121	20234	55.4	6.63 (5.98, 7.36)	3.80 (3.38, 4.27)
Youth	21	235	89.4	10.89 (7.04, 16.85)	6.31 (4.07, 9.80)
Accused received a probation sentence					
No	1033	16990	60.8	7.31 (6.58, 8.12)	4.13 (3.67, 4.65)
Yes	109	3479	31.3	3.68 (3.00, 4.53)	2.39 (1.94, 2.95)

\* Adjusted for number of children, neighbourhood income quintile, residence changes, receipt of income assistance and conviction in the 2 years prior to index date

**Appendix Table 3**

Hazard ratios for Intentional Injury resulting in hospitalization associated with IPV characteristics

	No. Events	No. of women	Rate (per 1000 women)	Victims vs. non-victims	
				HR (95% CI)	AHR* (95% CI)
Non-Victims	296	61407	4.8	1.00	1.00
All Victims	586	20469	28.6	6.03 (5.24, 6.93)	3.49 (2.99, 4.07)
IPV characteristics among victims					
IPV episode involved physical violence					
No	27	1598	16.9	3.29 (2.22, 4.88)	2.12 (1.43, 3.17)
Yes	559	18871	29.6	6.28 (5.46, 7.23)	3.60 (3.08, 4.21)
Accused was convicted of physical violence					
No	371	12584	29.5	6.22 (5.34, 7.24)	3.59 (3.04, 4.25)
Yes	215	7885	27.3	5.73 (4.81, 6.83)	3.32 (2.76, 4.01)
Accused was a Youth					
Not Youth	577	20234	28.5	6.01 (5.22, 6.91)	3.47 (2.97, 4.05)
Youth	9	235	38.3	8.22 (4.24, 15.95)	5.03 (2.58, 9.81)
Accused received a probation sentence					
No	529	16990	31.1	6.58 (5.71, 7.59)	3.78 (3.23, 4.42)
Yes	57	3479	16.4	3.39 (2.55, 4.50)	2.13 (1.60, 2.85)

\* Adjusted for number of children, neighbourhood income quintile, residence changes, receipt of income assistance and conviction in the 2 years prior to index date

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