An Excerpt Pertaining to the Long Gun Registry from the Peer Reviewed Study: “Canadian Firearms Legislation and Effects on Homicide 1974 to 2008”

An Analysis of the Association Between the Long Gun Registry and Suicide by Firearm

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Significance of the Study: “Canadian Firearms Legislation and Effects on Homicide 1974 to 2008”

- The research has been peer reviewed and accepted for publication in the Journal of Interpersonal Violence
- It is the only study examining those effects over the years 1974 to 2008
- It is the only study to use three different statistical methods to confirm results
- It is the only study that examines both immediate and gradual effects as legislation is often implemented over several years

Executive Summary

- The rate of homicide has been declining in Canada since 1974, prior to federal legislation
- The registration of long guns began in 1999
- The majority of long guns were registered in 2002
- Interrupted time series regression analysis fails to show a legislation associated statistically significant beneficial effect on firearms homicide, homicide by long gun and spousal homicide by long gun
- ARIMA analysis of both immediate or gradual effects of legislation demonstrated no beneficial associated effects on firearms homicide, homicide by long gun and spousal homicide by long gun
- Joinpoint analysis demonstrated no beneficial associated change in the trend of firearms homicide, homicide by long gun and spousal homicide by long gun
- There were no beneficial associations between legislation and the criminal charge of “Discharge of a Firearm with Intent”
- Time series regression demonstrates no statistically significant beneficial association between the long gun registry, suicide and suicide by firearms
- Anti-depressant medication, SSRIs, were introduced in 1989 at the same time point firearm legislation in Canada was introduced
- Suicide rates rapidly decline in 1989 and in 1995 as more antidepressant medications are introduced
- Suicide studies that do not include the use of anti-depressant medication to control for effects are questionable

Recommendations

- The results of the peer reviewed study suggest that the discontinuation of the registration of non-restricted firearms will not result in an increase in homicide or spousal homicide rates by long gun
- The discontinuation of the registration of non-restricted firearms is not likely to result in an increase in suicide rate by long gun
Introduction

The following brief contains excerpts relevant to the long gun registry (LGR) contained in the peer reviewed study: Langmann, C. “Canadian Firearms Legislation and Effects on Homicide 1974 to 2008.” *Journal of Interpersonal Violence*. Accepted for publication September 30, 2011. In press. Some figures are included here to provide a visual representation of the results found in the study for those not familiar with statistical interpretation.

Included in the **Executive Summary** are the main results found in the original study.

As well an examination of the effects of the LGR on suicide rates in Canada has been included.

Publication agreement between Dr. Langmann and the Journal of Interpersonal Violence prohibits submission of the original study as submissions to the Committee are published by Parliament for public access. Those wishing to view the original publication can schedule a viewing with Dr. Langmann and all methods are available on request.

**Relevant Timeline of the Long Gun Registry**

Prior to 1998 non-restricted firearms commonly known as long-guns, generally consisting of rifles and shotguns meeting minimum length criteria, were not registered. The 1995 Firearms Act required the registration of all firearms, and this was finally implemented on December 1998 [1]. By 2003 it would be mandatory that all firearms would be registered.

Registration of firearms in the Canadian Firearms Registration System (CFRS) began slowly after 1998 and most registration occurred in late 2002 [2].

**Methodology**

All data were obtained from Statistics Canada Juristat Database and CANSIM for the years 1974 to 2008. In the original study three methods typically utilized in epidemiology were used to examine for effects of the implementation of legislation: interrupted time series regression, autoregressive integrated moving average (ARIMA), and Joinpoint regression software (http://surveillance.cancer.gov/joinpoint/). The following figures or graphs will depict a 2 dimensional visualization of the regression analysis meant for non-statistical experts.

In the original study multiple years post legislation and potential gradual effects due to implementation over a sequence of years are investigated for beneficial effects on homicide. No other study currently exists utilizing these methods.

