Mass shootings in Australia and New Zealand: A descriptive study of incidence

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Abstract

The development of legislation aimed at reducing the incidence of firearm-related death is an ongoing interest within the spheres of criminology, public policy, and criminal justice. Although a body of research has examined the impacts of significant epochs of regulatory reform upon firearm-related suicides and homicides in countries like Australia, where strict nationwide firearms regulations were introduced in 1996, relatively little research has considered the occurrence of a specific type of homicide: mass shooting events. The current paper examines the incidence of mass shootings in Australia and New Zealand (a country that is socioeconomically similar to Australia, but with a different approach to firearms regulation) over a 30 year period. It does not find support for the hypothesis that Australia's prohibition of certain types of firearms has prevented mass shootings, with New Zealand not experiencing a mass shooting since 1997 despite the availability in that country of firearms banned in Australia. These findings are discussed in the context of social and economic trends.

About the Authors

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Introduction

The development of legislation aimed at reducing the incidence of firearm-related death is an ongoing interest within the spheres of criminology, public policy, and criminal justice. There is a growing amount of research (including meta-review) examining the impacts of significant epochs of regulatory reform upon firearm-related deaths in countries like Australia, where strict nationwide firearms regulations were introduced in 1996. These studies typically focus on suicide or homicides, and a summary of key findings is given below. However, comparatively little scrutiny has been applied to the occurrence of a specific type of homicide - mass shootings – even though mass shooting events characteristically representing the catalyst for legislative change.

The current paper begins to address this gap in knowledge, by describing the incidence of mass shooting events in Australia and its near neighbour New Zealand. This between-countries approach represents a novel and, to our knowledge, hitherto unexplored approach to understanding potential relationships between legislative change and the occurrence of mass shooting events. The findings of this study have international relevance. For example, in the United States – and, indeed, in various European countries where mass shootings have occurred – debate continues about the efficacy or otherwise of increasing firearms legislation as a means of reducing the occurrence of mass shootings. It may therefore be informative for policymakers in the United States and elsewhere to consider the experiences of a country where increased firearms legislation has occurred following a mass shooting.

Australian firearms legislation is considered among the most stringent in the developed world. The National Firearms Agreement (NFA) was ratified by Federal Parliament in 1996 and implemented across all States and Territories by the end of 1997. A

key focus of the NFA was on prohibition of certain types of firearms, in particular semi-automatic rifles and semi-automatic and pump action shotguns. To facilitate the removal of these firearms, a government funded 'buyback' scheme was designed, whereby owners were compensated for handing in their firearms. Over 640, 000 firearms were subsequently destroyed by police.

In addition to prohibiting specific types of firearms, the NFA introduced restrictions around licensing and possession of firearms. These included the necessity to have a proven or 'genuine reason' for firearm ownership (self defence was explicitly excluded), mandatory registration of all firearms, and the establishment of State recognised safety training, satisfactory completion of which became a prerequisite for licensing. Various specific reasons for refusal or cancellation of licences were defined, such as situations where the applicant or licence holder has been the subject of an apprehended violence order, domestic violence order, restraining order, or conviction for assault with a weapon/aggravated assault. Also, suffering from certain types of mental or physical illness constituted cause for rejection of a licence application or cancellation of an existing licence.

The Commonwealth government also provided compensation for the buyback of firearms prohibited under the NFA. The total costs for the buyback have been stated as Au$329 million in 1996-97 and Au$167 million in 1997-98 (Commonwealth of Australia, 1997), with the yearly running cost of the registries in each state and territory conservatively estimated at Au$27 million per year (Vos et al., 2010). More detailed information about the ongoing costs of the scheme is not publicly available.

