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Assessing a set of policies and the usage of smart-tech to mitigate and minimize the risk of school shootings in the United States

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ABSTRACT

In the world of illegal markets, the sales of guns soar right through with incessant increases in its unlicensed misuses which continue to threaten the safety of us human beings in places we consider our second home - schools. This exploitation of guns, that should be used purely as defensive measures, has led to a spiral in the contingencies of school shootings worldwide, but most notably in the United States; being 25 times higher compared to other high-income countries. With many of its government policies deemed ineffective and unresponsive to the scenario of school shootings, school shooting rates have immensely increased with the subject still being outlined and circulated as a global issue in the modern era. The impacts of such a circumstance have left a stain on humans' mental and physiological aspects, whilst also blemishing the environment and its infrastructures from an economic perspective. A series of notable school shootings have stemmed from the age group between 16 and 20 (Camélia Dumitriu, 2013). Statistical figures, which record 23 school shootings with casualties in the year 2000-01 as compared to 93 school shootings with casualties in the year 2021, serve as solid proof of the illegal misuse and access to guns by adolescents which has generated public concern to a creation of a modern, civilized society that thrives under the ideology of hypocrisy.

The trauma imposed on the victims of school shootings is said to be so heavy that it has led them to find solace in the use of antidepressants. According to panel data collected before and after incidents of school shootings, the use of antidepressants among adolescents increased by approximately 21% (Maya Rossin-Slater, Molly Schnell, Hannes Schwandt, Sam Trejo, and Lindsey Uniat, 2021). School shootings have subsequently led to cases of chronic absenteeism in some survivors, for whom the mental wound of these incidents is too intact to be erased. Such factors impair the educational progress of these students, who may need to repeat their grade for the following one to two years.

Additionally, the analysis aims to use Economist W. Kip Viscusi's methodology in order to assess the damage that school shootings pose in an economic aspect by looking at the lives lost and the total revenue lost in that regard. This can be done by

assigning a cost to human life and taking into account the healthcare costs in case of injuries. Hence, we will be able to successfully cover non personnel costs to society.

With ideas dating from the 1970s, smart guns have been making a gradual emergence into the firearms market. Combining technologies of proximity and identity detectors, smart guns had been initially introduced with the intention to improve gun safety. Many, however, cite smart guns as an infringement on the right to bear arms. Moreover, reports suggest that hacking the main RFID system may even be possible with a simple magnet. So, do smart guns possess substantial benefits such that they could be of use to reduce the casualties of school shootings and similar events? This research article will conclusively analyze how the implementation of smart guns, along with other policies to enhance the efficiency of this technology, should mitigate the risk of public and private school shootings, as well as the possible psychological ramifications it might have on students and the quality of the education that they receive.

Keywords: Illegal markets, Unlicensed misuse, School shootings, Antidepressants, Chronic absenteeism, Smart guns

I. INTRODUCTION

The United States has heavily fallen prey to a multiplying amount of violence in schools through incidents of school shootings, endangering the lives of the school's students and the faculty. While the predominant causes of school shootings remain unfounded, the trauma it builds is nearly inescapable, with the intensity varying from person to person. The loss of lives ensued as the aftermath/repercussions of these shootings are posing as heavy "damages" to not only the American, but also the global population, both psychologically and financially. The argument we put forward is that the implementation of new tech smart guns along with other policies can significantly reduce the number of yearly victims of school shootings, the consequential impacts of these shootings, as well as the overall misuse of guns.

