Gun Regulations and Gun Violence

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Challenges for Comparative Cross-National Research

Steffen Hurka and Amelie Sieber

Zeppelin University Friedrichshafen

Abstract

This review synthesizes research on the relationship between gun regulations and gun violence, focusing on cross-national, comparative perspectives and the conceptual and methodological challenges that hinder systematic global analysis. Although substantial evidence from the United States demonstrates that stricter firearm laws are associated with reductions in homicides, suicides, accidents, and mass shootings, the United States represents an extreme outlier both in regulatory permissiveness and levels of gun violence. Consequently, findings from that context may not easily generalize to countries with stricter baseline regulations. The review identifies three central challenges for advancing comparative research: First, the measurement of gun law restrictiveness remains inconsistent, as many studies rely on proxy indicators such as firearm availability rather than direct assessment of legal provisions and implementation quality. Second, cross-national data on gun violence suffer from gaps, inconsistencies, and limited comparability, complicating robust empirical analysis. Third, causal identification is still rare outside the U.S., where quasi-experimental methods have begun to illuminate policy effects. Addressing these challenges requires improved data infrastructure, more precise measurement of regulatory design and enforcement, and broader use of causal research designs. The review calls for interdisciplinary and cross-national collaboration to build a stronger evidence base for effective gun policy worldwide.

Keywords

Gun violence, gun regulation, gun homicide, gun suicide, violence prevention

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1. Introduction

In 2021, an estimated 458,000 people were killed in a homicide worldwide and about 40 per cent of those homicides were committed with a firearm, whereas this share varies from 12 percent in Europe to 15 percent in Asia and 67 percent in the Americas (UNODC 2023 p. 8, 13). Moreover, in 2019, approximately 52,700 people committed suicide by using firearms, with the highest rates in Greenland and the United States (Ilic et al. 2022). These facts underscore not only the immense human toll associated with firearms but also the importance of regulative frameworks in mitigating lethal gun violence. Despite a broad consensus on the dangers associated with firearms (Crifasi et al. 2015, 2025; Webster et al. 2016), however, countries differ substantially regarding scope, restrictiveness, and enforcement of (stricter) gun regulations (Duquet & Alstein 2015; Hurka & Knill 2020; Newman & Head 2017). Given this variance, it is not surprisingly that gun regulations and gun violence have been at the center of attention of many academic disciplines, including criminology, epidemiology, political science, law, and psychology.

In this review, we aim to provide an overlook of those studies and identify some of the remaining challenges contemporary research on gun regulation and gun violence is confronted with. We primarily focus on studies that adopt a cross-national, comparative perspective, but one of the key insights of this review is that such studies hardly exist or are outdated in methodological terms. Therefore, we enrich our review with some key insights that have been gained in research on the United States, which represents an extreme outlier case both with regard to the levels of gun violence it has been experiencing over time and with regard to the permissiveness of its regulatory approach towards guns (Raissian et al. 2022). We show that despite their often very different research designs and data foundations, most studies on the link between gun regulations and gun violence in the US conclude that stricter regulations can make a significant difference for the number of gun homicides, suicides and accidents and also for the occurrence of mass shootings. Given the status of the US as an extreme outlier, however, it is questionable whether we can easily transfer knowledge gained in the US context to the rest of the world, where gun regulations tend to be much stricter in general (Hurka 2015; Raissian et al. 2022). Only very few studies adopt a comparative, cross-national perspective on the matter (e.g. Hurka & Knill 2020) and there is a multitude of disciplinary perspectives that all have distinct strengths, which have yet to be united in a truly interdisciplinary approach. This is why we call for a more systematic, inter-disciplinary effort to study the relationship between

gun regulation and gun violence in a comparative and cross-national way in the future. To this end, however, several research challenges need to be overcome.

First, we argue that exiting research often circumvents the difficulties associated with the cross-national measurement of gun law restrictiveness by using crude proxy variables, most importantly gun availability. In order to improve our understanding of the effects of different gun regulations, however, we need to measure the restrictiveness and permissiveness of those regulations directly in the respective gun laws (Reeping et al. 2021). We also argue that research should integrate the implementation stage more systematically, taking into account matters of implementation structures, administrative capacities, and legislative design. Second, cross-national research suffers from poor data availability and quality on the key outcome measures (gun) homicide and (gun) suicide. To improve the situation, we emphasize the importance of initiatives like the *European Homicide Monitor* (Kivivuori et al. 2024) in order to make gun regulations more evidence-based. Finally, we argue that research needs to move from cross-sectional, correlational studies towards research designs that allow for the causal identification of policy interventions. Given that the measurement challenges of the independent variable (gun regulations) and the dependent variable (gun violence) can be solved, cross-national research has much to learn from first studies in the United States that use quasi-experimental approaches to assess the effects of gun control on different outcome measures. We argue that better strategies to isolate the causal effect of gun regulations are needed to improve the evidence base for more effective policy interventions.