The aims of the 1996 NFA

In 1996, then-Australian Prime Minister John Howard stated with regard to the prohibition of certain firearms that: "This whole scheme is designed to reduce the number of guns in the community and make Australia a safer place to live" (Howard, 1996). Later in

the same year the Attorney-General alluded to reduction of firearm numbers as the aim of the buyback, with a media release praising the co-operation and responsibility of Australian firearms owners: “They have been paid cash for their firearms - giving our nation a welcome Christmas gift by removing unnecessary high powered firearms from the community. It offers all of us the real chance of a safer festive season and New Year” (Williams, 1996).

It is thus reasonable to infer that the intended outcome of the 1996 NFA was to impact upon all types of firearm-related death (suicide, homicide, and unintentional) in Australia. However, research since that time has demonstrated that the legislative reforms did not deliver the desired outcomes. In the late 1990’s, studies suggested that the NFA may have been successful in reducing firearm suicides, but ineffective for other gun deaths (Carcach, Mouzos & Grabosky 2002; Reuter & Mouzos, 2003). Recent work confirms these observations (e.g., Baker & McPhedran, 2007; Klieve, Barnes, & De Leo, 2009; Lee & Suardi, 2010), suggesting that the only category of firearm-related death that may have been influenced by the introduction of the NFA was firearm suicide[1].

However, suicides using other methods also declined steadily from the late 1990’s onwards, which suggests that the introduction of nationwide suicide prevention programmes along with improvements in psychiatric care may have had an impact on suicides overall, including firearm suicides. It has also been noted that method substitution from firearms to hanging may have occurred (De Leo, Dwyer, Firman, & Neulinger, 2003; De Leo, Evans, & Neulinger, 2004). Firearm homicide rates were not significantly altered by the NFA, with the pre-existing downwards trend in firearm homicides continuing at the same rate after the reforms as before (Baker & McPhedran, 2007; Lee & Suardi, 2010). Regardless of the lack of impact upon firearm related homicides in general, it could be suggested that the 1996 legislation may have affected the incidence of mass shootings.

[1] This possibility has recently been called into question by Lee and Suardi (2010), who did not find evidence of an impact of the legislative changes on suicide or homicide.

Definitional issues

In the current context, a mass shooting is defined as an event with four or more people killed, following the definitional convention adopted by the Australian Institute of Criminology (AIC) National Homicide Monitoring Program (NHMP). However, it is acknowledged that the definition of a mass shooting (or, more broadly, mass murder) event varies within criminological literature, with definitions ranging from three or more fatalities through to five or more fatalities. It is also acknowledged that perpetrator numbers and timeframes have been subject to dispute, with disagreement over what space of hours or days enables classification of an incident as a mass murder (versus, for example, serial killing). For the purposes of the current paper, therefore, only single-perpetrator incidents occurring within a 24-hour time frame were examined (again, in line with conventions adopted by the NHMP).

Methodological challenges

Mass murder in Australia is a rare event, with a low baseline level. Consequently, mass shootings have historically represented an even rarer event, making statistical analysis extremely challenging. Although there exist a range of statistical tests that can be applied to rare events, these tests are limited in their ability to produce reliable results and are prone to a high degree of error. Also, Australian mass shooting data sets are heavily zero inflated. That is, the number of zeros is so large that the data do not fit standard distributions (e.g. normal, Poisson, binomial, negative-binomial) (Heilbron, 1994; Tu, 2002). While one approach in such instances is to use a zero-inflated Poisson or negative binomial model, which enable before and after comparisons to be conducted, these models are not recommended for use with very small sample sizes – such as the sample size for mass shooting incidents in Australia.

The proposition that prohibition of certain types of firearms in Australia has prevented mass shootings is therefore difficult to examine using a within-country 'before and after' statistical approach. Consequently, an alternative approach to evaluation should be sought, such as a between-countries design. This enables the incidence of mass shooting events between different countries to be examined before and after Australia's legislative changes, thus using another country as a 'pseudo control'. Also, while not fully overcoming the challenges of a small sample size, this approach nonetheless increases the available number of observations, enabling a limited degree of statistical analysis to be undertaken (with appropriate interpretive cautions and caveats).

