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An Evaluation of Canadian Gun Control Legislation: Bill C-51

by

David H. Bartlett, B.A. Hons.

A thesis submitted to
the Faculty of Graduate Studies and Research
in partial fulfillment of
the requirements for the degree of
Master of Arts

Department of Sociology

Carleton University

Ottawa, Ontario

September 3, 1988

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Thesis Supervisor

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16 September, 1988

Abstract

This thesis examines the efficacy of the Canadian gun control legislation as it pertains to suicide, homicide and fatal firearms accidents. . Various statistical procedures (eg., multiple regression, significance tests) were utilized to assess the effects of the legislation. The suicide data were broken down by gender, and the analyses did reveal several sex differences in the suicide patterns. It was found that the legislation contributed to reduced use of firearms in homicide and suicide. Using American data as a non-equivalent control group revealed that the leveling of homicide and suicide rates, which roughly coincided with the implementation of the legislation, was a product of the continental trending and the intervention. The fatal firearms accident rate was unaffected by the gun control measures.

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Introduction

In North America, there is considerable concern about the incidence of violent crime. Canadians and Americans are inundated with accounts of firearms violence, largely through the media. Much of the media, the government bureaucracy, and the general public draw a causal link between the presence and availability of guns and the rates of certain crimes of violence. The common sense appeal of prohibiting or greatly restricting the availability of firearms is considerable: if you do not have guns people will not be shot, and fewer lives will be lost. In the United States, popular support for tighter gun control measures has remained near the 75% level (Smith 1980), and for Canada a recent Gallup poll (Toronto Star 1982) indicates 70% of the population is in favour of more restrictions. However, whether gun control laws¹ actually achieve their stated objectives is unclear. This paper will critically examine the effect of gun laws upon suicide, homicide and fatal accidents in Canada.

Much of the research on firearms in society has a strong negative bias (eg., Beard 1977; Bakal 1966; Wright and Marston 1975). Firearms ownership is seen as a social problem rather than as a social behaviour. The Australian scholar Richard Harding goes as far as to equate firearms

with a bacterium attacking an organism. "With regard to gun ownership and use in Australia, there can be no ambivalence: prevention is necessary.... [With the spiral to epidemic proportions] the quality of life will inevitably and inexorably deteriorate" (Harding 1983:6-7). Conversely, a strong opposing bias exists in certain ideological camps, as is readily observable in publications of the American National Rifle Association. When exploring the literature, one must bear in mind that the appeal of extreme positions (be they pro or con) frequently overrides objectivity when dealing with this emotional issue. In general, many of the earlier works (which reached anti-gun conclusions) were inadequate on methodological grounds. Rossi and Wright (1987) found that gun control studies have kept pace with the general improvement of sociological research methodology. Later studies have tended to avoid the errors of their forerunners, and are not as open to criticism on methodological points. Like many recent studies, this study does provide qualified support for gun control as an effective public health measure.²

Many people maintain that the presence of firearms in a society ensures certain social evils. These evils are not necessarily malicious, as suicides and accidents are also attributed to firearms (Bakal 1966:54-61). According to the following psychological hypothesis, many impulse homicides

(primarily domestic ones) and suicides are deemed to be direct consequences of the availability of guns. Social psychologists (eg., Bandura 1973), using a form of modelling theory, would tend to predict that increased familiarity with weapons will lead to increased aggressivity as individuals' inhibitions against violence are weakened. Easy access to firearms for ordinary citizens is also perceived as ensuring equivalent availability for criminals. In summary, the presence of numerous firearms in any society presumably leads to a myriad of problems such as homicides, suicides and armed robberies. For example, Berkowitz contends "that we sometimes react mindlessly and impulsively to the presence of guns. Since that is so, the more control the law exercises over the availability of guns, the better" (Berkowitz 1981:12).

In a study drawing on the principles of classical conditioning, Berkowitz and LePage (1969) sought to determine what effects stimuli associated with violence (i.e., guns) would have on individuals prepared to act violently. They found that the presence of guns increased the probability of a person who was primed to commit violence acting more aggressively. As an explanation of firearms assaults, they proposed that "the presence of the weapon might have elicited an intense aggressive reaction from the person with the gun, assuming his inhibitions

against aggression were relatively weak at the moment." (Berkowitz and LePage 1969:206). Page and O'Neal (1977) subsequently found aggressive behaviour was more likely to occur after individuals had been exposed to pictures of weapons, thereby supporting the bulk of the mainstream social psychological research which points to general negative effects of firearms in the social environment. Caprara et al. also support this research with their finding "that exposure to pictorial depictions of weapons, quite apart from any previous instigation, is sufficient to increase subsequent aggression" (1984: 319). Boyanowsky and Griffiths (1982), in a non-laboratory operationalization of this hypothesis, found that the presence of weapons did increase aggressive arousal outside of laboratory settings.

Much of the above research contains a number of weaknesses. In Berkowitz and LePage's study (1969), subjects were placed in a situation in which demand characteristics (unintentional cues that reveal the hypothesis and indicate the desired response) were probably present. Their discussion primarily argues against the importance of possible flaws in the experimental design which may have precipitated the effect observed. The experimenters remain adamant that subjects' suspicions were not aroused by the presence of a shotgun and a revolver. However, as these firearms were immediately adjacent to the

subjects (i.e., on a table next to a switch for administering electric shocks); that assertion is weak. In an attempted replication, Page and Scheidt concluded

that there is a complex interplay between [subject] sophistication, demand awareness, and evaluation apprehension in experiments designed to study a negative behaviour. The weapons experiment is not evidence for the conditioning theory and cannot be generalized to nonlaboratory situations. (Page and Scheidt 1971:304)

In another failed replication attempt, Turner and Simons also questioned the applicability of the experimental findings because: "In nonlaboratory settings, strong inhibitions might be experienced by individuals concerning the appropriateness or consequences of engaging in aggressive behaviour." (Turner and Simons 1974:348)

Similarly, Cahoon and Edmonds (1985) did not find evidence supporting the existence of a weapons effect. The lack of consistent replication indicates that simple conditioned responses may not account for violence.

Overall, the learning and modeling theories of aggression are very sound. Using scientific methods, these models have developed readily defensible propositions regarding the origins of violence. The vast majority of the behaviourists have taken a very reasonable stand: they maintain that while learning does make aggression more probable, it does not make violence inescapable. Other influences are beyond the scope of a purely behaviourist

theory. The nature of social interaction, the social structural units to which we belong, and ecological factors all fall within the realm of sociology.

Wright and Rossi (1986) reviewed the relevance of sociological theories of crime and deviance to deviant firearms use. They found that macro level theories such as social control theories, conflict theories and labeling theories were not directly applicable to the study of firearms crimes; being concerned with broad societal issues rather than 'method' related causal models. They did find that microeconomic frameworks were useful in the study of primarily economically motivated crimes. Deterrence theories, while relevant to the mandatory sentencing provisions of the legislation, are not pertinent to firearms homicides as the penalties for homicide are not significantly increased by the addition of punishments for using a firearm. Learning theories are applicable to determining the likelihood that individuals will have been socialized into firearms usage, and thus more prone to using firearms in violent acts. Macro-level theories of suicides (eg., Giddens 1971; Perlin 1975), have paid negligible attention paid to the actual destructive methods utilized: the focus has been upon cultural and structural factors.

The anthropologist, Paul Bohannan, places the frustration-aggression hypothesis in a cross-cultural setting vis-à-vis homicide:

There are some situations in all societies to which at least some of the members react by the commission of homicide. However, the circumstances in which homicide is committed vary extensively from one society to another.... Every society exhibits different cultural situations of tension. It is in situations of tension, in which people cannot gain the ends they... have come to desire, that crimes are committed. (1963:297-298)

Bohannan found that the methods used in fatal assaults depended entirely upon the availability of suitable instruments within a particular culture. As aggressive acts are constrained by cultural norms, those norms and structural factors are at the root of interpersonal violence, and those factors determine the form of violent attacks. Nevertheless, pressures for active controls of violent behaviour (beyond simply punishing such behaviours) have tended to centre primarily upon controlling the tools used in violence.

In 1977 the Canadian Parliament passed Bill C-51, which entailed a major overhaul of the country's gun control measures. This amendment of the criminal code was the descendent of a broad package known as the "Peace and Security Program: an act for the better protection of Canadian society from the perpetrators of violence and other

crime." Introducing the original Bill in the House of Commons on March 8, 1976, the Minister of Justice, Ron Basford, outlined its objective.

It is to counter rising violence in our society without resort to violence itself in response, this to the end that law-abiding citizens will know a greater degree of security and safety while preserving the critical balance in the scales of justice. This bill contains a number of important measures directed to the objective which will adapt our criminal justice system to respond in a more effective yet just way to the rising incidence of crime in Canada, particularly that of a violent or organized nature. (Canada 1976a)

Originally, the Program consisted of Bill 83, which involved gun control, prison breaks, wiretapping, dangerous offenders, and crime inquiry commissions, and Bill 84, which would abolish capital punishment. The package was often ~~seen~~ as trading the death penalty for a host of other preventive measures. The Liberal majority was able to pass Bill 84 in the year of its introduction but Bill 83 became bogged down in debate. Many members of Parliament balked at the format of the Bill: four major amendments to the criminal code together with an entirely new piece of legislation, the gun control measures. Critics of the government saw this as an attempt to subvert discussion of the material by mixing a wide range of "good" and "bad" changes into a single bill rather than weighing the merits of each provision individually. However, in the following sitting of the House, after considerable critical comment

from various rapidly mobilized lobby groups, the reworked bill was passed.