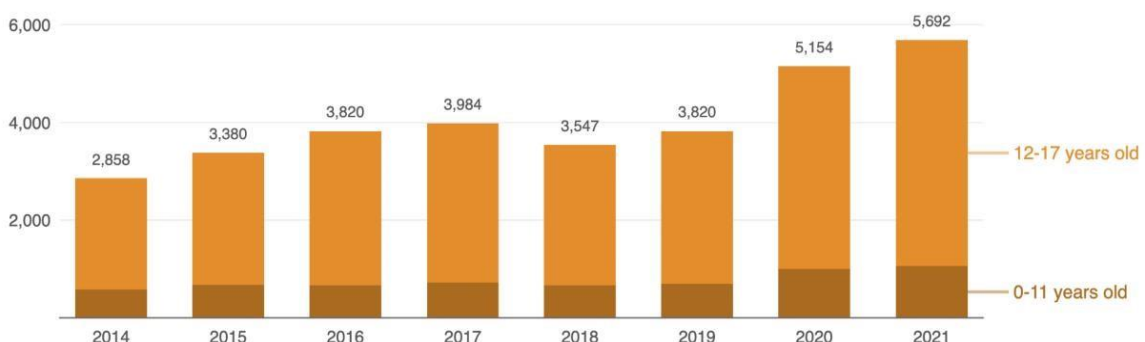
Existing Policies at a Glance

Gun laws in the United States are such that it is quite easy to the extent that in the majority of the states it is possible to get a gun without the authorities carrying out background checks on the purchaser of the gun. Moreover, the Second Amendment prevents anyone from infringing upon the right to carry guns to maintain a "safe" state and more often than not several gun rights advocacy groups take advantage of an amendment that dates back to the time when industrialization had just barely been initiated. It is of noteworthy concern that some states do not even require permits to purchase and carry guns, states such as Vermont allow for minors above 16 years of age to possess firearms (obviously with certain restrictions; but the thought of it seems so appalling). The above reasons barely scratch the surface of the lax gun laws and the lack of nationwide laws that guarantee the prevention of the misuse of firearms. At this rate, it is quite easy to see the reasons why school shootings are prevalent in the country and why the causes, effects and mitigation of this issue are pertinent for discussion.

Examining the Causes of Minors Wielding Firearms

The number of young people affected by gun violence in the U.S. continues to climb

Children and teens killed or injured by gun violence

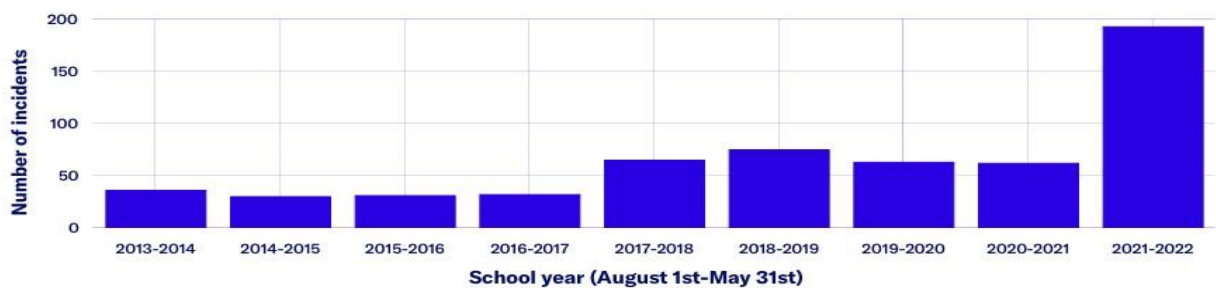


source - <https://www.npr.org/2022/05/28/1101307932/texas-shooting-ualde-gun-violence-children-teenagers>

Guns, tools capable of such infliction of harm that, in all righteousness should be used purely and strictly as a measure of self-defence are hugely frowned upon and have trivialized and outweighed the gravity of the situation of illegal gun sales. Today, the ease with which a teenager can obtain a gun and unrestrainedly use it is something that requires scrutinization and that needs to be

a dire matter of concern for every living being. As per a statistical report by the health journalist and writer *Steven Reinberg* in *December 2019*, out of the 15 million students that attend high school in the United States, 1 in 18 possesses a gun. Teenagers being vulnerable to capricious behavior can be linked to reasons that include and are not limited to hormonal changes, pop (music) and other forms of music promoting the usage of guns as a symbol of power, status and having a (what they assume as,) “cool” personality, as well as peer pressure. This can be held culprit/accountable for the rise in the number of public shootings by teenagers in not only the USA but also globally. What reflects even more irrational thinking on our part is that this behavior is not confined only to teenagers but also to full-grown adults who are caught in the possession of a gun for no legitimate reason. Humans have now fully mastered the art of surreptitiously handling guns as if they were toys and releasing their triggers as if they cause no real damage. This can be attributed to the fact that there is no impending danger to them this is nothing more than a simple game that gives them a higher status of power in their minds and not a criminal inhumane offence that is endangering the lives of a number of individuals and their prospects, despite not even being remotely involved in the perpetrators’ lives. The following few contents discuss the impacts of these actions on victims.