Desirable features of a comparison country would include general similarities to Australia's social and economic structure and circumstances, but a divergent approach to firearms legislation. A prime contender is New Zealand, which is located in close geographic proximity to Australia. Although the population of New Zealand is around one-fifth that of Australia (meaning that any comparisons should control for population size), New Zealand and Australia have a shared historical background, and show many social and economic similarities. Indeed, previous work on firearm homicide rates has used New Zealand as a comparison for Australia, in a between-countries approach (McPhedran, Baker, & Singh, 2010).

The New Zealand firearms control system is, however, different to that of Australia. The difference is, primarily, that New Zealand arms control focuses on ensuring the licensing of fit and proper persons to possess firearms, rather than placing restrictions on the types of firearms that those persons are subsequently permitted to possess. New Zealand has a relatively high density of firearms ownership, and, importantly for the purposes of this study, semi-automatic rifles and semi-automatic and pump action shotguns remain available to

licensed persons (New Zealand Police, 2010). Box 1 summarises key similarities and differences between the two countries.

Box 1: Summary of legislative similarities and differences

	Australia	New Zealand
Licence required	Yes	Yes
Photographic licence	Yes	Yes
Years longarm licence issued for	5	10
Police background check	Yes	Yes
'Safe storage' (firearms must be stored in a locked receptacle when not in use)	Yes	Yes
Registration required for all firearms	Yes	No
Bans on self-loading longarms (rifles and shotguns)	Yes	No
Bans on pump-action shotguns	Yes	No
Separate permit needed for each firearm acquired	Yes	No

Aims of the current work

A major point of difference between the Australian and New Zealand approach to firearms legislation is the relative availability of specific types of firearms (semi-automatic longarms and pump-action shotguns). The banning of these types of firearms in Australia (rather than any other changes to legislation that occurred at the same time) has been specifically credited with stopping mass shootings. If this proposition is correct, it would be expected that mass shootings would continue to occur in New Zealand, where such firearms are still available. Therefore, the current paper describes the incidence of mass shootings in Australia and New Zealand over a thirty year time period. It also presents comparative

analysis of mass shootings between countries, pre and post-1996 (when Australia prohibited certain firearms). For reasons outlined above, the question of particular interest to this study was not whether the occurrence of mass shootings in Australia differed pre- and post-1996. Rather, the two questions of interest to this study were:

1) Did the occurence of mass shootings differ between Australia and New Zealand, after Australia prohibited certain firearms that New Zealand retained?

2) Can post-1996 between country findings be attributed to pre-existing differences in the occurrence of mass shootings between countries?

Methods

The NHMP was implemented by the AIC in 1989. Subsequent NHMP annual reports (e.g., Davies & Mouzos, 2007; Dearden & Jones, 2008; Mouzos, 2002, 2003, 2005; Mouzos & Houliaris, 2006; Mouzos & Segrave, 2004) provide reliable, quality controlled homicide data which was used to detect the occurrence of any mass shootings. For earlier data, a range of publicly available sources concerning mass shootings have been used, including police reports (written and verbal), cross-referenced media reports, and criminological and forensic literature. A similar approach was adopted to gather New Zealand data, with publicly available records from Statistics New Zealand and New Zealand Police examined in conjunction with media and government reports (e.g., Thorp, 1997) and criminological/forensic literature.

Given the very small size of the datasets being used, the current paper emphasises the use of descriptive information. However, to control for the possibility that the two countries may have had different experiences with mass shootings *before* 1996, which could confound the conclusions drawn about observations *after* 1996, population data were obtained from the Australian Bureau of Statistics and Statistics New Zealand. The number of incidents per year

was standardised to a rate per 100 000 population. T-tests were performed on these data, to examine whether the rate of mass shootings differed between countries.