The chief components of the new Canadian gun control policy came into force in two parts; on January 1, 1978 and January 1, 1979. Firearms Control In Canada: An Evaluation outlined the three primary stated objectives of the regulations. The first was to prevent the irresponsible use of firearms. This was to be accomplished through the alteration of the restricted and prohibited categories of firearms, which were last revised in 1969. All fully automatic firearms became prohibited, with the exception of those in the possession of bona fide collectors who were protected by a grandfather clause. Also a system of Firearms Acquisition Certificates (FAC) was introduced on January 1, 1979, requiring everyone to hold such a certificate prior to acquiring any firearm. These five year permits are obtained from local firearms officers, who run background checks³ prior to issuing the permits to suitable applicants. A system of prohibition orders was created, which automatically bans individuals who have been convicted of an indictable offence with a possible ten year sentence, as well as allowing discretionary and pre-emptive bans. Individuals who have been refused an FAC also have prohibition orders enforced against them for an indeterminate period. Expanded search and seizure

provisions allow police to act without warrants when they believe a firearms offence is being committed.

The legislation sought to increase the punishment for criminal firearms usage. A consequence of this aim was to increase the number of criminal offenses related to firearms. Stiff penalties were seen as the way of enforcing the expanded universe of regulations. The key deterrent measure was the introduction of mandatory sentencing for anyone who commits an indictable offence with a firearm. Thus any individual who uses a firearm in the commission of such an offence theoretically receives an automatic term with a one year minimum, to be served consecutively with any other penalties. Other punishments pertain to enforcing compliance with respect to the infrastructure of permits and certificates while some are targeted at actual firearms related behaviours.

Finally, the legislation sought to encourage the safe and responsible use of firearms. Changes allowing easier prosecution of those who misuse or improperly store firearms were effected through altering the wording of certain sections. A greatly expanded system of record keeping and physical standards was developed to ensure that businesses involved in the firearms trade meet the requirements of the justice administration. As of January 1, 1979, these

measures control those who can engage in the lawful gun business and punish those who do so in an unacceptable manner. One of the frequently touted provisions of the legislation has yet to be brought into force. This provision would require that individuals complete a firearms safety and handling course approved by the provincial Attorney General prior to obtaining a FAC.

The objective of this thesis will be to determine if the legislation has met its intended goal of reducing mortality due to firearms. If a determination of the causes of homicide and suicide were a component of this thesis, it would follow a methodology such as that implemented by Henry and Short, to explain these phenomena: quantifying the theoretical links between "the economic correlates of suicide and homicide and their social and psychological aspects" (Henry and Short 1954:14) - but this area is beyond the scope of this study. In part, this thesis is a response to the evaluation of these laws by Decision Dynamics (Scarff 1983), a government commissioned research firm. A review of Decision Dynamics' conclusions has found them to be overly optimistic, methodologically weak and statistically unsophisticated. For instance, Scarff frequently took the point of intervention as the beginning of the legislative amendment procedure, early 1977; thus attributing existing desirable trends to the legislation prior to its

implementation. Another illustration is found in Scarff's executive summary which states: "Accidents with firearms were declining prior to 1978 but the legislation contributed to further downward trends." (1983:14). Identifying the legislation as a causal factor in the continuation of a trend which dates back to the early 1960's is clearly an unfounded conclusion. Additional supporting evidence for this claim will be detailed in the final summary section, where the results of the two evaluations will be compared. This thesis, with its thorough quasi-experimental analysis of the available data regarding suicide, homicide, and accidental firearms deaths will be highly informative.

Given the relatively short period examined by the government's evaluation, its findings are vulnerable to the problems inherent in all time-series analysis. Ordinarily, troughs and peaks occur in a time series as a multitude of variables simultaneously affect the variable in question. In the case of crime, policy interventions tend to occur after an increase in a particular offense. As a period of sharp increases is usually followed by one of decreases, the to-be-expected decrease may be incorrectly attributed to the intervention (Wright, Rossi and Daly 1983:287). Extraneous variables, such as a demographic shift in the population, econometric factors, or increased awareness of punishments

stemming from the 1976 capital punishment debate, could also affect the dependent variable. The nature of time series and the difficulty of establishing a definite causal link were inadequately considered in the official evaluation. The approach to be used in this study will avoid many of the methodological weakness of Scarff's report and provide the first technically sound evaluation of the legislation.

Hypotheses

The hypotheses of this study are shaped by alternatives to the theoretical viewpoints which currently justify gun control measures. Unfortunately, these theoretical perspectives neither reflect sociological theories of cause nor accurately depict complex social reality. The availability of a tool is frequently confused with the underlying social features which influence behaviours which may make use of the tool. With respect to suicide, causal factors should be emphasized in lieu of the method used, as all possible methods cannot be removed. If societal pressures and alienation generate a desire for self-destruction, individuals will find feasible techniques. Accidents are a serious matter, but researchers should endeavour to keep the scale of incidents in perspective. A host of other worldly elements inadvertently kill far more people than firearms; items such as ladders and stairs take a greater toll (Statistics Canada 1985). Pragmatic decisions must be made as to whether or not firearms pose an important public health problem in our society, and whether the benefits of the selected 'cure' outweigh its costs.

Many researchers maintain that cultural and social characteristics, rather than the existence of certain tools, shape behaviour (eg., Giddens 1971; Messner 1982). In

discussing peaceful and violent cultures, Montague echoes Bohannan's perspective:

Some people have learned that the appropriate response (to tension) is with non-aggressive behaviour. It depends upon the culture and its particular history. Aggression, the existing evidence suggests, occurs only in cultures in which the individual is conditioned in aggressive behaviour (1978:185).

If the characteristics of a culture shape behaviour, is it possible to reduce the probability of violence by removing potential weapons? The answer put forth by North American legislators has been 'yes'. As a result, the Americans have 20-25,000 gun control measures in place (Kluin 1982). However, they lack a comprehensive national policy such as Bill C-51, and many of their laws are not enforced (Bendis and Balkin 1979). The extreme of control, prohibition, is rarely considered, as it is ineffective in heavily armed societies (Kaplan 1981); and Canada, with approximately ten million guns (Stenning and Moyer 1981:35), of which almost 900,000 are handguns, would be described as heavily armed. \

It may be argued that the government took a politically expedient yet possibly inappropriate course of action by waging a public campaign against possible tools of violence, rather than addressing the causes of violence rooted in the social order. Blau and Blau (1982) conducted an elaborate statistical analysis of violence in the United States in order to quantify some of the nebulous sociological theories

regarding the source of violence. They found that "the relative deprivation produced by much inequality rather than the absolute deprivation produced by much poverty provides the most fertile soil for criminal violence" (Blau and Blau 1982:122). "The social process that may be inferred is that much inequality [endemic to capitalism] engenders alienation, despair, and pent-up aggression, which finds expression in frequent conflicts, including a high incidence of criminal violence" (Blau and Blau 1982:126). Given the well documented economic inequality in Canada (Hunter 1981), the government's quick 'cure' may not prove to be an effective solution.

Several tenuous assumptions provide the rationale for restrictive gun control measures. It is assumed that career criminals will obey the laws which would prohibit them from possessing firearms, a dubious premise considering the very definition of a criminal. As many of the individuals who commit homicide or suicide exhibit no prior indications that they may become violent, they would not be screened out by the FAC process. Aside from questionable assumptions underlying the gun control laws, what effects do they actually have? Murray (1975) conducted a statistical analysis of the American data available on handguns, firearms violence and gun control laws. Murray's use of stepwise multiple regression gave that study unequalled

statistical sophistication among gun control studies at that time. Murray found "that gun laws have no effect on either handgun ownership or on crime rates, suggesting that this type of legislation is totally irrelevant to its stated purpose" (1975:90). In addition, differential access to handguns was not found to have any statistically significant effects on the rates of shooting accidents or violent crimes.

Unfortunately, the utility of mathematical models such as Murray's is limited by the specification of variables. The use of alternative variables based upon a different causal theory of crime can produce different outcomes. In addition, the existence of gun control statutes does not necessarily bear any relationship to the actual strength of restrictions. If those in the justice system are unwilling or unable to enforce controls, any legislation will be effectively 'repealed'. Arnett (1985) points to bans on certain kinds of interstate firearms transport, which make it illegal for hunters to bring their guns across state lines, as an example of restrictions which are unenforced because the police refuse to be bound by "nonsensical" rules.

This study consists of a statistical evaluation of the impact of Bill C-51 using an interrupted time-series

analysis as the principal technique. It will attempt to avoid the weaknesses inherent in mathematical models by using a relatively simple model and pursuing a limited range of objectives. The possibility of trans-cultural influences (eg., media, world economic state, birth cohort and religious trends) affecting Canadian firearms use in homicides and suicides is also considered. The forms of mortality under study do have very reliable data sets which, to a considerable extent, avoid the problematic nature of official statistics (Connidis 1979).

The efficacy of the mandatory sentencing and other provisions focused upon violent crime in general will not be assessed. A variety of complications make the appropriate data sets exceedingly difficult to acquire. For instance, the category of armed robbery does not have a clear breakdown by type of weapon, thus making it impossible to measure changes in the subcategory of armed robberies with firearms.

The null hypothesis throughout this thesis shall be that there are no significant changes in the homicide, suicide and fatal firearms accident rates following the intervention. To test the null hypothesis the influence of Bill C-51 upon Canadian mortality trends must be determined. Within the following hypotheses is the assumption that, if

the legislation did reduce the use of firearms in particular behaviours, there will be a displacement to other methods compensating for the diminished use of firearms. Initially, the 'best case' for gun control will be tested in each section. Where applicable, the percentage of the mortality rates due to shooting in pre-and post-legislation periods, rather than overall mortality rates, will be analyzed. If there is a measurable change due to the legislation, it should be most apparent in these data. Following a determination of whether or not the use of firearms in these behaviours has significantly changed, the study will proceed to determine if these mortality rates have changed. While the rates may be higher in the post-C51 period, it is still possible that the legislation reduced the rate of increase in suicide and homicide, thus making it a qualified success. To determine if this is the case the pretest and post-test slopes of the trend lines will be checked for changes in their rates of increase. To reiterate, it is conceivable that deaths by shooting may have diminished, but this reduction may have been offset by the adoption of alternative destructive methods.