The review is structured as follows. In section 2, we provide a short overview of the different disciplinary perspectives that have been adopted on gun regulations and gun violence, calling for an attempt to move from multi-disciplinarity to inter-disciplinarity. In section 3, we outline the conceptual and methodological central challenges the existing literature still needs to overcome and the obstacles that have prevented research from becoming truly cross-national, cross-temporal and comparative. In section 4, we summarize our contribution.

2. Gun regulations and violence through different disciplinary lenses

When a phenomenon receives systematic attention from a broad variety of academic disciplines over a long period of time, the phenomenon is likely to be quite relevant for society. Most prominently, gun regulations and gun violence have been studied in political science, public

policy and law, criminology, epidemiology and psychology. All of those different disciplines vary in terms of the conceptual lenses; the analytical foci and the methodologies they employ to study the genesis and effects of gun regulations. We briefly illustrate those differences in this section.

Political scientists and scholars of public policy and law often mainly focus on the evolution, restrictiveness, and genesis of gun laws rather than their effects. Thus, the focus predominantly lies on questions of agenda formation, politicization, coalition building, and institutional constraints, asking how shocks (e.g. rampages or mass shootings), the interplay of federal and central structures, or interest groups shape the timing and substance of policy change. One line of research specifically analyzes framing strategies and contests in the wake of mass shootings and the dynamics that affect politicization and policy change in the gun policy domain (Aslett et al. 2022; Haider-Markel & Joslyn 2001; Hurka 2015; Hurka & Nebel 2013; Merry 2016, 2018, 2019; Newman & Head 2017; Quinn 2022). With the exception of Hurka and Nebel (2013), Hurka (2015), and Newman and Head (2017), which adopt cross-national comparative perspectives, those studies strongly focus on the United States. Others direct their analytical attention to institutional factors and how they inhibit or facilitate the agenda-setting process (Fleming 2012; Fleming et al. 2016; Kamal & Burton 2018). Another strand of research argued that gun policies are often subject to patterns of policy diffusion (Butz et al. 2015; Godwin & Schroedel 2000). Studies in political science, public policy and law thus often provide thorough analyses of the scope conditions that make gun policy change more or less likely, but they hardly ever focus on the question of whether or whether not those policies achieve their started objectives. Hitherto, only few studies in public policy explicitly focused on policy evaluation, most notably Smith and Spiegler (2020), in their study on the US and Hurka and Knill (2020), who analyzed a sample of 16 West European countries. Both of those studies conclude that stricter gun laws are associated with declines in gun homicides and gun suicides.

The analysis of the effects of gun regulations and availability has been at the center of attention in criminology and epidemiology. While both of those disciplines share an interest in the evaluation of gun policies, they adopt different perspectives on the nature of the gun problem. While criminologists are mainly interested in studying the relationship between firearms, crime, and social order, epidemiologists look at the problem from a public health perspective. Accordingly, criminology often studies phenomena like gun markets, trafficking and illicit possession (e.g. Cook 2018; Squires 2025), as well as deterrence and policing (e.g.

Braga et al. 2021). Moreover, criminologists have studied the important question of whether the presence of guns make violent situations more lethal (Braga et al. 2021; Cook 2018), testing Zimring's original instrumentality hypothesis. In their review of the pertinent literature, Braga et al. (2021) conclude that there is "considerable evidence that guns contribute to fatalities that would otherwise have been nonfatal assaults", which strongly underlines the need for more effective gun control. Accordingly, criminologists are mainly interested in how the availability of guns affects different types of criminal behavior. More recently, criminology has addressed the important question of how new technologies such as 3D printing and the darknet (e.g. Lee et al. 2024; Leonidou et al. 2023) affect the availability and spread of illicit firearms. This line of research is broadly in agreement that these recent developments significantly undermine the ability of the state to regulate gun ownership effectively.