Also, negative binomial and zero inflated negative binomial models were applied to the data. By using population counts as an exposure variable, these models indicate whether the different raw number of mass shootings between the countries is statistically meaningful, or merely an artefact of the different population sizes. Applying two different models also provided an indicator of whether one of those models (the zero inflated model, designed for application to data with excess zeros) offered superior explanatory power to the standard negative binomial model. Both models used location and time (in years) as predictor variables. Two different inflation specifications were used for the zero inflated model; the first used a constant inflation term, while the second used location as an inflation term. Robust standard errors were used.

Results

Table 1 summarises Australian and New Zealand mass shooting events from 1980 to 2009, inclusive. Since the period 1996/1997, neither country has experienced a mass shooting event.

In New Zealand, there were no firearm mass murders recorded between 1980 and 1989 (Newbold, 2010). Earlier data were obtained where possible; from 1970 to 1979, it appears that there was only one Australian mass shooting incident (in 1971). Similarly, the only earlier incident that could be found for New Zealand was in 1941 (Newbold, 1998).

Table 1: Mass shooting events in Australia and New Zealand, 1980-2009

Country	Location	Setting	Date	N. killed	Perpetrator suicided?
Australia	Port Arthur, TAS	Public	28 April 1996	35	N
Australia	Hillcrest, QLD	Domestic	25 January 1996	6	Y
Australia	Central Coast, NSW	Domestic	27 October 1992	6	N
Australia	Strathfield, NSW	Public	17 August 1991	6	Y
Australia	Surry Hills, NSW	Domestic	30 August 1990	5	N
Australia	Rock Country, NT	Domestic	25 September 1988	6	N
Australia	Melbourne, VIC	Public	8 December 1987	8	Y
Australia	Canley Vale, NSW	Domestic	10 October 1987	5	Y
Australia	Melbourne, VIC	Public	9 August 1987	7	N
Australia	Pymble, NSW	Domestic	23 Jan 1987	4	N
Australia	Wahroonga, NSW	Domestic	1 June 1984	5	Y
Australia	Campsie, NSW	Domestic	24 September 1981	5	Y
New Zealand	Raurimu	Public	8 February 1997	6	N
New Zealand	Dunedin	Domestic	20 June 1994	5	N
New Zealand	Paerata (near Auckland)	Domestic	20 May 1992	6	Y
New Zealand	Aramoana	Public	13 November 1990	13	N
Total mass shooting events 1980-2009					
Australia	12 (4 public, 8 domestic)				
New Zealand	4 (2 public, 2 domestic)				

Regarding the decade immediately prior to the 1996 Australian gun law reforms, six of the 10 mass shootings that occurred in Australia between 1986-1996 were domestically related (including intimate partners and family members, classified in Table 1 as "domestic"), and four involving the killing non-family members who were known to the perpetrator (e.g., neighbours) and/or strangers (classified in Table 1 as "public"). Six mass shootings occurred in New South Wales (Australia's most populous state). Interestingly, five incidents occurred within a relatively short period of one another in the late 1980's (23 Jan 1987-25 September 1988), including two out of the four total public mass shootings. Two took place in Melbourne, Victoria[2]. Copycat or contagion theories of violent crime are discussed elsewhere (Carcach, Mouzos, & Grabowsky, 2002).

Overall, the rate of mass shootings in Australia and New Zealand in the period 1980-1996 did not differ significantly. In Australia, the mean rate was 0.0042 incidents per 100 000 population, while in New Zealand it was 0.0050 incidents per 100 000 population ($t = 0.26$, $p=0.80$). Table 2 summarises the results of negative binomial and zero inflated negative binomial models, with a main effect term for location (i.e., comparing the occurrence of mass shootings in Australia and New Zealand prior to Australia's gun law changes). Although, due to reasons outlined above, the results should be viewed with due caution, neither of the models indicate that there was a significant main effect of location on mass shootings. This suggests that, once the different population sizes are taken into account, the occurrence of mass shootings did not differ significantly between the two countries during the period 1980-