The intent of this study may be clarified by specifying the four distinct questions which the analysis will be addressed towards. First, has there been a reduction in the use of firearms (the preferred tool) in acts of suicide

and homicide? Second, has the occurrence of suicide, homicide, and fatal accidental shootings in Canada been reduced? Third, have the rates of increase in suicide and homicide been curbed? Finally, and most importantly from a program evaluation perspective, do the findings support the contention that the implementation of stricter gun control legislation is responsible for any observed favourable changes? There is research (e.g., Boor 1981; Boyd and Moscicki 1986) which indicates that, if interventions such as this are effective at reducing the availability of a principle method of suicide, the suicide rate may decline.

The third question is necessitated by the possibility of attaining success in the specific area of death by shooting, while failing to reduce the death rate for suicide and homicide by all means. Failure in the second area, as revealed by a displacement to other, traditionally less popular, methods of destruction, could negate any theoretical "success" calculated solely in terms of firearms usage. To reduce the number of shooting deaths is a hollow victory if the total number of homicides and suicides remains constant. While this research cannot demonstrate causality, it is designed to reveal the existence of spurious correlations that would prevent unfounded assumptions of causality. To this end, a nontreatment group will be included to control for continental secular

trending. The continental trend in suicide and homicide from the early sixties was steadily upward, until the mid to late 1970's when a leveling occurred. Canadian suicide, homicide and fatal firearms accident rates have correlations of .792, .898, and .791 with the corresponding American rates. It is possible that changes in continental trends in suicide and homicide could be mistaken for effects of the legislation if American data were not used as a control.

Methodology

General

This study uses quasi-experimental methodology in the form of an interrupted time series with a nonequivalent control group (Cook and Campbell 1979). January 1, 1979 was taken as the time of the legislative intervention. While other phases of Bill C-51 came into effect on January 1, 1978, those earlier phases would have had a minimal impact upon the acquisition of firearms. In preliminary explorations two interventions were examined. Gun control legislation that was passed in 1969 was of a relatively mild nature: basically it reorganized categories of restricted and prohibited weapons. As these firearms (i.e., handguns and automatic weapons) have rarely been used in acts of violence in Canada, one would not expect any major changes in rates of violent deaths. This minor intervention was found to have no impact upon the behaviours being examined, as no change was observed in their trends (graphs and tables not shown). The latter intervention, under study here, was much more stringent. Assuming that firearms availability is an irreplaceable contributor to suicide and homicide, Bill C-51 is expected to have a greater probability of producing a reduction in these mortality rates.

Rather than pursue the exceedingly complex paths required in an etiological study (Lester 1985a), a nonequivalent control group shall be utilized in this policy evaluation, following the methodology laid out by Cook and Campbell for this genre of interrupted time series analysis. As the United States has not experienced a federal intervention aimed at firearms control since the implementation of the 1968 Gun Control Act, the American rates represent those of a non-treatment group. It could be argued that the United States is not truly a nontreatment group because the multitude of gun laws passed in that country during the period in question may have had a cumulative effect which is comparable to that of the single Canadian intervention. However this possibility was examined and dismissed as too remote. Wright, Rossi and Daly (1983) found that the American domestic firearms stock was increasing in the 1970's at double the rate it had in the 1960's, with the bulk of the increase being accounted for by new handguns. This trend does not support the contention that there is a gradually evolving effective level of gun control in the United States. From plots of standardized American and Canadian rates (see Table M2 & M3 below) it is obvious that the United States has experienced similar homicide and suicide trends, and is thus an appropriate control for continental secular trending. Secular trending, as it is used in this study, refers to the change in continental

behaviour patterns as they are related to time dependent social phenomena.

Year, another indicator of secular trending, was examined in preliminary analyses and found to produce quite similar results as using the American rate and tended to be superior in the analyses relating to lethal methods. Based on these results it was decided to interchange year and the American rate depending upon their explanatory power in particular models. Evidence will be presented which will support this decision by detailing the differences of firearms use and type between the two countries. Another alternative, the use of year in addition to the American rates (ARATE) is not a sound approach given the high colinearity between the variables. Also a counter could be used instead of the American rate to give two additional points but the latter tends to be preferable, given its 'real world' relevance.

The statistical results presented here have all been generated using SPSS/PC+, and interpreted using appropriate principles (Norusis 1986; Norusis 1986a). Where tests of statistical significance are applied to these data sets, a probability of 0.05 with two-tailed tests are to be used to evaluate the findings. While this measure will be the ultimate criterion used to determine whether or not an item is significant, actual probability levels will be reported

where appropriate. A two-tailed test shall be utilized throughout, because the 'common sense' directions of change may not correspond to reality. If the legislation were to have no effect on mortality rates, it is conceivable that there might be significant changes in the direction opposite to that which would be predicted of effective legislation. Where essential, plots and tables will appear on adjacent pages immediately following their citation in the text. Any other relevant computer generated outputs and data listings may be found in the Appendices.

Data

The data came from a variety of sources. The suicide and firearms accidents figures are from the Vital Statistics Section of Statistics Canada. The total homicide rates, as well as the percentage of homicides involving firearms, for Canada (1961-1986), are from publications of the Canadian Centre for Justice Statistics. The percentage of homicides committed by shooting is derived through flawed measures. In the 1960's the only breakdowns by method are for murder, excluding manslaughter. From 1970 onward the breakdowns are for the total homicide rate. During the period under examination, manslaughter accounted for less than 10% of total homicides. The percentage of violent deaths by shooting reported herein is based upon the total number of homicides or murders, depending upon the availability of appropriate data. If the method of commission of manslaughter is not markedly different from that of murder, the percentage of each form of fatal assault by shootings should be a reliable measure. If the method of commission is significantly more or less likely to be by shooting, the post 1970 data will tend to either exaggerate or minimize the role of firearms, respectively. The American figures (crude rates where possible) were all obtained from the appropriate Statistical Abstract of the United States, 1963-1987.

The statistics regarding homicide, suicide (Lester 1985, 1986) and fatal shooting accidents are among the most reliable of any social science data sets. Concerns have been expressed that suicides may be disguised as accidents by the perpetrators or by coroners. Given the very low incidence of fatal firearms accidents this does not appear to be happening in Canada. The frequencies, histograms, and ultimately the residuals' analyses of the individual sections revealed that the data sets were normally distributed. Given the overall normality of the data, transformations were considered unnecessary. However, the data sets do not merit absolute faith, as changes in reporting techniques may occur over time and across regions; albeit such changes are likely to be minimal for these mortality measures. Moreover, one must bear in mind that in every year there are a small number of officially uncatagorized deaths⁴ which would influence various rates and percentages: if they were to be categorized.

Four data sets will be used to examine three categories of mortality (see Table M1) to gauge the effect of Bill C-51. The sections will be ordered on the basis of decreasing complexity of the analyses to be performed: suicide, homicide, then accidents. Initially the various data sets

Table M1 about here

will be examined using a wide range of exploratory techniques. Correlation matrices of the various variables are found in Appendix 3. Confirmatory statistics in the form of multiple regression models, with either forced or stepwise entry of the independent variables, will be employed throughout the study. While the principle technique used here is a variant of the quasi-experimental design, the data analysis will be conducted in the manner promoted by Erickson and Nosanchuk (1977).

It must be noted that there is a critical limitation which this thesis shares with Scarff's evaluation. By relying upon national level aggregate data this study is subject to the problems which are inherent within this genre of data sets. While it is possible to make broad statements about societal level behaviour and trends, it is not possible to make reliable statements about individual behaviour. From the data being used in this project it cannot be determined whether or not individuals were being killed with, guns which were held prior to the intervention, guns which were acquired through legal means following legislation ("new guns"), or guns which were obtained by circumventing the control measures. Only with detailed case studies (which are not available) would it be possible to build up aggregate data with which one could make more definitive conclusions.

FIGURE M1

Selected Mortality Rates

Canada, 1960-1986

Source: Statistics Canada

Suicide

In the section on suicide the percentage of suicides by shooting as the dependent variable will be considered initially, with the American suicide rate, a dummy variable for pre- and post-Bill C-51 ('no' gun control / gun control) and an interaction variable, the product of the American rate and the dummy variable, as the independent variables. This interaction variable is used because the effect of gun control measures may be dependent upon the factors represented by secular trending. While the simple variable 'year' could have been substituted for the American rates, it was found not to be as effective when it was used in exploratory regressions (R^2 s were .12 lower on average). As the American rate is a product of time as well as of economic and cultural trends it possesses greater explanatory power (the correlation between the rates is .792); possibly reflecting the cultural and economic linkages between the two countries. The plot of standardized⁵ American and Canadian suicide rates (Figure M2) reveals that there actually is a continental trend. Subsequently, a regression using a model which assumes a

Figure M2 about here

causal relationship as follows will be utilized:

Suicides by gun = constant + ARATE + dummy + interact.

That is, the percentage of suicides by guns will be modelled by continental secular trending as represented by the American rate; the availability of firearms as mediated by the absence or presence of gun control; and the interaction between secular trending and gun control. The dummy will detect change in level; the interaction, change between the slopes of the pre- and post-intervention regression lines.

An examination of the total suicide rates, with a breakdown by gender, will be conducted after examining the trends in suicides by shooting. This examination is intended to detect displacement from firearms to other destructive methods. As shooting has historically been the leading method of suicide, it is expected that, if the legislation makes this favoured technique less practical, other traditionally less popular methods may be found to increase. Total, male and female Canadian suicide rates will serve as the dependent variables. The independent variables will consist of the American suicide rate, a dummy variable for pre- and post- Bill C-51, and the interaction variable. The large number of suicides provides adequate cases for separate analyses of the data for both males and females. Females will serve as a form of control group; as suicidal females have historically made little use of

firearms, they should be minimally affected by the legislation.

FIGURE M2

Standardized Suicide Rates Canada and the U.S.