Gunfire at Preschools and K-12 by School Year



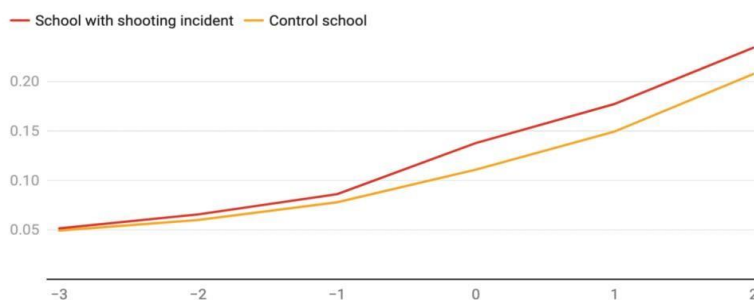
source: <https://everytownresearch.org/report/how-to-stop-shootings-and-gun-violence-in-schools/>

Psychological Impacts of School Shootings

School shootings are nothing short of a traumatic incident that leave a permanent mark on individuals and societies as a whole. School shootings victims and/or their guardians report incessant changes in behavior, mood swings, increased frequency of intrusive thoughts and nightmares, and more. All of these are very common signs of Post-Traumatic Stress Disorder, to which children happen to be especially vulnerable to. More often than not, these behavioral differences can lead to exclusion (by the individual themselves or due to social stigma). According to economists Marika Cabral, Bokyoung Kim, Maya Rossin-Slater, Molly Schnell and Hannes Schwandt, the prevalence of chronic absenteeism among children who have encountered public school shootings is 1.8 percentage points higher. This impedes not only the smooth educational journey that students should ideally receive but also incurs as a loss to the economy as a whole due to its future repercussions. Other statistics recorded by them tend towards similar propositions about the hurdled education that the victims of these shootings have to face. They are 1.3 percentage points more susceptible towards repeating a grade, 2.9 percentage points less likely to be able to graduate high school and are 5.5 percentage points less likely to register for a four-year college. High school students’ victims (grades 9 to 11) are also at a disadvantage when it comes to their employment from the ages 24 to 26 with their scope being 4.4 percentage points lower.

School shootings lead to increase in absenteeism

Students at schools that experience a shooting have higher rates of chronic absenteeism (vertical axis) in the years after the incident (horizontal axis)



source: <https://theconversation.com/the-lasting-consequences-of-school-shootings-on-the-students-who-survive-them-183906>

Additionally, these school shootings impose a mental trauma on its victims and one that holds onto them for the rest of their lives. All the academic setbacks mentioned above stem solely from this trauma which reins in the brains of these students exposed to school shootings. The gravity of the situation has escalated so much that these students have fallen back on the infamous use of ‘antidepressants’, essentially drugs. As per editor Eric W Dolan, there was a surge in the use of antidepressants by 21.4% in those under 20 who were exposed to fatal school shootings. May Wong adds that this increase in the rate of use of antidepressants, which was measured 2 years before and after the incident, and the growth per year was evidently seen continuing through the third year, based on comparisons two years before the incident and two years after. Such psychological impacts can only be fixed by schools and governments taking decisive measures to fund student counselling sessions, more for an actual impact on their mental health, rather than simply for the sake of keeping a counsellor. Furthermore, these changes should not last temporarily and must be a permanent investment to minimize the exacerbation of the ingrained detrimental thoughts in one’s mindset. Prevention is always the first step before finding an effective cure. These psychological impacts have a direct correlation with economic impacts that will be highlighted as follows.

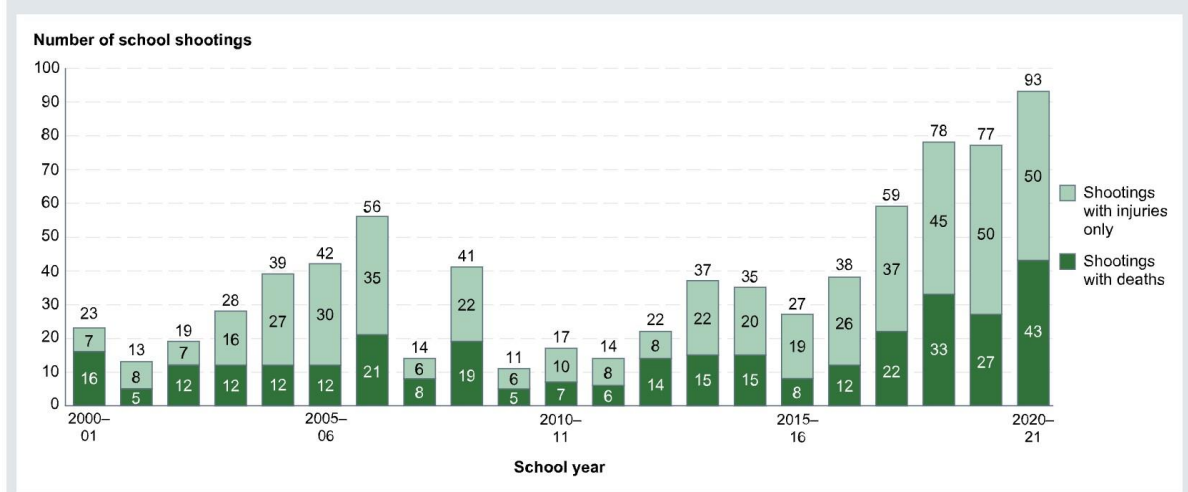
Socio-economic Impacts of School Shootings