In contrast to the criminological perspective on illicit firearms and their markets, epidemiologists have understood the proliferation of guns primarily as a threat to public health at the level of entire populations (Cukier & Sidel). Accordingly, they have been primarily interested in studying the patterns and determinants of firearm-related death and injury and the associated risk factors such as storage, mental health, demographics, or substance use (Chen & Wu 2016; Grossman 2005; Hemenway 2000). Gun regulations are understood here as preventive interventions that can potentially lower the risk of gun violence and thereby improve public health (Cook & Ludwig 2006; Sanchez et al. 2020). From this perspective, firearm violence is treated as a preventable cause of morbidity and mortality rather than as an inevitable social phenomenon. Epidemiological research therefore seeks to identify population-level interventions—such as background checks, safe-storage laws, or restrictions on high-risk individuals—that have measurable effects on injury and death rates (Zeoli et al. 2022). In doing so, public health scholars emphasize evidence-based policy evaluation and the systematic monitoring of firearm injuries as essential components of violence prevention.

Unlike epidemiologists, who are mostly interested in macro-patterns of gun violence and its spread across society, psychologists have studied gun violence at the micro level, identifying the scope conditions that affect a person's probability to abuse guns both in homicides and suicides (Hyde 2025; Metzl et al. 2021; Pirelli et al. 2019). Psychological research emphasizes the role of individual traits, cognitive and emotional processes, and situational triggers in shaping violent behavior involving firearms. Studies have linked factors such as impulsivity, aggression, depression, and access to firearms to an elevated risk of both interpersonal and self-directed gun violence (Montgomerie et al. 2015; Wintemute 2015). In

recent years, interdisciplinary work has begun to connect these individual-level factors with social and cultural dimensions, showing how gender norms, identity, and symbolic meanings attached to guns interact with psychological predispositions to influence firearm misuse (Carlson 2015; Daruwala et al. 2023). This line of inquiry bridges psychological and sociological perspectives, highlighting that gun violence is not only a matter of individual pathology but also of social context and cultural meaning.

As the considerations above have shown, gun regulations and gun violence have been subject to research from a broad variety of academic disciplines and naturally, different disciplines employ different analytical foci, methodological approaches and research designs. We believe that this disciplinary variety is a strength of the research area, not a weakness. However, research is currently mostly characterized by *multi*-disciplinarity rather than *inter*-disciplinarity. In our view, the research area would benefit from more systematic enquiries that transcend disciplinary boundaries and integrate political, criminological and epidemiological and psychological perspectives. Ideally, such an inter-disciplinary effort should also have a cross-national, comparative dimension. More exchange across disciplines might be beneficial not the least because different disciplines share the same essential challenges when it comes to studying the link between gun regulations and gun violence. We will detail those challenges in the following section.

3. Conceptual and methodological challenges

Studying the relationship between gun regulations and gun violence comes with a series of conceptual and methodological challenges that are difficult to overcome in practice. First, we contend that most studies still focus on the United States as an outlying case and many of those studies do not measure the restrictiveness of gun laws directly, but approximate it using proxy variables, most prominently gun availability. Moreover, only few studies explicitly take the quality of policy implementation into account and often implicitly take this step for granted. Second, especially cross-national research suffers from poor data availability and quality on the dependent variables gun homicide, gun suicide and gun accidents/injuries. Finally, most studies are still correlational in nature and do not offer any clear attempts to identify the causal relationship between gun laws and gun violence using quasi-experimental methods for observational data.

3.1 The independent variable challenge: measuring gun law restrictiveness

For any study that aims to investigate the effects of gun laws on gun violence, it is crucial to conceptualize and measure the permissiveness or restrictiveness of gun regulations, i.e., the independent variable. In case studies of one particular political system, this is often rather straightforward, as the analytical focus is typically put on specific policy interventions and how they relate to different outcome measures (Bartos et al. 2020; McCourt et al. 2020; Post et al. 2021). When it comes to cross-national, comparative research, however, measuring gun law restrictiveness across time and space becomes much more challenging and costly. Obtaining detailed, high quality data on regulatory outputs in different nations is often complicated due to language barriers or problems of data availability and quality (cf. Krüsselmann et al. 2021).