—•— Canadian Rate

—□— American Rate

mean = 11.57; dq = 5.3

mean = 11.63; dq = 1.3

Source: Statistics Canada

Homicides

In the second section the preliminary examination will have the percentage of homicides by shooting as the dependent variable. Although secular trending as represented by the American rate does explain a considerable proportion of the variance in the use of firearms in homicides, it will not be used in this regression. Considerable differences exist in both the types of firearms available and the patterns of use between the two countries. Given the preponderance of handguns, and the treatment of firearms as offensive/defensive weapons in the United States (Kleck 1988; Smith and Uchida 1988; Cook 1982) it is quite likely that the differences may outweigh the converging influence of secular trending. Thus year (another secular trending indicator but not a non-equivalent control) will be substituted in place of the American rate, as it was found to explain 5% more of the variation in firearms homicides than did the American rate, when both were compared in exploratory regressions. The independent variables consist of the year, a dummy variable for pre- and post- Bill C-51, and the interaction variable. Subsequently the study moves on to an examination of the Canadian homicide rate as the dependent variable. The independent variables will again consist of the American homicide rate (with a correlation of .898), a dummy variable

for pre-and post-Bill C-51, and an interaction variable, the product of year and the dummy. As with the suicide data, year was used as an independent variable in place of secular trending for exploratory regressions and found to have less overall explanatory power. Breakdowns by sex will not be included in this section, as females consistently compose less than 10% of homicide offenders, and complete information on homicide method by perpetrator's gender is unavailable. That there is a continental secular trend in homicide is readily visible in the plot of standardized American and Canadian rates (Figure M3).

Figure M3 about here

FIGURE M3

Standardized Homicide Rates Canada and the U.S.

—•— Canadian Rate

mean = 2.2; dq = 3.7

—□— American Rate

mean = 18.0; dq = 1.1

Source: Statistics Canada

Accidents

The final, and simplest, section will use the total fatal firearms accidents as the dependent variable. Although the American fatal firearms accident rate follows a similar pattern to the Canadian rate it will not be used to represent secular trending. Year will be substituted in place of the American rate, as it was found to explain 50% more of the variation in firearms accidents than did the American rate, when both were compared in exploratory regressions. Considerable differences exist in the types of firearms available and patterns of use between the two countries (Morrow and Hudson 1986; Alexander, Massey, Gibbs, and Altekruze 1985). Given the preponderance of handguns, and the treatment of firearms as defensive weapons in the United States, it is quite likely that the differences in firearms type and use may outweigh the positive effects of the comparable levels of increased firearms safety training. The independent variables consist of year, the same dummy variable, and an interaction term of the dummy multiplied by the year. A breakdown by sex has not been provided in this section as females account for less than a tenth of victims of shooting accidents. With an annual incidence for females that is typically well under ten cases, a separate

statistical analysis would be meaningless. As shooting accidents have historically been one of the smallest categories (under 1%) of fatal accidents (Statistic Canada 1960-1986), they are not examined in relationship to the total accidental death rate. The trivial contribution of firearms to fatal accidents was deemed to be too small to affect the total accidental death rates in any notable manner.

FINDINGS

Suicide

The male suicide rate is significantly higher than the female rate with the total rate occupying the middle ground, conforming to a world-wide pattern. Figure S1 shows the plot of standardized suicide rates per 100,000 for males, females and total population, against the year. The overall rates climbed steadily during the 60's into the mid 1970's, levelled off in 1977 and have since fluctuated around that level. In the ten years prior to the intervention the female rate was above the total standardized rate. There is a break in this pattern which coincides with the intervention: the female rate drops below the total rate, highlighting a possible sex difference which this study may provide insights into.

FIGURE S1 HERE

Before proceeding to multiple regression the relevant assumptions regarding the nature of the data were met. It is assumed that all of the observations are independent. Given the nature of suicide, one can be reasonably certain that the observations are independent. While celebrity suicides have a tendency to 'take others with them' (Stack 1987); this

FIGURE S1

Standardized Suicide Rates Male, Female and Total

— Total Rate —●— Female Rate —*— Male Rate

means / dq = 11.57 / 5.3

5.8 / 2.4

17.37 / 8.4

Source: Statistics Canada

factor, while important in weekly rates, should not be significant with annual data. The data readily met all other assumptions.

The first stepwise regression used the total percentage of suicides by guns as the dependent variable and the American rate (ARATE), dummy, and the interaction variable as the independent variables. The variables which met SPSS/PC+'s selection criteria were the dummy and the American rate, producing the following regression equation:

$$\text{suicides by shooting} = -2.9(\text{dummy}) + 1.5(\text{ARATE}) + 17.5.$$

The interaction variable was excluded from the equation, having a partial correlation of .15148 and a t-value of just .613 ($P=.55$). When the actual values are entered for the dummy variable, the pre-legislation equation is:

$$\text{suicides by shooting} = 17.5 + 1.5(\text{ARATE})$$

and the post-legislation equation is:

$$\text{suicides by shooting} = 14.6 + 1.5(\text{ARATE})$$

The dummy variable with a T value of -3.074 [$P=0.0065$] was entered on the first step and produced an adjusted R^2 of .31. The ARATE with a T value of 3.572 [$P=0.0023$] was entered on the second step and raised the adjusted R^2 to .58. The R^2 indicates that the carriers explain approximately 58% of the variation in Y, 31% by the dummy and 27% by secular trending: these results are significant at the $P=.0002$ level. The change in slope, revealed by the interaction term, is not

statistically significant, possibly because of the small number of data values following the intervention.

From the preceding regression results, with the lower intercept for the post-intervention series, we may conclude that the legislation was associated with a reduction in the use of firearms in suicide. Of the independent variables both the dummy variable and the American rate, respectively representing the legislation and secular trending, were significant. The influence of both of these variables upon the use of firearms in suicide is roughly comparable, as revealed by the similar R^2 s. Although the interaction term was not significant, it was positive, possibly portending an increase in the suicide rate by shooting following the legislative intervention.

Figure S2 contains the percentage of suicides by guns, hanging, drugs, and gas, plotted against year. For firearms there are two distinct clusters, the first with higher percentages of suicides by guns and the second with lower percentages. Suicides by shooting have dropped markedly since the legislation, with the largest single drop occurring in the year of the intervention. The results of a t-test (3.85) of actual pre- and post-legislation percentages reveals that the reduction in suicides by shooting is

Figure S2 About Here

FIGURE S2

Suicide Methods vs. Year Canada, 1965-1986

Source: Statistics Canada

statistically significant ($P=.001$). Figures S3 shows pre- and post-intervention suicide methods for the entire population; with significant changes denoted by a star.

Table S3 About Here

When the percentage of suicides by guns was broken down by sex it was found that none of the independent variables was a significant predictor of the dependent variable for females. For the males the variables which met SPSS/PC+'s selection criteria were predictably the dummy and the American suicide rate (ARATE), producing the regression equation:

$$\text{male suicides by shooting} = -5(\text{dummy}) + 2(\text{ARATE}) + 21.$$

The interaction variable was excluded from the equation, having a partial correlation of .20759 and a t-value of .849 ($P=.4085$). When the actual values are entered for the dummy variable the pre-legislation equation is:

$$\text{male suicides by shooting} = 21 + 2*(\text{ARATE})$$

and the post-legislation equation is:

$$\text{male suicides by shooting} = 16 + 2*(\text{ARATE})$$

The dummy variable with a T value of -4.560 [$P=0.0002$] was entered on the first step and produced an adjusted R^2 of .51. The American suicide rate, with a T value of 3.962 [$P=0.001$], was again entered on the second step and raised the adjusted R^2 to .73. The R^2 indicates that the dummy explains

FIGURE S3

Suicide Methods

Pre- / Post-Intervention

Source: Statistics Canada

approximately 51% and the American rate another 22% of the variation in male suicides by shooting, with a significant F score of 26.7.

From these preceding regression results one may conclude that the legislation did not bring about a reduction in the use of firearms in suicide by females. However, the use of firearms in suicides by males was substantially affected by the legislation, as revealed by the lower intercept for the post-intervention series. Figures S4 and S5 show pre- and post-intervention suicide methods respectively for females and males; with significant changes denoted by a star. As with the regression on the total percentage of suicides by shooting, both the dummy variable and the American rate, respectively representing the legislation and secular trending, were significant. In this case the influence of the legislation upon the use of firearms in suicide is over double that of secular trending, as revealed by the size of the R^2 s. This may be interpreted as the presence of gun control measures being more important than the pressures to commit suicide in determining if males will use firearms in suicide. The exclusion of the interaction term indicates that the gun control legislation and the pressures to commit suicide do not interact in a way which significantly affects the slope; the rate of change in suicides by shooting. That the partial correlation of the interaction term is positive

in the above regressions (as with the total suicide shooting rate) suggests that the slope may be increasing again. This implies that the impact of C-51 may be temporary and that more permanent changes will depend upon the depletion of the existing stock of firearms.

The barchart in Figure S5 indicates that there may have been a considerable displacement effect from guns to other methods for males. While male suicides by shooting dropped 5.1%, suicides by hanging increased 5.0%. This apparent shift indicates that the effectiveness of the legislation may be considerably reduced by a strong displacement effect. Curiously, female suicides by drugs dropped 8.2% while hanging increased by 4.5%; this occurring without the stimulus of greater restrictions on drug availability, although the overall consumption of the drugs most used in suicide has been declining for over a decade (Rosenbaum & Rosenbaum 1988).

FIGURE S4 & S5 ABOUT HERE

FIGURE S4

Female Suicide Methods Pre- / Post-Intervention

Source: Statistics Canada

FIGURE S5

Male Suicide Methods Pre- / Post-Intervention

Source: Statistics Canada

While the rates of suicide are significantly higher in the post-legislation period, the legislation may have had a positive effect. In the pre-legislation period there is a statistically significant upward trend in suicide rates. A plot with a simple linear regression of the rates against year for before and after intervention reveals that the earlier series had a slope of 0.45 ($R^2 = .96$) and the latter a slope of $-.05$ ($R^2 = .05$). The previously strong relationship between year and rate is virtually nil in the post-C51 period. While the rates are still high, they have essentially ceased to increase and may even be decreasing slightly. Possibly the legislation, while not being effective enough to clearly decrease suicide, has stemmed the increase in suicide. This is surprising, given that the legislation was primarily focussed upon the acquisition of firearms it had a minimal impact on the existing stock of approximately ten million guns in private hands.