With the country at the state of jeopardy, the people have been forced to accustom to a new lifestyle which involves the daily impacts of gun violence. According to Economist *W. Kip Viscusi*, in an interview with Planet Money, the value assigned to a statistical life is worth around \$ 3 million. As a singular household, this includes the future possible incomes, excluding the emotional aspect of the grievances that are inclusive in one’s death. Besides the mental deterioration, young students ranging from ages 11-19 are also expected to earn, as panel data suggests, US\$115,550 less over the course of their lifetime according to a survey done by *The Conversation*. School shootings and increased expenditure are correlated in a manner

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such that an estimated \$248 per pupil (calculated by taking an average). This expenditure is consumed while repairing infrastructure and filling up the missing (and quite unnecessarily foregone) gaps in the security system that the school desperately requires to prevent its broken reputation from being tarnished further. These incidents stem from chronic absenteeism and a gradually spiraling record with respect to grades due to the psychological impacts as mentioned earlier. These impact societies in its entirety as they increase disparities due to inequality in educational attainment and hence future employment prospects. Such circumstances only trigger society’s innate instinct to segregate better from worse, qualified from less qualified and hence victims from perpetrators and groups of individuals who try to hide these perpetrators.

Figure 2. Number of school shootings with casualties at public and private elementary and secondary schools: 2000–01 through 2020–21



SOURCE: National center for education statistics, 2022

Following the 2002 “Beltway Sniper” attacks, researchers Seth Gershenson and Erdal Tekin had taken the initiative to conduct standardized testing focused specifically on elementary students in the State of Virginia to analyze how the performance of students living in the vicinity of the catastrophic events. Research results provide us with the following information: “The main results indicate that the attacks significantly reduced school-level proficiency rates in schools within five miles of an attack”. Proficiency levels declined by approximately 2-5%. This research furthermore establishes the point that vulnerable societies on the basis of intellect, capabilities and race are already a basis for victimization. Concerningly, these vulnerable individuals (who are already subject to systematic oppression) are also the ones that seem to be at the forefront of the decline in academic achievements in school. This pensive thought now sets the question - Is there any real way to put an end to or at least mitigate these public shootings?

Smart Guns: their benefits and fields for further research



Image taken from Viking Biometric trigger lock

The new tech development of smart guns brings with itself a wave/promise of hope and a sigh of relief. With the implementation of high technology features that we hypothesize would impede the execution of these illicit actions, the right use of smart guns is bound to enforce a change.

Occasional unintended gun deaths can easily be avoided with the use of smart guns. Since 2015, the United States of America have had an estimate of 1700 shootings of children, where 26% of all firearms were targeted amongst the children aged 1-9 years old in 2016. Recent studies also suggested a higher probability of accidental deaths, with this rate rapidly soaring during the COVID-19 pandemic. [Andreas Paciuc, 2020]. In 2017, it was reported that 43% of the youth suicides that occurred in that year were due to firearms and whopping 80% of this already significant number was a result of the firearm belonging to a family member. A very significant factor that contributed to the aforementioned rates is that these children are left at home unattended with a gun that is at their disposal to use whenever and however they please, often leading to their untimely death.

Smart guns make prudent/judicious use of biometric-based trigger locks which enables only licensed and registered users to fire the gun, no matter who the gun is being carried by. It does this with the installation of a fingerprint or palm-based lock which does not allow access to all carriers. Additionally, the equipment of the feature of radio frequency identification ensures that the trigger of the gun is unlocked only when the gun is in the vicinity of an electronically matched external device and can be fired when unlocked as such. By only allowing the authorized user to fire the firearm, smart guns have the potential to prevent youth suicide and accidental gun deaths, without preventing an authorized user from accessing a firearm in case of emergency.

Considering the United States as a nation with the highest crime rates associated with an oversupply of guns, at an estimated rate of 393.3 million- which is about 120.5 for every 100 of its residents, there is a need to adopt certain legislations to overcome this scenario [Statista, 2020]. An element smart guns could offer as a theoretical solution for this issue is their biometrical-based trigger lock attachments [Viking trigger lock, 2020]. In summary, smart firearms could be helpful in reducing accidental and teen gun suicides.

However, from a practical perspective, sensible gun regulation is likely to face many challenges before becoming a reality.