Researchers have often tried to circumvent this problem by resorting to more easily available proxies to measure the restrictiveness of gun law regimes. Most prominently, much research does not directly analyze the relationship between gun laws and gun violence, but the relationship between gun availability and gun violence (Altheimer & Boswell 2012; Hepburn & Hemenway 2004; Killias et al. 2001; Rutar 2025; Siegel et al. 2013). Some have even gone a step further and inferred gun availability from gun suicide rates, which they then used to explain gun homicide rates (Hemenway 2000). Unsurprisingly, those tightly related variables usually turn out to be highly correlated. In one of the classic studies on the topic, Hemenway (2000) analyzed correlations between different proxies for gun availability and overall homicide rates across 26 high-income countries and reported correlation coefficients around 0.7. Killias et al. (2001) also found strong associations, although their findings were somewhat more mixed. In their comparative study on the 50 US states from 1981-2010, Siegel et al. (2013) estimated an increase of gun homicide rates of 0.9 percent if the gun ownership rate increases by one percentage point. The most recent studies in this line of inquiry, however, which are more advanced in methodological terms, show a strong and robust correlation between gun availability and gun homicide. Specifically, in his cross-national study of more than 100 nations from 2000-2019, Rutar (2025) concludes that "even modest increases in civilian access to guns translate into non-trivial rises in lethal firearm violence. Roughly speaking, a 10 % rise in gun ownership is associated with around a 3–4.5 % higher rate of gun homicide." However, unlike Hemenway (2000), the study does not confirm any effects on the *total* homicide rate, which might indicate that firearms are not easily substituted by other means if they become less easily available. Yet, in our view, the correlational evidence between gun availability and gun violence is rather clearly established by the majority of the published

research in public health, criminology and epidemiology, although the size and strength of the relationship varies depending on the data foundation and employed research designs.

In our view, the predominant focus of the literature on firearm availability measures is somewhat misguided. Simply put, the finding that something that is more widely available is also (mis)used more frequently is not particularly surprising and comes close to a truism. The more computers are available, the more emails and spam messages will occur. The more cars are available, the more car accidents and CO2 emissions we will see. In other words, the robust finding on the relationship between firearm availability and firearm abuse is likely attributable to scaling effects. In addition, the direction of causality is not necessarily always clear, as high levels of gun violence might also drive individual-level incentives to obtain a gun, implying the possibility of reverse causation (Altheimer & Boswell 2012). Such issues often turned out to be impossible to resolve in cross-sectional, correlational studies. In our opinion, however, the intriguing and relevant question is not so much whether gun availability drives gun violence, but whether gun regulations effectively reduce gun availability. Given the spread of illegal guns and the enormous amount of guns that already circulate around the world (Squires et al. 2021), this question is critically important to answer, but has by far not received the same attention as the link between gun availability and violence. We therefore argue that, whenever possible, (1) instead of relying on proxy measures of gun law restrictiveness, this restrictiveness should be measured directly on the basis of the regulatory measures in place and (2) that research needs to take matters of legislative design and implementation into account more systematically.

Recent research demonstrated that the permissiveness and restrictiveness of gun regulations can be measured validly and reliably. In the United States, for example, researchers measured the restrictiveness of gun regulations using “legislative strength scores” (Fleegler et al. 2013) built other indices based on a range of central regulatory measures in different gun laws (Rodríguez Andrés & Hempstead 2011). Most creatively, Reeping et al. (2021) used traveler guides for gun owners to assess gun law restrictiveness in the United States. Importantly, Reeping et al. (2021) showed that the choice of the permissiveness scale does not impact the substantive conclusions in studies on gun violence in the United States. This encouraging finding should be a motivation to comparative researchers in extending research on the effects of gun law restrictiveness beyond the United States using similar measures. In their comparative analysis of 16 West European countries, Hurka and Knill (2020) used a measure of gun law restrictiveness that combines the overall policy paradigm with more

detailed measures on age restrictions and rules for safe storage. Yet also their measure is incomplete, as it only covers certain aspects of gun regulations while leaving others unmeasured.

In addition to a more systematic attempt to measure regulatory restrictiveness directly, however, we need more studies that focus on the *implementation* of gun regulations. The implicit assumption of much of the literature on the effects of gun regulations is that more restrictive measures are properly implemented, leading to reductions in gun violence. Yet, given the widespread overburdening of public administrations and their resource limitations (Adam et al. 2019b), additional measures are not automatically implemented effectively (Frattaroli & Teret 2006). In this context, it is further important to acknowledge that the restrictiveness of gun regulations might not be the only relevant characteristic determining their effectiveness. Also matters of legislative design can make a difference (Hurka et al. 2025). As Vizzard argued, “enforcement is facilitated by simplicity, uniformity and clear delineation between compliance and violation. Most importantly the law must be logically consistent, focused and easily understood” (Vizzard 1995, p. 346). Yet, those ideals are not often met in practice. In their analysis of the Maryland Gun Violence Act, Frattaroli et al. (2006) found that the "discretionary nature of the laws, combined with the lack of clarity with regard to their execution, provides implementers with an opportunity to influence whether and how these laws are being implemented” (ibid., p. 357). Similarly, Adam et al. (2019a) showed that Germany was hardly able to enforce and monitor the more restrictive safe storage requirements it introduced for gun owners after the school shooting in Winnenden in 2009. Accordingly, the quality of the legislative design and how it fits the implementation structures and the administrative capacities of the state needs much more attention in research on gun regulations and violence.