While there is a clear correlation between the legislation and change in the suicide pattern, a causal link cannot be assumed (as was done in Scarff's report). It is possible that undetermined intervening variables might be responsible for the observed change. From the plot of standardized American and Canadian suicide rates in Figure M2, it is obvious that the United States has experienced a similar pattern of trends in suicide, including the leveling

of the upward trend commencing in the late 1970's. While there are not enough post-test statistics for the United States to judge the significance of the difference, the reduction in the American suicide rate appears greater than that in the Canadian rate in Figure M2 above.

The final stepwise regression should provide further insight into the process at work; determining whether or not the displacement effect cancelled any benefits from the reduction of firearms use in suicide. It uses the total suicide rate (TRATE) as the dependent variable and the American rate, the dummy, and the interaction as the independent variables. Once more, the interaction variable was excluded from the equation, having a partial correlation of $-.22089$ and a t -value of $-.906$ ($P=.3784$). The regression equation produced is as follows:

$$\text{Suicide rate} = 2.1 * (\text{ARATE}) + 2.1 * (\text{dummy}) - 13.$$

When the actual values are entered for the dummy variable the pre-legislation equation is:

$$\text{suicide rate} = 2.1 * (\text{ARATE}) - 13$$

and the post-legislation equation is:

$$\text{suicide rate} = 2.1 * (\text{ARATE}) - 10.9$$

The American rate with a T value of 7.402 [$P<0.0005$] was entered on the first step and produced an adjusted R^2 of $.61$. The dummy variable with a T value of 5.012 [$P=0.0001$] was entered on the second step and raised the adjusted R^2 to $.83$.

The R^2 indicates that the ARATE explains approximately 61% and the dummy another 22% of the variation in Y, with a significant F score of 48.

From this final regression result it may be concluded that the legislation did contribute to a reduction in the total suicide rate. As with the previous regressions both the dummy variable and the American rate were significant. The influence of the legislation upon the total suicide rate plays a secondary rôle compared to secular trending, as revealed by the size of the R^2 s. This may be interpreted as the pressures to commit suicide being more important than the presence of gun control measures in determining the total suicide rate, even though the inclusion of female data weakens the relationship. Nevertheless, while the importance of the gun control measures is a third of that of secular trending it is still a significant positive influence in the reduction of suicide. Despite the strong displacement to other methods among males, this significant effect on the total suicide rate indicates that a considerable number of males, who may have committed suicide if the legislation were not implemented did not turn to alternative methods. While the interaction was not significant, it did have a sizeable negative partial correlation, which may indicate a trend towards decreasing suicide rates after the intervention.

Although the interaction term was not significant it proved to be informative in that it indicated the direction of possible trends. With the interaction term being excluded from all of the regressions, it is possible to conclude that the interaction term, as specified herein, did not contribute significantly to the explanatory power of the models. This indicates that the post C-51 slopes are not reliably different from the pre C-51 slopes.

(

Homicide

Figure H1 shows a plot of homicide rates per 100,000 against year. This graph reveals that the rates were consistently climbing from 1962-1974, and from 1975-86 there was a rough plateau with the post-intervention rates somewhat lower. At first glance this pattern appears to indicate a weaker relationship to the intervention than did the plot of the suicide rate, but a relationship nevertheless. In this section the homicide rates and methods will not be broken down by the sex of the perpetrator. From Figure H2 it is evident that homicides by shooting have dropped substantially while homicides by stabbing have risen correspondingly. The barchart in Figure H3 shows the means of the main homicide methods for before and after the intervention. Evidently there has been a displacement in homicide methods, paralleling that found in suicide.

Figure H1, H2, & H3 ABOUT HERE

The first regression uses the percentage of homicides committed by shooting as the dependent variable, and a stepwise entry procedure to determine if the legislation has affected the use of firearms in homicide. The independent variables were the year, the dummy, and the interaction term.

FIGURE H1

Canadian Homicide Rate 1961-1986

Source: Statistics Canada

FIGURE H2

Homicide Methods vs. Year

Canada, 1961-1986

Source: Statistics Canada

FIGURE H3

Homicide Methods Pre- / Post-Intervention

Source: Statistics Canada

The overall R^2 of 71% is highly significant ($P < .0005$) with a F value of 31.7. The dummy variable with a T value of $-.270$ was the only variable excluded from the equation. This yielded a regression equation of:

$$\% \text{ homicides by shooting} = 643 - 3.2^{03}(\text{interaction}) - .3(\text{year})$$

The strength of the interaction term indicates that there has been quite a significant reduction in the use of firearms in homicide. The inclusion of the year in the equation boosted the explanatory power of the equation from 67% to 71%. The year thus has minimal explanatory power beyond the interaction. However, Figure H2 reveals that the use of firearms in homicide began declining four years before the intervention; thus the significant results may be partially spurious. Interestingly, at the time when legislative intervention was initially contemplated there were more firearms homicides than the regression model predicted; whereas in the three years prior to the implementation there were fewer firearms homicides than predicted. This could indicate that the influences which were responsible for the use of firearms in homicide were beginning to wane by the time the intervention was planned.

While the overall rates of homicide are significantly higher in the post-legislation period, there may have been a reduction in the rate of increase, as was found with suicide.

In the pre-legislation period there is a statistically significant upward trend in homicide rates. Plots with simple linear regressions of the rates for before and after the intervention reveal that the earlier series had a slope of 0.12 ($R^2 = .92$) and the latter a slope of $-.02$ ($R^2 = .06$). The previously significant relationship between year and rate is virtually nil in the post-C51 period. As with suicide, the rates are still significantly higher, yet the rate of increase in homicide has been stemmed. The disappearance of the strong positive relationship between the homicide rate and year may have begun a year before the intervention.

Did the reduction in the use of firearms affect the overall homicide rate? A regression, consisting of the homicide rates against three carriers; American rate (AMURDER), dummy, and interaction (AMURDER*DUMMY), should answer this question. The similarity of the Canadian and American trends is evident in the plot of the standardized rates (Figure M2, Methodology Section). This similarity and the results of exploratory regressions indicate that for the homicide rate the American rate is a better control for secular trending than is the year. The t-scores (10.868, 3.590 and -3.574 , respectively) reveal that all three variables are significant predictors of the homicide rate. An adjusted R^2 of 85.3% indicates that the carriers explain all but 14.7% of the variation in homicide rates. An F value

of 49.5 is significant, beyond the $P=.0005$ level. The regression equation is:

$$\text{homicide rate} = -.28 + .31 * (\text{American rate}) + 3.39 * (\text{dummy}) \\ -.36 * (\text{interaction})$$

which yield a pre-intervention equation of:

$$\text{homicide rate} = -.28 + .31 * (\text{American rate})$$

and a post-intervention equation of:

$$\text{homicide rate} = 3.11 - .05 * (\text{American rate})$$

According to this regression model the homicide rate is primarily determined by secular trending, increases with the presence of gun control but decreases with the interaction between secular trending and the gun control measures. The Canadian homicide rate is primarily a product of the continental pressures to commit homicide as represented by the American homicide rate. Curiously the intercept increased with the presence of gun control legislation, which is the result of rates simply being higher in the latter part of the series. The significance of the interaction term reveals that the presence of the gun control legislation did interact with the pressures to commit homicide in a way which reduced the number of homicides. The rate of increase in homicide was reduced in the post-intervention series, falling from .31 to -.05.

Accidents

The plot (Figure A1) of fatal shooting accident rates per 100,000 versus year reveals that the rates were consistently dropping throughout the entire series. A plot of accident rates versus the dummy variable revealed that the rates were lower in the post-legislation period. A simple linear regression of the accident rate by year produces a R^2 of .92, which is significant ($P < .0005$). The rate of decline as revealed by the slopes of pre- and post-legislation regression lines is $-.035$ and $-.014$, respectively. This means that the rate of decline in fatal firearms accidents is less than half what it was in the pre-legislation period. While the latter regression was not quite significant ($P = .058$) it may be indicative of a leveling of the downward trend as the number of firearms accidents (approximately 30-40 per year) encounters a floor effect. With approximately ten million guns in the country it may be impossible to eradicate accidental shooting fatalities completely, so there is little room for improvement remaining.

Figure A1 here

Unlike the previous sections, here only one dependent variable is used; fatal firearms accidents. Below are the results of a regression using all relevant independent

variables and a stepwise entry procedure. For the accident section these variables are year, the gun control /no gun control variable, and the interaction of gun control with year (the multiplicative product). As discussed in the methodology section, the American rate is not an appropriate variable in this section because the differences in firearms ownership and use appear to outweigh the similar trends towards increased firearms safety training. The adjusted R^2 of .92 indicates that the carriers leave 8% of the variation in fatal firearms accidents unexplained. The stepwise entry procedure produced the regression equation:

$$\text{fatal firearms accident rate} = -.03538(\text{year}) - 70.4$$

The only variable contributing significantly to reduced accident rates is the year with an F score of 292. According to the regression equation, the fatal firearms accident rate is determined by factors that are very closely linked with time and not at all with the gun control legislation. That one variable, the year, explains all but 8% of the variation in accidents is quite remarkable. This may indicate that the processes which determine the fatal firearms accident rate are progressing monotonically and are totally independent of the gun control measures. The process which is most obvious is the expansion of hunter education programs, which are training an ever increasing proportion of Canadian hunters.