[2] In 1988, Victoria increased the requirements governing ownership of self-loading firearms, but continued to allow possession of those firearms for the purposes of sport shooting and hunting. At the time of the introduction of the NFA, Victoria had not experienced a mass shooting in 9 years, although it appears that Victoria had a high density ownership level of hunting and sporting firearms that were subsequently prohibited under the NFA. While the extremely low number of incidents precludes separate analysis of individual Australian states and territories, it is of interest that there was little relationship between the stringency of legislation in various states and territories and the incidence of mass shootings. New South Wales, for example, experienced the highest number of mass shootings over the period 1980-1996 despite having comparatively restrictive legislation governing legal firearms ownership.

1996. Given that 25 out of the 26 post-1996 observations returned a zero count, negative binomial modelling was not appropriate for the period 1997-2009.

Table 2: Negative binomial modelling of mass shootings by location, 1980-1996

Model	Incidence Rate Ratio (IRR)	p. value
Negative binomial		
Location	1.20	0.773
Year	1.06	0.208
Zero inflated negative binomial		
Location	1.20	0.773
Year	1.06	0.208
Constant inflation	-23.97	<0.001
Location	1.20	0.773
Year	1.06	0.208
Inflation (location)	-1.49	0.794

Conclusions

The hypothesis that Australia's prohibition of certain types of firearms explains the absence of mass shootings in that country since 1996 does not appear to be supported. Rather, it can be seen that both Australia and New Zealand, a country where the firearms banned in Australia (self-loading longarms and pump action shotguns) are still available for the purposes of target shooting and hunting, have now experienced very similar periods of time without the occurrence of a mass shooting event. At the time of writing, this period exceeds 13 years, for both countries. This is not consistent with the expectation that, if civilian access to certain types of firearms explained the occurrence of mass shootings in Australia (and conversely, if prohibiting such firearms explains the absence of mass

shootings), then New Zealand (a country that still allows the ownership of such firearms) would have continued to experience mass shooting events.

This finding cannot be readily explained by differences in population size or pre-existing differences in the occurrence of mass shootings between the two countries – both of which were controlled for during the analyses. It is also important to note that in New Zealand, there have been no major changes to firearms legislation since 1992, when the requirement of photographic licences and 'safe storage' of firearms was implemented (in this regard, Australian and New Zealand legislation is similar). Prior to 1992, the last major change to firearms legislation in New Zealand occurred in 1983, when the requirement for mandatory registration of hunting and sporting longarms was removed. Thus, the absence of mass shootings in New Zealand over the past 13 years cannot be readily explained by any legislative changes implemented around the period 1996/1997.

There is a further challenge to the hypothesis that prohibiting certain firearms explains the absence of mass shootings in Australia. Specifically, despite the prohibitions in Australia, it is speculated that (even though there is no way of exactly quantifying the number of illegally held firearms in Australia), an extremely large number of prohibited firearms – potentially in the millions - were not handed in under the 'buyback' scheme (Rath & Griffith, 1999). For example, various types of prohibited firearms have been found during police operations related to other criminal activities (such as raids on drug manufacturing premises), as well as in the possession of former legal owners. Based on this information, it logically follows that there has been an absence of mass shootings *despite* the continued presence of now-illicit firearms in Australia.

Collectively, these observations highlight a need to examine other factors that may underlie the clustering of mass shooting events between the late 1980s and mid-1990s, followed by an absence of mass shooting events, in both countries. Earlier research suggests

that the economic prosperity of a country, coupled with related measures such as levels of employment (or, perhaps more meaningful in this context, levels of both unemployment and long-term unemployment), may contribute to variations in levels of violent crime including lethal violence (e.g., Bellair & Roscigno, 2000; Krivo & Peterson, 2004; Lee & Slack, 2008; Narayan & Smyth, 2004).