In order to improve our knowledge on how gun regulations affect gun violence, we need to study the relationship in a comparative manner, measure the design of gun regulations on the basis of a measurement scheme that is cross-nationally applicable, valid and reliable and integrate the implementation stage more systematically into our research designs. Most importantly, this measurement scheme may not only be cross-national, but given the inferential challenges associated with purely cross-sectional, correlational analyses (see section 3.3), it must also be dynamic and capture changes in gun legislation as they occur over time. Yet, gun policies are often quite intricate, and their provisions often involve different rules for different types of guns, scope conditions for the validity of certain needs for gun ownership, or very

detailed, procedural requirements on issues like safe storage, psychological tests for prospective gun owners, etc. (Hurka 2015). Moreover, in Europe, national gun laws are additionally influenced by supranational provisions on gun possession and trade made by the European Union (Tessman 2009). To solve those difficult challenges, we may need large-scale, collaborative efforts to jointly collect data on gun regulations on a fine-grained level, over time and as many countries as possible. As of today, however, such a comprehensive endeavor is not foreseeable. First steps have been taken in this research agenda (Hurka 2015; Hurka & Knill 2020), but clearly, more research is needed.

3.2 The dependent variable challenge: measuring gun violence

One central reason why research on gun policies exhibits a strong geographical focus on the US relates to matters of data availability. The high problem pressure in the US has led to a high degree of awareness among citizens, stakeholders and decision-makers, which in turn drives the collection of data on the problem. Most importantly, the Centers for Disease Control and Prevention (CDC) provide detailed data on gun violence based on the causes of death listed in the death certificates of the deceased, which are based on the International Classification of Diseases (ICD). Information on various causes of deaths is available for all US states since 1968 and data can be subset according to gender, age, race, etc. The data can be retrieved easily online through the CDC Wonder database (http://www.wonder.cdc.gov). In comparison, data on the international level is available for much shorter periods of time, in a much less detailed manner and data quality often varies drastically, especially as far as data from less-developed countries are concerned (Kanis et al. 2017; World Health Organization 2020, pp. 10-15). While some have noted deficiencies in the availability of data on gun violence in the US (Crifasi et al. 2015; Durkin et al. 2020), the data foundation researchers can draw from when analyzing gun violence in the US is still far more comprehensive than anything that is available for the rest of the world.

When it comes to the measurement of homicides, existing research also often varies in terms of whether it relies on health statistics (Hurka & Knill 2020; Richmond et al. 2005) or crime statistics (Ouimet 2012; Stretesky et al. 2017). This is not a negligible difference and it might affect the conclusions we draw. We strongly believe that using outcome data based on health statistics from the World Health Organization (WHO) should generally be preferred over outcome data based on crime statistics collected by the United Nations Office on Drugs and

Crime (UNODC) through its United Nations Surveys on Crime Trends and the Operations of Criminal Justice Systems (UN-CTS). This is mainly because whether or not crimes are detected and recorded can be heavily influenced by various factors, including the available resources for law enforcement or enforcement practices (Gonçalves & Quijano 2025). As the UNODC itself states, "crime statistics reported through the UN-CTS mostly refer to reported and/or detected crime and therefore caution should be used in interpreting these data and when carrying out cross-country comparisons" (UNODC 2023). This is not to suggest that health statistics are necessarily always perfectly valid and unbiased. In fact, Kanis et al. (2017) pointed out that the WHO's homicide estimates use both data from the WHO Mortality Database and the UNODC and are often adjusted or modeled to compensate for missing or unreliable national data. Hence, also those data should be used with great caution in cross-national analyses. However, this problem mainly seems to affect less-developed world regions and should be less severe in cross-national analyses of developed nations.