FIGURE A1

Fatal Firearms Accidents Canada 1960-1986

Source: Statistics Canada

Conclusions

The direction of the effect of the dummy variable tends to be in keeping with what one would expect from effective legislation. The intervention is primarily linked to a reduction in the relative use of firearms in both suicide and homicide. There is a leveling of the rates of increase in the incidence of suicide and homicide in the post-legislation period. However, a very similar pattern found in the homicide and suicide rates of the nonequivalent control group indicates that the causal link between the observed phenomenon and the intervention is secondary to secular trending. Nevertheless, the regression results support that the intervention was successful in reducing suicide. The interaction variable was found to contribute significantly only to the regression model for the percentage of homicides by shooting. The interaction terms utilized throughout indicates that the passage of C-51 did not interact with secular trending in a significant manner for (i.e., jointly affecting) the other dependent variables; that is, the relationship of Canadian and American rates is not reliably different before and after C-51.

The Executive Summary of the official evaluation states:
"Suicides with firearms declined moderately in the post-

legislation period." (1983:14). The new legal barriers to firearms acquisition have contributed to the stabilization of the overall suicide rate. While secular trending is responsible for much of the observed change the legislation also contributed significantly to the desired changes. The official evaluation failed to use a control for secular trending and thus incorrectly attributed all of the favourable outcome to the intervention. The only individuals who would be screened effectively by the Firearms Acquisition Certificate (FAC) procedure would be those who had attempted suicide in the past five years and whose attempt came to police attention. Individuals who do not exhibit obvious indications that they are contemplating suicide, would receive a FAC.

Yet, the findings of this report support the recommendation of the National Task Force on Suicide that "Measures should be taken to reduce the lethality and availability of instruments of suicide (eg., more stringent enforcement of gun-control legislation..." (National Task Force on Suicide in Canada 1987:41). The government's energies towards suicide prevention appear to have been partially misdirected, as the end result, death, is the same regardless of the method used (witness the displacement to hanging). Reforms based upon a sociological model of suicide (eg., focussing upon a dearth of personal support systems in

our social structure) may have been even more (fruitful than this attempt to limit but one of a multitude of possible methods. Nevertheless, the results of the statistical evaluation of the suicide data provides support for the legislation. This sort of favourable impact was also found by Medoff and Magaddino (1983) in a study which determined that states with stricter gun control had lower suicide rates for white males than states with less strict control.

Females do not appear to be affected by the legislation. As females tend not to be socialized into the use of firearms (Lizotte and Bordura, 1980, 1980a), and implicitly, into the methods of firearms acquisition, they should tend to see acquiring new firearms to be more difficult than it actually is. Yet the analysis of the methods of suicide by females shows no change in firearms use. In contrast, males tend to have been socialized into firearms usage and thus ought to be more cognizant of how to acquire firearms. Yet males exhibit a reduction in the use of firearms. Possibly females tend to use firearms which are present within the home and not to acquire firearms specifically for suicide, thus they would rely to a considerable extent upon the existing stock of firearms. These findings support the American findings of Markush and Bartolucci (1984) who found that white female suicides were unaffected by the availability of firearms while white male suicides were increased by the availability

of firearms. These findings run counter to those of Marks and Stokes (198?) who maintain that suicide methods and rates are independent. Support is found for their contention that the use of firearms in suicide is a matter of socialization into firearms use, and when socialization is held constant much of the sex difference in suicide methods disappears. The significant reduction in female suicides using drugs is indicative of a general downward trend in female suicides.

These findings do provide qualified support to the component of the existent literature on the interdiction of a means of suicide and the suicide rates. Support is found for Boor's suggestion that

the physical availability of the more culturally accepted method of suicide is a major determinant of suicide rates and that suicides may be prevented by decreasing the availability of the most common methods of suicide to suicidal individuals. (Boor 1981:70)

While the exclusion of a particular suicide method usually causes individuals to turn to alternative methods (Lester and Murrell 1982), these findings suggest that the displacement is not complete. Possibly some individuals who were prevented from committing suicide by the absence of a firearm did not turn to other methods. A similar conclusion holds for the homicide rates. The displacement effect which was seen in homicide and suicide appears to be the principle impediment to the success of the intervention. To some extent the cliché "where there's a will there's a way" is supported, but

the will may not have been strong enough to overcome the apparent reduction in the availability of lethal instruments for a significant number of individuals. If additional data were available they might reveal a greater proportion of nonfatal attempts at suicide and homicide.

Murder with firearms began declining in 1975, four years before the FAC portion of the legislation, making causal attributions rather tenuous. A similar trend also occurred in the United States, indicating a potential confounding factor which might be responsible for the shift. However, these findings do support those of Fisher (1976) who found that increasing handgun availability in Detroit explained much of that city's rise in homicide. It must also be noted that Scarff's presentation of the percentage of murders involving firearms throughout may slightly inflate the apparent role of guns, as manslaughter and infanticide are excluded. Given the nature of the latter two crimes, it is plausible that firearms are less frequently utilized; thus their role in all homicide may be marginally less significant. If this is the case, Scarff would have increased the probability of attributing a positive change in homicide rates to the legislative intervention.

There has been a substantial decline in the rate of accidental deaths due to firearms in recent years. There may

be some leveling of this trend due to the potential influence of a floor effect. Some other factors (eg., reduced hunting, improved medical treatments) are perhaps responsible, as the section of the federal legislation pertaining to gun safety has yet to be implemented. Attributing causality was not justified by Scarff's examination of the existing data.

Since the early 1970's, many provinces have initiated hunter safety programs, focusing largely upon new hunters. As these hunters have historically been over represented in firearms fatalities, it is quite possible that such training has made them more safety conscious. Over time, an increasing proportion of shooters will have received formal safety training. The resultant increased competence with firearms could explain the witnessed decline in accidental gun deaths. If the government's legislation has had any effect it may have been in having deterred individuals who might otherwise have been accident victims from being involved with firearms. It should be noted that shooting and hunting are quite safe, given the high levels of participation. In 1985 the National Sporting Goods Association found that hunting and shooting ranked thirteenth of the forty-four sports in which they rank participation (Aim 1986:29).

The results of this study do not provide clear support for the theoretical models reviewed in the introduction. It appears that reducing the availability of new guns has produced changes whose magnitude are more readily explained by a social-psychological perspective than by a purely sociological one. The general population's perception of the legislation may be that it is much more stringent than it actually is, thus deterring attempts to obtain firearms. If broad structural phenomena were solely responsible for determining homicide and suicide rates one would expect reduced access to the preferred method to have a minimal effect. The moderate effect indicates that environmental factors are also at play. The intervention's impact may reveal something of cultural perceptions of various forms of death: perceptions which may have an impact upon homicide and suicide (i.e. people {males primarily} may be less likely use less violent and effective methods of destruction).

There are several areas which give cause for reservation in this study. As discussed above, the use of aggregated data throughout this study make it susceptible to the hazards of all such data, the interpretation of aggregated data may be misleading at the individual level (Borgatta and Jackson 1980). The uneven enforcement of Bill C-51 blurs the relationship between the 'theoretical' gun controls and the 'actual' gun controls. As the legislation primarily affects

newly acquired firearms, this study's validity would be enhanced if new firearms were a significant contributor to the forms of mortality examined. If this is not the case, program evaluations regarding gun control are virtually impossible, as the long (decades) period necessary for an effect will surely be masked by cultural changes. However, given the significant findings of this study, it does appear that new firearms play a disproportionately important role. Note that the gun control legislation may have reduced the availability of new guns more by indirectly, yet drastically, reducing the number of retail firearms outlets (Commissioner of the RCMP 1984) than through the Firearms Acquisition Certificate process. It should be reiterated that this study's function has been to determine the efficacy of Bill C-51, not the etiology of suicide and homicide.

The inconsistent success of Bill C-51 regarding homicide, suicide and fatal shooting accidents highlights the merits of evaluating the efficacy of the legislation in the other areas it was designed to affect. The mandatory sentencing provisions of the Bill may well be less effective than indicated by the government's consulting firm. There is considerable research which indicates that mandatory sentencing is not very effective (eg., Loftin and McDowall 1984; Loftin, Huemann and McDowall 1983; and Wright, Rossi, and Daly 1983). Attempted suicides and homicides as well as

nonfatal assaults and armed robberies could also be examined to determine if there has been a shift in the usage of weapons in those offenses, and what the effects of any shifts may be. Insights into the internal processes of the justice bureaucracy may be revealed by scrutinizing how the policy formulation process culminated in the introduction of new gun control legislation. As the pressure for the new legislation originated within the state rather than from the public it is an excellent case for examining the current dynamics of the administration of justice as it relates to the state's political orientation, possibly pursuing a perspective akin to Taylor (1981, 1981a, 1983) who explores the evidence supporting the claim that the state is becoming increasingly interventionist.

Additional studies are required to prove conclusively which elements of the Canadian gun control measures are effective. As there is a tendency to use methodologically inadequate research in justice issues (Cousineau and Plecas 1982) the emotionally charged issue of gun control especially warrants high quality research. Only with reliable research can the most effective components of gun control measures be identified as valuable public health measures. There is a clear need to balance the negative aspects of firearms availability for society with the potential positive aspects for the millions of firearms owners.

