Unintentional Firearm Deaths: Can They Be Reduced by Lowering Gun Ownership Levels?

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Firearm-related deaths are a leading cause of injury-related premature mortality. In the United States, wounds inflicted by a firearm are second only to motor vehicle crashes as a cause of death stemming from an injury.¹ In Canada, too, a study conducted in 1991 showed that the risk of death from a firearm discharge rivaled that resulting from a motor vehicle accident – 2.37 deaths per 10,000 firearms versus 2.4 deaths per 10,000 motor vehicles – despite the fact that cars are used for transportation far more often than firearms are used for recreational purposes.²

The longstanding debate about gun control has largely focused on the problem of intentional harm: suicide and lethal criminal violence inflicted with firearms. However, gun ownership may also pose a threat to human health and life through unintentional injuries and deaths.

Unintentional firearm deaths (UFDs) constitute a fairly modest proportion of all firearm deaths: on average, there are approximately 50 incidents per year in Canada. However, hospitalization data indicate that there are at least 10 times as many nonfatal injuries each year due to an accidental firearm discharge.³ A Manitoba study also found the ratio of nonfatal to fatal cases to be 10:1.⁴ Furthermore, a US study revealed that there may be more than two cases requiring outpatient treatment for every case requiring hospitalization.⁵ One reason for concern about the problem

of UFDs is the youthfulness of many victims. Between 1979 and 1988, fully one quarter of UFD victims in Canada were under 15 years of age and another 30% were between 15 and 24 years of age.²

As in the case of violent crime and suicide by firearms, fierce debate rages around the question of the factors responsible for UFDs. Are these incidents unavoidable accidents, the result of recklessness on the part of the shooter; or is opportunity, in the form of the availability and accessibility of firearms, a significant factor?

The present Canadian study examined the extent to which opportunity, as measured by provincial firearm ownership levels, explains UFDs. While access to firearms is an intuitively appealing explanation, Kleck^{6,7} argues that UFDs are not simply accidents but tend to arise from recklessness. He argues that shooters in unintentional incidents are disproportionately involved in car crashes and violent behaviour, often have been drinking prior to the incident, and tend to be drawn from demographic groups that are over-represented in intentional violent behaviour (e.g., young males).^{6,7}

Studies conducted in the United States, Sweden, and Canada, however, show that alcohol usually is involved in less than a third of all UFDs and that incidents of recklessness, in the form of playing with guns, tend to account for just a small fraction of cases.^{4,8-13} Cases involving children usually result from the improper storage of firearms.^{14,15} The majority of unintentional gunshot wounds (whether fatal or nonfatal) tend to involve routine gun-related activities and errors – such as cleaning, loading/unloading, showing or carrying a gun, poor maintenance, and unsafe handling – rather than recklessness.^{4,16}

Trend analyses and international comparisons are somewhat contradictory in terms of the role of firearm availability. Most industrialized countries, including Canada and the US, show a steady decline in the rate of UFDs over the past few years,¹⁷ often without a corresponding decline in ownership levels or the gun stock.^{7,18} The most obvious conclusion is that UFDs are not influenced by availability. However, UFDs may also have declined because of design improvements, better safety practices, changes in the demographic profile of owners, and long-term improvements in emergency care and in the treatment of gunshot wounds.¹⁹ While fatalities have dropped, there is no firm evidence that firearm accidents as a whole have declined.

Cross-national studies have tended to reveal significant associations between gun ownership levels and UFDs.^{20,21} While some cross-sectional analyses within countries do not support such an association,⁷ data from the US suggest that rural and small town residents have higher rates of gun ownership and higher UFD rates than do residents of larger communities.⁷ Also, Canadian, US, and Australian studies indicate that both gun ownership and UFD rates are considerably higher among males compared to females.^{7,22,23}

METHOD

The present study examined the link between firearm ownership levels and UFDs across the provinces/regions of Canada. Data on UFDs were obtained from Statistics Canada's *Causes of Death* publication²⁴ for the years 1988-1997 – the most recent period for which data were available at the time of the study. A 10-

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year time span was selected to lessen the effect of annual fluctuations in UFDs. Mortality rates for the provinces, territories, and each gender were calculated for the 10-year period based on the International Classification of Diseases category E922 – Accidental Deaths from Firearm Missile. Figures for the Atlantic Provinces were combined to be consistent with data on firearm ownership available from national surveys.

Two sets of analyses were conducted – one in which the Prairie Provinces were considered individually and the other with data for the Prairie Region combined – to reflect the different regional breakdowns used in the gun ownership surveys. The measure of firearm availability was the percentage of households that reported owning one or more firearms. The figure for each province/territory was obtained by averaging the figures drawn from the most respected national surveys conducted during the study period.²⁵⁻²⁷

Pearson and Spearman rank-order correlation coefficients were then computed to ascertain the degree of association between firearm ownership and UFD rates across the regions of Canada. National cross-gender comparisons were also undertaken in relation to ownership and mortality rates.

RESULTS

Table I presents the firearm ownership figures and UFD rates for Canadian provinces and territories. According to four national surveys conducted during the study period, the highest household ownership level was found in the Yukon and Northwest Territories (a mean of 60.7% of households across the surveys) and the lowest level was found in Ontario (16.8%). As for the mean UFD rates for 1988-1997, the Yukon and Northwest Territories had the highest rate of mortality from an unintentional firearm-related injury (1.66 per 100,000) and Ontario had the lowest rate (0.08).

