**Project Background**

The Violence Prevention Project is a nonpartisan, nonprofit research center located at Hamline University in St. Paul, Minnesota. Since 1966 they have been collecting extensive data on mass shooters through on the ground studies of communities where mass shootings occur, in depth interviews with incarcerated mass shooters, and conversations with the people that know them. The goal of the project is to “understand the pathway that gets someone to the point of committing a mass shooting so we can prevent other people from ever getting to that point”

This project focuses on analyzing data with the goal of identifying key drivers, trends, and risk factors that can inform violence prevention strategies. The KPIs we are investigating are: Composite Risk Score, Firearm Acquisition Risk Score, Motive Risk Score, and Intervention Opportunity Rate. Recommendations will be used by the Policy & Advocacy team to better allocate legislative and funding resources. Insights are delivered to Training & Outreach and Threat Assessment teams to refine prevention programs and intervention protocols.

Insights and recommendations are provided on the following key areas:

* **Overall Composite Risk Score:** a weighted metric that evaluates key risk factors across four categories: family background, childhood trauma, psychological and behavioral history, and recent stressors to identify and prioritize common shooter characteristics.
* **Firearm Acquisition Risk Score:** Ametric based on how the firearm was obtained (legal, illegal, gifted, stolen, modified) and the type of firearm used, which could help policymakers address loopholes.
* **Motive Risk Score:** A weighted metric that quantifies the explicit motivations behind mass shooting incidents, categorizing perpetrator intent into *hate-based*, *personal grievance*, and *other motive* risk tiers. This score identifies high-risk patterns (e.g., extremism, fame-seeking, or workplace violence) to guide targeted prevention strategies, policy prioritization, and early intervention efforts.
* **Intervention Opportunity Rate:** A measure of prior system contact (law enforcement, mental health, school interventions), signs of crisis, and leakage (pre-incident warnings) that highlights missed opportunities for intervention.

**Data Structure & Initial Checks**

The companies main database structure as seen below consists of three tables: 1.mass\_shooter 2. firearms\_used 3. victims, with a total row count of 2042 records. A description of each table is as follows:

* **Mass Shooter:** Contains detailed information about mass shooters, including demographic, psychological, motives, and behavioral characteristics, as well as incident details.

**Columns (Key Fields):**

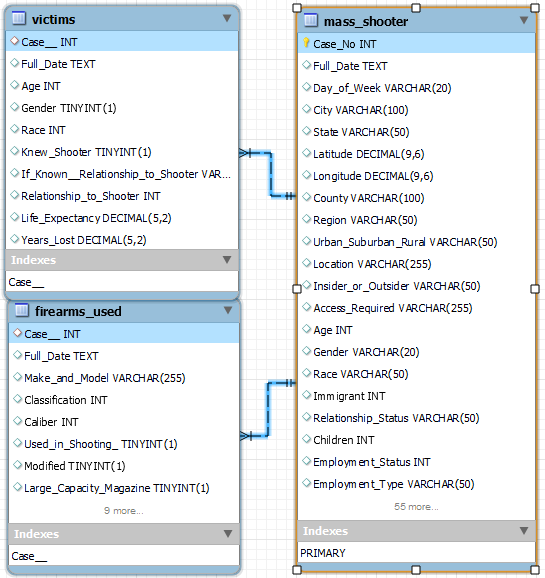
* + **Case\_No:** Unique identifier for each mass shooting incident.
  + **Shooter\_Last\_Name, Shooter\_First\_Name:** Name of the shooter.
  + **Full\_Date, Year, Month, Day:** Date of the incident.
  + **Location, City, State, Region:** Geographic details of the incident.
  + **Number\_Killed, Number\_Injured:** Number of victims killed and injured.
  + **Mental\_Illness, Criminal\_Record, Known\_to\_Police\_or\_FBI:** Shooter's mental health and criminal history.
  + **Leakage, Leakage\_How, Leakage\_Who:** Pre-incident warning signs and how they were communicated.
  + **Prior\_Hospitalization, Prior\_Counseling, Psychiatric\_Medication:** Prior mental health interventions.
  + **Other Fields:** Additional details about the shooter's background, motives, and behavior.
* **Firearms Used:** Contains information about the firearms used in mass shootings, including acquisition methods and modifications.