Appendix 1

SUICIDE DATA LIST

YEAR	TRATE	MRATE	FRATE	ARATE	T BY GUN	T BY DRG	T BY HNG	T BY GAS
1960	7.6	12.0	3.0	10.6	.	.	.	.
1961	7.5	11.9	3.0	10.4	.	.	.	.
1962	7.2	11.2	3.1	10.9	.	.	.	.
1963	7.6	11.4	3.8	11.0	.	.	.	.
1964	8.3	12.3	4.1	10.8	.	.	.	.
1965	8.8	12.9	4.5	11.1	36.3	19.6	18.4	9.4
1966	8.6	12.8	4.3	10.9	35.5	19.3	20.8	9.2
1967	9.0	13.2	4.8	10.8	33.3	20.8	20.9	9.3
1968	9.7	14.2	5.2	10.7	35.5	20.4	20.8	9.5
1969	10.9	15.6	6.2	10.9	32.7	22.3	20.1	9.4
1970	11.3	16.2	6.4	11.6	33.0	21.5	21.2	9.5
1971	11.9	17.3	6.4	11.7	36.1	23.0	18.2	9.1
1972	12.2	17.4	6.9	12.0	35.2	23.4	17.9	7.9
1973	12.6	18.0	7.1	12.0	34.3	23.3	18.3	9.1
1974	12.9	18.7	7.1	12.1	35.2	21.2	19.1	8.6
1975	12.3	17.8	6.8	12.7	37.5	21.4	18.7	8.2
1976	12.8	18.4	7.2	12.5	37.3	22.5	17.5	8.5
1977	14.2	21.2	7.3	13.3	38.3	21.3	18.6	8.4
1978	14.8	22.4	7.3	12.5	37.0	19.8	20.3	8.9
1979	14.2	21.4	7.0	12.4	32.8	19.0	22.6	10.8
1980	14.0	21.3	6.8	11.9	33.4	18.9	22.3	10.7
1981	14.0	21.3	6.8	12.0	34.4	17.5	23.4	9.8
1982	14.3	22.3	6.4	12.2	34.1	17.2	23.8	9.8
1983	15.1	23.4	6.9	12.1	33.0	16.2	25.5	10.0
1984	13.7	21.4	6.1	11.6	30.6	17.1	26.7	10.4
1985	12.9	20.5	5.4	.	31.9	13.1	26.2	12.3
1986	14.3	22.5	6.3	.	32.3	16.6	24.9	12.2

Number of cases listed = 27

SOURCE: All variables based upon Canadian figures were derived from the annual publications (84-203) from Statistics Canada's Vital Statistics Branch entitled Causes of Death.

DICTIONARY

TRATE = TOTAL SUICIDE RATE PER 100,000
MRATE = MALE SUICIDE RATE PER 100,000
FRATE = FEMALE SUICIDE RATE PER 100,000
ARATE = TOTAL AMERICAN SUICIDE RATE PER 100,000
DUMMY = INTERVENTION VARIABLE (NO C51/C51 or NO GUN CONTROL/GUN CONTROL)
T_BY_GUN = PERCENTAGE OF TOTAL SUICIDES COMMITTED WITH FIREARMS
T_BY_GAS = PERCENTAGE OF TOTAL SUICIDES COMMITTED WITH GAS
T_BY_HNG = PERCENTAGE OF TOTAL SUICIDES COMMITTED BY HANGING
T_BY_DRG = PERCENTAGE OF TOTAL SUICIDES COMMITTED WITH DRUGS (or solids)
M_BY_GUN = PERCENTAGE OF MALE SUICIDES COMMITTED WITH FIREARMS
M_BY_GAS = PERCENTAGE OF MALE SUICIDES COMMITTED WITH GAS
M_BY_HNG = PERCENTAGE OF MALE SUICIDES COMMITTED BY HANGING
M_BY_DRG = PERCENTAGE OF MALE SUICIDES COMMITTED WITH DRUGS (or solids)
F_BY_GUN = PERCENTAGE OF FEMALE SUICIDES COMMITTED WITH FIREARMS
F_BY_GAS = PERCENTAGE OF FEMALE SUICIDES COMMITTED WITH GAS
F_BY_HNG = PERCENTAGE OF FEMALE SUICIDES COMMITTED BY HANGING
F_BY_DRG = PERCENTAGE OF FEMALE SUICIDES COMMITTED WITH DRUGS (or solids)
ACCIDENT = CANADIAN FATAL FIREARMS ACCIDENTS per 100,000 POPULATION
AACCIDNT = AMERICAN FATAL FIREARMS ACCIDENTS per 100,000 POPULATION

HOMICIDE DATA LIST

YEAR AMURDER H BY GUN H BY HIT H BY CUT H BY STR H BY OTH HOMICIDE

1960	4.7	NA	NA	NA	NA	NA	NA
1961	4.7	45.4	25.4	17.8	4.9	6.5	1.28
1962	4.9	37.3	24.4	19.4	9.7	9.2	1.43
1963	4.9	46.0	22.8	17.2	6.0	7.9	1.32
1964	5.1	48.2	22.0	18.3	6.0	5.5	1.31
1965	5.5	46.1	28.8	14.0	5.3	5.8	1.41
1966	5.9	41.4	30.9	12.3	7.7	7.7	1.25
1967	6.8	49.5	18.5	16.4	6.8	8.9	1.66
1968	7.3	43.0	21.0	21.0	7.6	7.3	1.81
1969	7.2	44.4	22.2	17.8	6.4	9.1	1.86
1970	8.3	41.9	16.3	15.3	6.3	20.2	2.19
1971	9.1	45.3	19.2	15.7	6.8	12.9	2.19
1972	9.4	41.7	19.4	16.0	5.0	17.9	2.39
1973	9.8	45.2	21.5	19.2	6.9	7.3	2.48
1974	10.2	47.2	22.0	15.5	4.3	10.9	2.68
1975	10.0	41.7	23.3	17.7	5.4	12.0	3.09
1976	9.1	38.6	22.2	20.4	7.8	11.1	2.91
1977	9.2	36.6	21.4	21.0	7.5	13.6	3.06
1978	9.4	37.8	22.8	22.1	7.9	9.4	2.81
1979	10.2	32.8	20.9	25.7	7.6	13.0	2.66
1980	10.7	32.9	19.7	23.3	5.6	18.5	2.47
1981	10.3	30.7	23.9	27.2	8.8	9.4	2.66
1982	9.6	37.1	18.6	27.2	6.6	10.5	2.71
1983	8.6	32.8	22.0	25.4	7.9	11.9	2.74
1984	8.4	34.2	17.1	28.3	6.9	13.5	2.65
1985	8.4	31.5	16.8	32.2	6.0	13.5	2.78
1986	9.2	30.8	21.8	29.0	6.3	12.1	2.22

H_BY_GUN = PERCENTAGE OF HOMICIDES COMMITTED BY SHOOTING

H_BY_HIT = PERCENTAGE OF HOMICIDES COMMITTED BY BEATING

H_BY_CHK = PERCENTAGE OF HOMICIDES COMMITTED BY STRANGULATION

H_BY_CUT = PERCENTAGE OF HOMICIDES COMMITTED BY STABBING

H_BY_OTH = PERCENTAGE OF HOMICIDES COMMITTED BY OTHER METHODS

HOMICIDE = CANADIAN HOMICIDE RATE per 100,000 POPULATION

AMURDER = AMERICAN HOMICIDE RATE per 100,000 POPULATION

PRELIMINARY RUNS OF SUICIDE DATA (T-TESTS)

Appendix 2

Independent samples of DUMMY INTERVENTION VARIABLE

Group 1: DUMMY EQ 1 Group 2: DUMMY EQ 2

t-test for: MRATE MALE PER CAPITA RATE

	Number of Cases	Mean	Standard Deviation	Standard Error
Group 1	19	15.5155	3.413	.783
Group 2	8	21.7728	.924	.327

		Pooled Variance Estimate			Separate Variance Estimate		
F	2-Tail	t	Degrees of	2-Tail	t	Degrees of	2-Tail
Value	Prob.	Value	Freedom	Prob.	Value	Freedom	Prob.
13.64	.002	-5.05	25	.000	-7.37	23.02	.000

t-test for: FRATE FEMALE PER CAPITA RATE

	Number of Cases	Mean	Standard Deviation	Standard Error
Group 1	19	5.5107	1.612	.370
Group 2	8	6.4821	.537	.190

		Pooled Variance Estimate			Separate Variance Estimate		
F	2-Tail	t	Degrees of	2-Tail	t	Degrees of	2-Tail
Value	Prob.	Value	Freedom	Prob.	Value	Freedom	Prob.
9.03	.006	-1.65	25	.112	-2.34	24.38	.028

t-test for: TRATE TOTAL PER CAPITA RATE

	Number of Cases	Mean	Standard Deviation	Standard Error
Group 1	19	10.5250	2.451	.562
Group 2	8	14.0562	.633	.224

		Pooled Variance Estimate			Separate Variance Estimate		
F	2-Tail	t	Degrees of	2-Tail	t	Degrees of	2-Tail
Value	Prob.	Value	Freedom	Prob.	Value	Freedom	Prob.
15.00	.001	-3.98	25	.001	-5.83	22.69	.000

Independent samples of DUMMY INTERVENTION VARIABLE

Group 1: DUMMY EQ 1 Group 2: DUMMY EQ 2

t-test for: M_BY_GUN % OF MALE SUICIDES BY GUNS

	Number of Cases	Mean	Standard Deviation	Standard Error
Group 1	14	44.6509	2.127	.568
Group 2	8	39.5959	1.785	.631

		Pooled Variance Estimate			Separate Variance Estimate		
F Value	2-Tail Prob.	t Value	Degrees of Freedom	2-Tail Prob.	t Value	Degrees of Freedom	2-Tail Prob.
1.42	.662	5.66	20	.000	5.95	16.95	.000

t-test for: F_BY_GUN % FEMALE SUICIDES BY GUNS

	Number of Cases	Mean	Standard Deviation	Standard Error
Group 1	14	10.9228	1.423	.380
Group 2	8	10.4879	1.286	.455

		Pooled Variance Estimate			Separate Variance Estimate		
F Value	2-Tail Prob.	t Value	Degrees of Freedom	2-Tail Prob.	t Value	Degrees of Freedom	2-Tail Prob.
1.22	.820	.71	20	.484	.73	16.00	.474

t-test for: T_BY_GUN % TOTAL SUICIDES BY GUN

	Number of Cases	Mean	Standard Deviation	Standard Error
Group 1	14	35.5101	1.739	.465
Group 2	8	32.8105	1.241	.439

		Pooled Variance Estimate			Separate Variance Estimate		
F Value	2-Tail Prob.	t Value	Degrees of Freedom	2-Tail Prob.	t Value	Degrees of Freedom	2-Tail Prob.
1.96	.376	3.85	20	.001	4.22	18.79	.000