One additional factor that makes research on gun laws and gun violence challenging to compare (and to review) is that the dependent variable "gun violence" is often operationalized in quite different ways. Some studies are interested in homicide, either total homicide (Hemenway 2000), gun-related homicide (Altheimer & Boswell 2012; Siegel et al. 2013; Stretesky et al. 2017) or both (Hurka & Knill 2020; Kaufman et al. 2018; König et al. 2018; Krüsselmann et al. 2023; Rutar 2025; Smith & Spiegler 2020). Others, in turn, look at (gun) suicides (Crifasi et al. 2015; Kivisto & Phalen 2018; Kposowa et al. 2016; Rodríguez Andrés & Hempstead 2011; Saadi et al. 2020), while still others look at (gun) homicides and (gun) suicides in a comparative manner (e.g. Hurka & Knill 2020; Kaufman et al. 2018; Killias 1993). Still others, sometimes additionally, analyze gun accidents (Hemenway et al. 2019; Levine & McKnight 2017; Smith & Spiegler 2020). Yet, even across studies of (gun) homicide, differences exist sometimes with regard to which type of homicide is looked at specifically. Some studies are particularly interested in specific types of homicide like intimate partner homicide (Lynch & Logan 2018), police shootings (Hemenway et al. 2019) or the occurrence of mass shootings (Lankford 2016; Lemieux 2014; Reeping et al. 2022). In addition, nuances exist with regard to the demographic characteristics of the victims. Some studies specifically look at gender-based gun violence (Stamatel et al. 2020), while others are interested in differences across race and ethnicity (Conrick et al. 2023), while still others are mainly interested in gun deaths among different age groups (e.g. Kwon et al. 2023; Raifman et al. 2020; Saadi et al. 2020) and in this context especially in the vulnerability of children (e.g.

Hamlin 2021). Interestingly, despite this enormous variance in how the outcome is measured, most studies come to the conclusion that stricter gun laws or lower firearm availability are correlated with lower degrees of gun violence. Clearly, the reported effect sizes vary and nuances exist, but we hardly came across any clear evidence that would suggest that no relationship exists at all or that it would even be reversed.

In sum, cross-national research on the causes of gun violence is still hampered by a lack of high-quality data sources that track different types of gun violence across space and time. While data availability and quality in the United States are comparably good by international standards, there is a clear need for more consistent and comprehensive – and ideally even disaggregated – datasets in the rest of the world, especially Europe. We therefore strongly support the collaborative efforts undertaken by a range of European criminologists who established the *European Homicide Monitor* (EHM), a cross-national database that is based on a "standardized international homicide data collection process" (Kivivuori et al. 2024, p. 432). In our view, those efforts should be supported both financially and politically to the best extent possible, and ideally be coordinated by the European Union (ibid., p. 440). Obtaining more detailed and more reliable information the dependent variable, gun violence, is of essential importance to improve cross-national research on the matter.

3.3 The inference challenge: towards the identification of causal effects

Until recently, most studies analyzing the relationship between gun laws and gun violence have used correlational approaches to study the relationship (e.g. Duquet & Alstein 2015; Kapusta et al. 2007; Kaufman et al. 2018; Killias 1993; König et al. 2018; Smith & Spiegler 2020). Those studies broadly confirmed the hypothesis that stricter gun legislation is correlated with lower rates of gun violence. But while this correlation seems to be quite firmly established, only few studies have used empirical strategies that allow for a causal identification of the effect.

To the extent those studies exist, they are typically located at the national level and the preferred identification strategy has been the synthetic control method. For example, Bartos et al. (2020) used this method to study the impact of Australia's 1996 gun buyback program and found that the program significantly reduced Australia's homicide rate, confirming previous findings by Leigh and Neill (2010). Similarly, McCourt et al. (2020) showed that purchaser licensing laws, coupled with comprehensive background check requirements reduced firearm

homicide and suicide in their synthetic control study of four US states, thereby confirming similar results that had been reported by (Crifasi et al. 2015) for the effects of permit-to-purchase laws on firearm suicide.

Also regression discontinuity designs have been used as an alternative approach to causally identify the effects of gun laws on gun crime using observational data. Leveraging variation in the age thresholds at which guns may be purchased (18 vs. 21), (Raifman et al. 2020) showed that adolescent suicide is significantly reduced when age thresholds are higher. In another regression discontinuity design, (Post et al. 2021) studied the impact of the Federal Assault Weapons Ban on the occurrence of mass shootings, gun deaths and gun injuries in the United States, showing a strong effect of the ban, which was abolished in 2004. In another empirical context, Schneider (2018) used an interrupted time-series approach to study the effects of more restrictive gun laws in Brazil, finding a significant reduction in firearm homicides and gunshot wounds.