The world we live in is one of technological advancements but is also living proof of the many setbacks technology carries with itself. The case with smart guns is exactly the same. Biometric lock systems will prevent the usage of a gun if it falls in the wrong hands, but these biometrics are bound to defect when held by sweaty, dirty or wet hands. It is in fact so simple to hack the RFID trigger locks used by these smart guns that all it takes is \$ 15 to buy some magnets that place all the control in the hacker's hands.

Additionally, the replacement of all existing guns with smart guns will be an onerous process. The National Rifle Association (NRA) has already posed a major setback to progress in the development of better smart guns and many other similar organizations support the boycott of such goods and the dealers that do sell them.

Referring to data collected by Andres Paciuc (J.D. Candidate, Duke University School of Law) , 114-300 million guns are privately owned by citizens in the USA, which alone serves to make the backbone of the implementation of smart guns more fragile.

Moreover, these old-style guns are being over-produced at the moment, which means that it won't be soon that their production will be extinct.

The idea of the implementation of smart guns has also sizzled some bitter reactions from gun rights advocacy groups, for example, the National Rifle Association. They carried out boycotts against companies that attempted to take steps in the production of smart guns. New Jersey's Childproof Handgun law of 2022 has stirred controversy in regard to the introduction of smart guns. The law states that 'once personalized guns are available, in any part of the country, New Jersey must start selling only these personalized handguns or smart guns within 30 months. The US constitution's Second Amendment Right states that "A well-regulated Militia, being necessary to the security of a free State, the right of the people to keep and bear Arms, shall not be infringed". Groups such as the NRA consider New Jersey's Law to be a breach of the Second Amendment Right. Such backlash is currently making it harder for smart guns to take over traditional guns.

However, many believe that there won't be much difference and they could still be used for self-defence, equally as efficiently. A significant point to be noted is the reduction in the malfunction of smart guns in the cases of sweaty and dirty palms. Furthermore, certain independent studies claim that some of smart guns have reported just a mere 0.01% of false authentication errors. This technology, although yet another form of weaponry development, should be received as a positive change that could possibly change the way people view the idea of carrying

Policies the government could implement

Adopting progressive wise gun policy is another option. So as to appeal to gun rights advocacy organizations as well as safeguard the younger generation from accidental deaths confining the sale of firearms to smart weapons can be too severe and must be discarded as an option, but legislation encouraging the sale of smart guns without outlawing the sale of conventional firearms might bridge the gap between the two extremes. Smart guns pose their own appeal as they are a significant improvement to where technology can take us.

The reliability of smart guns is something that needs to be proven to not only the public but also to gun rights advocacy groups. Governments should work on providing subsidies to further research and development in the reliability and promotion of smart guns so as to familiarize civil gun users with the idea and procedure

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to use smart guns. Areas of R&D include reliability (prevention of malfunction), user-friendliness (such that it resembles a typical gun but one that poses significant safety improvements), Once plans to incorporate have been initiated, the local/state security forces should be trained to use smart guns and prove its reliability and appeal, hopefully reducing the number of boycotts of this piece of technology that could possibly revolutionize the way guns are misused in the United States and potentially the world. Moreover, a law, passed in each of the states that constitute the USA, should ideally be implemented preventing the sale of weaponry by unlicensed dealers. Existing gun laws should be facilitating of newer technology such as smart technology once they are introduced to the market. Amendments may constitute a mandate that requires authorized officials to be the sole issuers of "passes" that allow applicants to use traditional guns, as well as review deals involving bulk purchases, sales to individuals with a history of misuse etc. Smart guns should solely be allowed to be configured biometrically to one individual and in a method such that it is only possible to access the gun by one "key" that the owner possesses. Any changes to the biometrics should be authorized by the licensed user, the dealer and the producer. Additionally, each state government should take the initiative of ensuring that these guns are not taken into or near facilities that provide education to any member of the population of that settlement, vehicles with students/minors and more.

If the real motive of gun rights advocacy groups is to carry guns in public for solely the purpose of selfdefense, then such measures should ideally not infringe upon their rights as this does not prohibit any individual from carrying a firearm and at the same time, it maintains the status quo of the United States as a "secure" free state as advocated in the Second Amendment.

II. CONCLUSION

As mentioned above, implementation of the policies is of utmost importance to reduce the number of accidental deaths, suicides associated with pulling the gun trigger (especially minors), school shooting incidents and hence the victims of such an act, among others. This is in light of the evident psychological and socio-economic impacts which prove detrimental to society as a whole and must be mitigated through new legislation and research into smart guns. Hence, this paper has covered the lax laws, the effects (whether socio-economic or psychological) as well as looking at smart guns, the method of their operation and areas for improvement such that the issue of school shootings can be mitigated to ensure a less marginalized society based on educational attainment in the future.

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