Independent samples of DUMMY INTERVENTION VARIABLE

Group 1: DUMMY EQ 1 Group 2: DUMMY EQ 2

t-test for: M_BY_GAS % MALE SUICIDES BY GAS

	Number of Cases	Mean	Standard Deviation	Standard Error
Group 1	14	9.9425	.896	.240
Group 2	8	11.2987	1.021	.361

		Pooled Variance Estimate			Separate Variance Estimate		
F	2-Tail	t	Degrees of	2-Tail	t	Degrees of	2-Tail
Value	Prob.	Value	Freedom	Prob.	Value	Freedom	Prob.
1.30	.648	-3.25	20	.004	-3.13	13.14	.008

t-test for: F_BY_GAS % FEMALES SUICIDES BY GAS

	Number of Cases	Mean	Standard Deviation	Standard Error
Group 1	14	6.2069	1.113	.297
Group 2	8	8.9520	1.813	.641

		Pooled Variance Estimate			Separate Variance Estimate		
F	2-Tail	t	Degrees of	2-Tail	t	Degrees of	2-Tail
Value	Prob.	Value	Freedom	Prob.	Value	Freedom	Prob.
2.56	.122	-4.43	20	.000	-3.88	10.08	.003

t-test for: T_BY_GAS % TOTAL SUICIDES BY GAS

	Number of Cases	Mean	Standard Deviation	Standard Error
Group 1	14	8.9272	.527	.141
Group 2	8	10.7375	.993	.351

		Pooled Variance Estimate			Separate Variance Estimate		
F	2-Tail	t	Degrees of	2-Tail	t	Degrees of	2-Tail
Value	Prob.	Value	Freedom	Prob.	Value	Freedom	Prob.
3.55	.047	-5.63	20	.000	-4.78	9.31	.001

Independent samples of DUMMY INTERVENTION VARIABLE

Group 1: DUMMY EQ 1 Group 2: DUMMY EQ 2

t-test for: M_BY_DRG % MALE SUICIDES BY DRUGS

	Number of Cases	Mean	Standard Deviation	Standard Error
Group 1	14	11.9700	.866	.231
Group 2	8	10.3857	1.072	.379

		Pooled Variance Estimate			Separate Variance Estimate		
F	2-Tail	t	Degrees of	2-Tail	t	Degrees of	2-Tail
Value	Prob.	Value	Freedom	Prob.	Value	Freedom	Prob.
1.53	.481	3.79	20	.001	3.57	12.28	.004

t-test for: F_BY_DRG % FEMALE SUICIDES BY DRUGS

	Number of Cases	Mean	Standard Deviation	Standard Error
Group 1	14	46.7853	2.389	.638
Group 2	8	38.5697	3.597	1.272

		Pooled Variance Estimate			Separate Variance Estimate		
F	2-Tail	t	Degrees of	2-Tail	t	Degrees of	2-Tail
Value	Prob.	Value	Freedom	Prob.	Value	Freedom	Prob.
2.27	.192	6.46	20	.000	5.77	10.61	.000

t-test for: T_BY_DRG % TOTAL SUICIDES BY DRUGS

	Number of Cases	Mean	Standard Deviation	Standard Error
Group 1	14	21.4101	1.359	.363
Group 2	8	16.9689	1.836	.649

		Pooled Variance Estimate			Separate Variance Estimate		
F	2-Tail	t	Degrees of	2-Tail	t	Degrees of	2-Tail
Value	Prob.	Value	Freedom	Prob.	Value	Freedom	Prob.
1.83	.331	6.49	20	.000	5.97	11.46	.000

Independent samples of DUMMY INTERVENTION VARIABLE

Group 1: DUMMY EQ 1 Group 2: DUMMY EQ 2

t-test for: M_BY_HNG & MALE SUICIDES BY HANGING

	Number of Cases	Mean	Standard Deviation	Standard Error
Group 1	14	20.8038	1.695	.453
Group 2	8	25.8418	1.772	.626

		Pooled Variance Estimate			Separate Variance Estimate		
F	2-Tail	t	Degrees of	2-Tail	t	Degrees of	2-Tail
Value	Prob.	Value	Freedom	Prob.	Value	Freedom	Prob.
1.09	.848	-6.60	20	.000	-6.52	14.15	.000

t-test for: F_BY_HNG & FEMALE SUICIDES BY HANGING

	Number of Cases	Mean	Standard Deviation	Standard Error
Group 1	14	15.3100	1.047	.280
Group 2	8	19.7595	1.387	.491

		Pooled Variance Estimate			Separate Variance Estimate		
F	2-Tail	t	Degrees of	2-Tail	t	Degrees of	2-Tail
Value	Prob.	Value	Freedom	Prob.	Value	Freedom	Prob.
1.76	.361	-8.53	20	.000	-7.88	11.63	.000

t-test for: T_BY_HNG & TOTAL SUICIDES BY HANGING

	Number of Cases	Mean	Standard Deviation	Standard Error
Group 1	14	19.3251	1.272	.340
Group 2	8	24.4352	1.668	.590

		Pooled Variance Estimate			Separate Variance Estimate		
F	2-Tail	t	Degrees of	2-Tail	t	Degrees of	2-Tail
Value	Prob.	Value	Freedom	Prob.	Value	Freedom	Prob.
1.72	.377	-8.10	20	.000	-7.51	11.72	.000

Appendix 3

Suicide variables

Correlation, Covariance, 1-Tailed Sig, Cross-Product:

	T_BY_GUN	DUMMY	INTERACT	ARATE	TRATE	MRATE
T_BY_GUN	1.000	-.587	-.582	.418	-.077	-.134
	3.907	-.545	-6.507	.576	-.312	-.904
	.999	.003	.004	.033	.374	.287
DUMMY	-.587	1.000	1.000	.177	.604	.689
	-.545	.221	2.660	.058	.585	1.107
	.003	.999	.000	.228	.002	.000
INTERACT	-.582	1.000	1.000	.182	.605	.690
	-6.507	2.660	32.028	.716	7.060	13.335
	.004	.000	.999	.222	.002	.000
ARATE	.418	.177	.182	1.000	.792	.738
	.576	.058	.716	.486	1.138	1.757
	.033	.228	.222	.999	.000	.000
TRATE	-.077	.604	.605	.792	1.000	.989
	-.312	.585	7.060	1.138	4.249	6.967
	.374	.002	.002	.000	.999	.000
MRATE	-.134	.689	.690	.738	.989	1.000
	-.904	1.107	13.335	1.757	6.967	11.677
	.287	.000	.000	.000	.000	.999
FRATE	.128	.211	.214	.839	.863	.780
	.236	.093	1.133	.546	1.662	2.488
	.296	.186	.182	.000	.000	.000

	Mean	Std Dev	Variance	Label
T_BY_GUN	34.770	1.977	3.907	% TOTAL SUICIDES BY GUN
DUMMY	.300	.470	.221	INTERVENTION VARIABLE
INTERACT	3.610	5.659	32.028	DUMMY * AMERICAN RATE
ARATE	11.850	.697	.486	American Suicide Rate
TRATE	12.358	2.061	4.249	TOTAL PER CAPITA RATE
MRATE	18.360	3.417	11.677	MALE PER CAPITA RATE
FRATE	6.393	.934	.872	FEMALE PER CAPITA RATE

N of Cases = 20

Homicide variables

Correlation, Covariance, 1-tailed Sig, Cross-Product:

	HOMICIDE	INTERACT	DUMMY	AMURDER	H_BY_GUN
HOMICIDE	1.000	.416	.423	.898	-.566
	.392	1.175	.126	1.101	-2.097
	.999	.019	.018	.000	.002
	9.404	28.192	3.024	26.428	-50.326
INTERACT	.416	1.000	.994	.490	-.816
	1.175	20.379	2.136	4.330	-21.820
	.019	.999	.000	.007	.000
	28.192	489.094	51.272	103.920	-523.670
DUMMY	.423	.994	1.000	.465	-.820
	.126	2.136	.227	.434	-2.312
	.018	.000	.999	.010	.000
	3.024	51.272	5.440	10.405	-55.492
AMURDER	.898	.490	.465	1.000	-.523
	1.101	4.330	.434	3.839	-6.069
	.000	.007	.010	.999	.004
	26.428	103.920	10.405	92.137	-145.650
H_BY_GUN	-.566	-.816	-.820	-.523	1.000
	-2.097	-21.820	-2.312	-6.069	35.081
	.002	.000	.000	.004	.999
	-50.326	-523.670	-55.492	-145.650	841.950

Accident data

Correlation, Covariance, 1-tailed Sig, Cross-Product:

	ACCIDENT	INTERACT	DUMMY	AACCIDENT
ACCIDENT	1.000	-.675	-.688	.791
	.082	-.068	-.086	.047
	.999	.000	.000	.000
	1.969	-1.629	-2.061	1.134
INTERACT	-.675	1.000	.993	-.731
	-.068	.123	.152	-.054
	.000	.999	.000	.000
	-1.629	2.958	3.648	-1.285
DUMMY	-.688	.993	1.000	-.758
	-.086	.152	.190	-.069
	.000	.000	.999	.000
	-2.061	3.648	4.560	-1.656
AACCIDENT	.791	-.731	-.758	1.000
	.047	-.054	-.069	.044
	.000	.000	.000	.999
	1.134	-1.285	-1.656	1.046

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Endnotes

1. While the term control is used throughout this thesis one must bear in mind that implicit within the term is the assumption that firearms legislation does indeed control the usage of firearms.

2. The reader may be interested to note that the author (a competitive target shooter) began this study with the assumption that the gun control legislation would have a negligible impact. However, this partisan position proved untenable given the outcome of the data analysis.

3. These checks are conducted using CPIC a national computerized database containing information on criminal records./

4. According to Statistics Canada, in 1983 there were a total of 3,755 suicides, 603 homicides, 41 fatal shooting accidents, and 33 deaths from gun shots which were undetermined as to whether they were instances of homicide, suicide or accidents.

5. Standardized data have the mean and the difference of the quartiles removed, thus facilitating the comparison of any underlying trends)

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