It is not unreasonable to consider mass shootings within this framework. For example, in the late 1980s and early 1990s, both Australia and New Zealand experienced high levels of unemployment (Australian Bureau of Statistics, 2008; Statistics New Zealand, 2008), followed by a decade of relative economic stability and growth from the mid-1990s onward. Potentially, the clustering of mass shootings around a period of economic downturn and high unemployment (particularly among males), followed by the absence of such events during a period of economic stability and relatively low unemployment, may reflect broader relationships between economic wellbeing and violence.

In addition, social changes – and the stresses they can place on individuals - may play a role in understanding the occurrence (or otherwise) of mass shootings. In the instance of domestic mass shootings, for instance, improved recognition of the impacts of separation/divorce on both women and men, and increased availability of services to support individuals and families through the strains of separation/divorce or other family problems, may have played a role in reducing the incidence of mass homicide. This example fits with a broader model of mass shooting events proposed by Levin (2009), whereby chronic strains lead to social isolation, and the resulting lack of social support systems in turn allows an acute strain, real or imagined, to have particularly severe consequences.

This highlights a range of potentially relevant variables that merit consideration in future work. For example, it would be valuable to study perpetrator characteristics such as mental health, history of violence, life events that may have precipitated their act, and so on.

Unfortunately, such data were not uniformly available for the purposes of this study, and while some items were available through media coverage of mass shootings (for instance, reports about motive) these could not generally be adequately validated or cross checked against independent sources of information (such as police reports). However, as an example of how such information could be used in future work, one piece of information that is reliably known is that the perpetrator of the Port Arthur shooting had a diagnosed intellectual disability and was under a 'guardianship order' (that is, they had been deemed unable to manage their own affairs). This should have automatically prevented the perpetrator from being granted a firearms licence in Tasmania, which should in turn have precluded them from legally obtaining firearms. Understanding how, and at what exact points, that system failed could inform policy changes such as enhanced protocols for information sharing between agencies.

Another interpretation of the data is that mass shootings may have occurred since 1996, but the likelihood of mass *fatalities* may have changed. This raises the possibility that mass shooting statistics are not adequately conceptualised. Technological changes such as mobile phone prevalence and coverage (leading to faster reaction times from police and medical personnel; see Chapman & Schofield, 1998), coupled with improvements in trauma surgery, may also need to be taken into account to understand the absence of mass fatality incidents. Further investigation is necessary to resolve this question.

A related observation is that in Australia, in the period 1989 - 1997, there were 13 mass murder incidents; 7 did not involve firearms (Mouzos, 2000). The NHMP indicates that from 1 July 1997 to 30 June 2004, there were no homicides involving four or more victims (i.e., no mass murders by any method over that period). From July 31 2004 - June 30 2007 (the most recent year of data available), one mass homicide incident occurred. Given that firearms have historically accounted for less than half of all mass murders, it is fair to suggest

that if all other factors were held constant, non-firearm mass murders would be expected to continue to occur post-1996. While acknowledging again the limitations of a very small dataset, this does not appear to be the case. Potentially, therefore, mass murder in Australia may have become less frequent from the late 1990's onwards, irrespective of method[3]. It has also been noted that an overall decline in family homicides has occurred in recent years (Mouzos, 2005). Therefore any social and/or economic changes that may have brought about a reduction in the occurrence of mass murder using methods other than a firearm could also have influenced the incidence of mass murder using a firearm.

Clearly, there remained many unanswered questions about the occurrence of mass shootings in Australia and, indeed, elsewhere. What does seems apparent, however, is that there is little support for the proposition that prohibiting certain types of firearms explains the absence of mass shootings in Australia since 1996. This underscores the need for a more comprehensive set of explanations for the occurrence of violent crime, which take into account potential precipitating factors for lethal violence. A better understanding of these issues may in turn inform more effective policy responses to violence.

[3] It is possible that this could also reflect demographic trends such as smaller family sizes.

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