The degree of association between ownership levels and UFD rates across the provinces and regions of Canada was exceedingly high. When the Prairie provinces were considered individually, the association was strong and positive as mea-

TABLE I
Percentage of Households Owning a Firearm and Unintentional Firearm Mortality Rates Per 100,000 Population, by Province/Region

	Angus Reid (1991)	Insight Canada (1992)	Insight Canada (1993)	ICVS (1996)	Mean Ownership*	UFD Rates (1988- 1997) [†]
Atlantic	32	44	45	35.8	39.2	0.31
Quebec	23	38	30	24.4	28.9	0.23
Ontario	15	20	18	14.2	16.8	0.08
Manitoba	25	n.d. ‡	n.d.	n.d.	25.0	0.53
Saskatchewan	35	n.d.	n.d.	n.d.	35.0	0.32
Alberta	39	n.d.	n.d.	n.d.	39.0	0.23
BC	24	47	46	19.9	34.2	0.19
Yukon/NWT	67	55	60	n.d.	60.7	1.66
Prairies	n.d.	40	38	28.8	35.6	0.32

* The mean household ownership levels were rounded to the closest integer for the calculations.

† Provincial mortality rates were computed on the basis of census data and intercensal estimates provided by Statistics Canada's Demography Division. Figures for 1988-1996 were obtained from the revised intercensal estimates at July 1st, 1991-1992; final postcensal estimates at July 1st, 1993-1995; updated post-censal estimates at July 1st, 1996; preliminary postcensal estimates at July 1st. For 1997, updated postcensal estimates were used.

‡ No Data. The survey report provided no information on ownership for this province or region. Sources: References 24-27

sured by both a Pearson correlation coefficient ($r=0.81$; d.f.=6; $p<0.05$) and Spearman's rank-order correlation coefficient ($Rho=0.53$; $t=1.53$; d.f.=6; $p<0.1$). When the Prairie provinces were considered collectively, in accordance with the majority of firearm ownership surveys, the relationship was even more powerful ($r=0.91$; d.f.=4; $p=0.01$ and $Rho=0.86$; $t=3.37$; d.f.=4; $p<0.05$).

To summarize, the data reveal that there is a strong degree of association between firearm availability and the incidence of UFDs across Canada. The reader should note, however, that these associations are volatile, due to the small number of provinces/regions in Canada. A significant change in the ownership levels or UFDs in just one province can change the size of the correlations significantly. The use of data covering a 10-year period, though, should lessen this volatility.

DISCUSSION

This analysis has revealed strong, positive correlations between household firearm ownership levels and unintentional, firearm-related mortality rates across Canada's provinces and regions. While causal inferences cannot be made directly from zero-order correlational analyses, the magnitude of the findings lends additional credibility to the common-sense notion that, everything being equal, accidents and

mortality increase as the opportunity for them rises.

There are insufficient national data in Canada with which to conduct multivariate analyses exploring the strength of the association between firearm availability and UFD rates, while controlling for confounding variables, such as the specific contexts in which, and the frequency with which, firearms are used in different regions of Canada. Provinces or territories in which firearms are more prevalent may also be those in which more high risk uses occur.

The data that are available, however, suggest that there is little variation across the country with regard to the reasons given for firearm ownership²⁵ and hence, presumably, the uses to which firearms are put. Furthermore, self-defence is likely to constitute the form of use that poses the highest risk – as firearms are most likely to be carried, loaded, and accessible with this use – and self-defence is rarely cited as a reason for ownership in any region of Canada.²⁵

Demographic factors might also provide competing explanations for the apparent link between gun ownership and UFDs. Gender, in particular, is a major factor in UFDs. During the 10-year study period, males were over 10 times as likely as females to fall victim to a fatal gun accident (513 to 41 deaths),²⁷ even though females accounted for slightly more than

half of the Canadian population during these years.²⁸ Differential gun ownership may account for much of this disparity, as the mean male-female ratio in ownership is 7:1 across three national surveys conducted between 1988 and 1997 that addressed this issue.^{25,26} Gender would be an important confounding variable if there were major differences in the distribution of the sexes across Canada. The variation, however, is modest: in 1997, males made up 52.3% of the population in the Territories, 49.1% in Nova Scotia, and 49.3% in Quebec, Ontario, and PEI.²⁸ The ratio of males to females across the provinces, therefore, does not constitute a useful explanation for the regional variations in UFDs.

Future research can benefit from improved databases including nonfatal, as well as fatal, gun accidents. Such research may identify other factors that vary systematically with UFDs. In the meantime, this study provides some compelling evidence of the importance of gun ownership levels and, hence, opportunity in these tragedies. Furthermore, previous research consistently indicates that most UFDs arise from tragic mistakes on the part of the "average" owner, as opposed to recklessness displayed by a small proportion of owners who are especially irresponsible.

The implication for policy is that UFDs can perhaps best be prevented by combining safety training for all owners with a reduction in firearm ownership levels. A number of researchers have underscored the importance of firearms training and regulation.^{29,30} A reduction in gun ownership can be achieved, perhaps, by showing

that the availability of firearms poses a risk to public health that is independent of the responsibility displayed by owners. Although accidents can be minimized through responsible uses of firearms, gun accidents due to misfortune and human fallibility will arise in proportion to the opportunities available for them.

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Received: November 10, 2000

Accepted: August 24, 2001