When indicated multiple regression included variables in the literature found to be associated with criminality obtained from available data: the median age of population, population attributed to immigration, population per police officers, the rate of prison incarceration, the rate of unemployment, the percent of the age 15 to 24 year old population in the low income bracket, percent of the total population in the low income bracket, and the GINI index of equality [3-7].
Understanding Interrupted Time Series Regression

This form of analysis looks for both immediate impact effects of legislation on homicide as well as a change in the trend of homicide post implementation of legislation. A solid line is generated by regression analysis to statistically predict the homicide rate expected at each year due to contributing factors such as unemployment or the age of the population. The break in the line represents the year of implementation of legislation. The immediate reduction impact of legislation, also known as a “step effect” is represented by the gap, $\beta_2$, on the following graph (Figure 1), while the change in the trend is represented by $\beta_3$.

As homicide has been declining prior to legislation it is important to account for, and determine if there has been a change in this trend due to legislation. A statistical test is performed that determines whether the size of the impact effect and/or change in the trend is larger than what would occur simply due to chance or yearly variation. For example in the graph below legislation has caused an immediate reduction, $\beta_2$, in the rate of homicide and an increasing speed in the declining trend $\beta_3$, of homicide rates.

![Figure 1](image-url)
Results of Analysis

Initial analysis demonstrates that as the population ages, there has been an associated decline in the homicide rate by firearm since 1974 (Figure 2). When the effect of the aging population is taken into account, the homicide rate by firearm is constant.

Figure 2
The first regression analysis looks at the effects of the LGR implemented in 1999 on the effects of the overall firearm homicide rate. Solid dots represent the actual homicide rate in each year. As depicted by the calculated regression (solid line) in Figure 3, there has been a consistent decline in homicide rates since 1974 that began prior to federal legislation, and in 1999 there is no statistically significant beneficial associated impact or trend effect on homicide rates due to the LGR. This analysis also includes the effects of the aging population, incarceration rate, immigration, police, and GINI which have been shown to be statistically associated with firearm homicide.

**Figure 3**

![Firearm Homicide per 100,000](image-url)
Next an analysis of the homicide rate by long gun is depicted in Figure 4. No statistically significant beneficial effects were found due to the LGR. The aging population and incarceration rates shown to be statistically associated with homicide rates by long gun are also included in the analysis.

Figure 4

Long Gun Homicide per 100,000

Year

No beneficial effects on spousal homicide by long guns are depicted in Figure 5. The effects of the aging population is also included in the analysis.

Figure 5

Spousal Long Gun Homicide per 100,000

Year

0.00 0.05 0.10 0.15 0.20 0.25 0.30
1,974 1,978 1,982 1,986 1,990 1,994 1,998 2,002 2,006
The same methodology used above is applied to the total suicide rate over the years 1991 to 2008. Only the years 1991 to 2008 were examined to account or control for any background effects from legislation implemented in 1991 and 1995. As can be seen when the LGR is implemented in 1999 there is no significant effect on total suicide in Figure 6. Moreover the overall suicide rate has remained relatively steady during this time.

Figure 6

Total Suicide per 100,000
No significant effects are associated with the implementation of the LGR in 1999 are seen on suicide rate by long gun in Figure 7.

Figure 7

Suicide by Firearm Rate per 100,000
Cutoff 1999
Recommendations

The results of the peer reviewed study suggest that the discontinuation of registration of non-restricted firearms will not result in an increase in homicide or spousal homicide rates through the utilization of long guns. Moreover the discontinuation of the registration of non-restricted firearms is not likely to result in an increase in the aggregate suicide rate by long gun.
Further Research on Suicide

Further analysis of suicide is complicated by the fact that medication effective in the prevention of suicide known as SSRIs were introduced in 1989 and dramatically increased in use in 1996 [8, 9]. This event occurs at the same time as firearms legislation is introduced in 1991 and 1995. Therefore in order to properly evaluate the effects on suicide by firearms legislation, the beneficial effects due to SSRI medication must be accounted for. In other words any beneficial effects on suicide may be simply due to the introduction of SSRI medication and not firearm legislation.

References