Combining various approaches of causal identification, Donohue et al. (2019) revisited the "More Guns, Less Crime" hypothesis put forward by Lott and Mustard (1997) and analyzed the impact of (permissive) right-to-carry (RTC) laws on violent crime in the United States. The concluded that "there is not even the slightest hint in the data from any econometrically sound regression that RTC laws reduce violent crime" (ibid. p. 240), thereby forcefully refuting the idea that easier access to firearms could reduce gun violence. Overall, the evidence from existing research on the causal impact of gun laws on gun violence is rather clear: most studies confirm that stricter gun legislation helps to reduce gun-related crime (Greenberg et al. 2024; Lee et al. 2017). Yet, most of those studies are based on the United States, which is an outlier both in terms of the ways in which it regulates guns and with regard to its extreme levels of gun violence.

Despite those instructive attempts to causally identify the effects of gun legislation on gun crime, only few cross-nationally comparative studies exist in this line of research. Duquet and Van Alstein (2015) studied 33 European nations comparatively, revealing strong associations between the availability of firearms and gun crime and studied rates of gun violence after reforms of firearm legislation in Austria, Switzerland and Belgium, discovering reductions in gun violence after the reforms. While useful to obtain a broad comparative picture, their approach was exploratory and correlational, which prevents us from deriving clear policy recommendations. In their comparative study of 16 Western European states,

Hurka and Knill (2020) come closer to a causal identification of the effects of gun law reforms on gun violence by controlling for unobserved, time-invariant factors at the country level, common time trends across nations and other confounders, but also their research design falls short of a truly quasi-experimental setup. Reflecting this lack of research, in their systematic literature review, Krüsselmann et al. (2021) could not find any other cross-national, comparative studies that systematically addressed questions of causal identification. Especially comparative studies of European countries, where the baseline restrictiveness of gun laws tends to be higher than in the rest of the world, hardly exist. In this sense, any effects that could be identified in such a least-likely scenario would be particularly useful to better understand the thresholds at which gun legislation makes a difference for gun violence.

For obvious reasons, classic experiments are neither feasible nor ethically appropriate to test whether gun laws affect gun crime. Accordingly, since the "gold standard" in causal inference is not attainable, the research community needs to turn towards the second-best option, namely quasi-experimental designs on the basis of observational data. Many of those studies have been conducted in the United States, where the stimulus of stricter gun laws is often quite strong given the low restrictiveness of existing regulations. Therefore, in our view, we need to extend those inferential designs beyond the outlier case USA in order to learn more about the threshold at which stricter gun control really makes a substantive difference for gun violence. In other words, the gun law reforms that are typically analyzed in the United States (background checks, permit-to-purchase legislation, etc.) constitute common-sense baseline regulation in most of the rest of the world and the finding that those changes matter in the United States do not automatically imply that we can easily generalize them to other countries. While first studies in other nations exist and broadly confirm the preventive effects of stricter gun laws on gun crime, we still believe that more cross-national, comparative research would help to further buttress those claims gained in single-country studies. To this end, we need more cross-national research that aims to isolate the effect of gun laws through quasi-experimental research designs like difference-in-differences, synthetic control methods or regression discontinuity designs. Such research could help us determine whether stricter gun laws also have an effect in policy environments that are characterized by a stricter baseline regulation than the one we find in countries like the United States or Brazil.

4. Conclusion

Gun violence remains a persistent global problem (Cukier & Sidel), and the question of how states can effectively regulate firearms to reduce deaths continues to be of central scholarly and political concern. The underlying premise—that firearms increase lethality in violent encounters (Braga et al. 2021; Zimring 1972), facilitate impulsive suicidal behavior (e.g. Crifasi et al. 2015), and heighten the risk of accidents (e.g. Smith & Spiegler 2020) – is well established. Yet, despite widespread agreement on the risks associated with firearms, our understanding of *how* and *under what conditions* gun regulations reduce gun violence remains surprisingly limited from a cross-national, comparative perspective. This review set out to synthesize the current state of research, highlight empirical patterns, and identify conceptual and methodological challenges that still need to be addressed.

One of the most striking insights of our analysis is the limited number of comparative cross-national studies on gun regulations and gun violence. While the United States has generated a substantial body of research—including studies employing sophisticated causal identification strategies—the rest of the world has not seen similar systematic inquiry. This imbalance matters because the US is an extreme outlier case in terms of both regulatory permissiveness and the scale of gun violence (Raissian et al. 2022). In such a context, policy changes are often large and their effects easier to detect. Conversely, in highly regulated environments such as most European countries, reforms tend to be smaller, more incremental, and embedded in complex institutional landscapes (Hurka 2015). Thus, the near absence of comparative, cross-national causal research leaves a major empirical blind spot: we cannot confidently assess whether the effects identified in the US generalize to countries with more restrictive regimes.

Yet, the few comparative studies that do exist tend to corroborate the key findings from the US: stricter gun regulations are associated with lower rates of homicides, suicides, and accidents (Hurka & Knill 2020). This suggests that regulatory measures matter even in contexts where gun availability is already limited. However, much remains unknown about threshold effects, marginal changes, and which specific components of gun regulation drive observed outcomes. Understanding these nuances requires more systematically collected data, greater variation in regulatory contexts, and more sophisticated research designs.

Three main challenges emerge from our review: (1) conceptual clarity and measurement of the independent variable, (2) data quality and availability on the dependent variable, and (3) the need for stronger causal identification.

First, comparative research must move beyond proxy measures such as firearm availability and focus instead on direct measurement of regulatory restrictiveness. While strong correlations between gun availability and gun violence are consistently observed (e.g. Rutar 2025), these findings reveal little about how specific policy instruments operate. The key question is not only whether more guns lead to more gun deaths – a scaling effect already firmly established – but whether regulations can effectively reduce availability, circulation, and misuse. Existing research demonstrates that gun law restrictiveness *can* be measured in valid and reliable ways, but such efforts have thus far been largely confined to the US (e.g. Reeping et al. 2021), with only few systematic attempts in other parts of the world (Hurka & Knill 2020). Expanding these approaches cross-nationally is critical for understanding how regulatory design shapes firearm outcomes in different institutional settings.

Second, data availability and data quality pose significant challenges for cross-national analyses. While the US benefits from detailed, high-quality health statistics that track firearm deaths over decades (CDC 2025), most other countries lack comparable datasets. International data on homicides and suicides often differ in definitions, reliability, and coverage, especially when relying on crime statistics rather than mortality data. Furthermore, the operationalization of "gun violence" varies considerably across studies—a diversity that reflects the complexity of firearm-related harm but complicates cross-study comparison. Strengthening international data infrastructure, including harmonized and disaggregated datasets such as the *European Homicide Monitor* (Kivivuori et al. 2024), is essential if we want to improve the validity of comparative analyses.

Third, causal inference remains underdeveloped in cross-national research. Most existing studies rely on correlational approaches, which are limited in their ability to isolate the effects of specific policies (e.g. Altheimer & Boswell 2012; Hemenway 2000; Killias 1993). While quasi-experimental designs – synthetic control, difference-in-differences, regression discontinuity – have produced promising results in the US (e.g. Crifasi et al. 2015; McCourt et al. 2020; Post et al. 2021; Raifman et al. 2020), only few studies use similar approaches in other empirical settings like Australia (Bartos et al. 2020; Leigh & Neill 2010)or Brazil (Schneider 2018). In comparison, cross-national, comparative studies are limited in the way

they use strategies of causal identification (Hurka & Knill 2020). Extending causal designs beyond a single national context would substantially deepen our understanding of how and why gun laws may influence firearm outcomes under different political, cultural, and institutional conditions. Yet, despite these hurdles, the broader empirical pattern is surprisingly consistent across disciplines, contexts, and methodological approaches: stricter gun regulations tend to be associated with lower levels of firearm deaths. This does not imply that regulations eliminate gun violence entirely, nor that any particular policy is universally effective. But it does indicate that states have meaningful tools at their disposal to reduce risk, even if effects vary across countries, policy types, and types of violence.

On a more general note, we believe that the field would benefit from a more systematic, interdisciplinary, and comparative research agenda. Political science, public policy, criminology, epidemiology, and psychology each bring distinct strengths, yet their insights remain largely siloed. Integrating these perspectives – while simultaneously expanding empirical inquiry beyond the US – would provide a stronger evidence base for understanding the conditions under which gun regulations are most effective. Ultimately, improving the quality and scope of comparative research on gun regulation is not only academically desirable but politically relevant. Policymakers need reliable, context-sensitive, and causally credible evidence to make informed decisions that can save lives. Strengthening cross-national data collection, refining measurement tools, and advancing research designs that permit causal inference are crucial steps toward this goal. By investing in these efforts, scholars can contribute to more evidence-based, comparative, and effective approaches to reducing firearm violence worldwide.

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