**Columns (Key Fields):**

* + **Case\_\_:** Foreign key linking to the Mass Shooter table.
  + **Make\_and\_Model, Classification, Caliber:** Details about the firearm.
  + **Used\_in\_Shooting\_, Modified, Large\_Capacity\_Magazine:** Modifications and usage details.
  + **Legal\_Purchase, Illegal\_Purchase, Gifted, Theft:** Methods of firearm acquisition.
  + **Other Fields:** Additional details about the firearm's origin and modifications.
* **Victims:** Contains information about the victims of mass shootings, including demographic details and the impact of the incident.

**Columns (Key Fields):**

* + **Case\_\_:** Foreign key linking to the Mass Shooter table.
  + **Victim\_Name, Age, Gender, Race:** Demographic details of the victim.
  + **Knew\_Shooter, Relationship\_to\_Shooter:** Relationship between the victim and the shooter.
  + **Life\_Expectancy, Years\_Lost:** Impact of the incident on the victim's life.



**Initial Checks**

Before proceeding with analysis, perform the following checks to ensure data quality and consistency:

**1. Data Completeness**

* Check for missing values in key fields:
  + **Mass Shooter:** Case\_No, Full\_Date, Number\_Killed, Number\_Injured.
  + **Firearms Used:** Case\_\_, Make\_and\_Model, Classification.
  + **Victims:** Case\_\_, Victim\_Name, Age, Years\_Lost.

**2. Data Consistency**

* Verify that all Case\_\_ values in the **Firearms Used** and **Victims** tables exist in the **Mass Shooter** table (Case\_No).
* Ensure that date formats (Full\_Date) are consistent across all tables.

**3. Data Integrity**

* Check for duplicate records in the **Mass Shooter** table using Case\_No.
* Validate that numeric fields (e.g., Number\_Killed, Years\_Lost) contain valid values (non-negative numbers).

**4. Relationships**

* Confirm that the relationships between tables are correctly established:
  + Each Case\_\_ in **Firearms Used** and **Victims** must match a Case\_No in **Mass Shooter**.

**Executive Summary**

**Overview of Findings**

Mass shootings have surged in recent decades, with the 2010s marking the deadliest period (58 incidents). High-risk cases driven by hate motives, illegal/modified firearms, and severe psychological distress have tripled since the 1980s, with 6 of the top 10 highest-risk shooters emerging between 2015–2022. Unaddressed mental health crises (psychological volatility making up 53% of risk scores), systemic failures (97.5% missed interventions) to act on warnings, and deadly firearm access (legal/modified firearms making up 23% deadlier outcomes) are the three pillars of mass shooting risk. Hate-based attacks now dominate high-risk cases (70% post-2015), while fame-seeking motives are emerging. Grievance-driven incidents, prevalent in the 1990s, have declined.

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**Insights Deep Dive**

**Overall Composite Risk Score:**

* **Rising Prevalence of Extreme & High-Risk Cases in Recent Years.**  75% of the top 5 highest-risk mass shooters (score ≥ 61) emerged between 2015–2022, with the worst case (score 75) occurring in 2022. Extreme and high-risk cases (score ≥ 41) tripled from 11% in the 1980s to 32% in 2015–2023. The data reveals a sharp escalation in severe risk profiles, suggesting modern mass shooters are more psychologically distressed and situationally volatile than past perpetrators.
* **Childhood Trauma is a Strong Predictor of Extreme Risk.** Extreme-risk cases (score ≥ 61) have an average Childhood Trauma Score of 14.8 versus 3.2 for lower-risk cases. Sexual abuse (5 pts) and physical abuse (4 pts) are highly weighted; 92% of extreme-risk cases had at least one trauma indicator. Childhood trauma’s contribution to high scores has remained consistent (40% of extreme-risk cases since 2000), but bullying appears in 18% of post-2010 cases.
* **Recent Stressors Are the Leading Driver of High-Risk Cases.** Recent Stressor Scores average 23.4 for high/extreme-risk cases versus 9.1 for moderate-risk. Suicidality (5 pts) and crisis signs (5 pts) are critical; 80% of high-risk cases had suicidality or paranoia. Post 2010, recent stressors spiked 70% of high-risk cases (2015–2023) had stressors ≥ 25 pts, compared to 45% (1990–2010).
* **Family Background’s Role Diminishes in Extreme Risk.** Extreme-risk cases average 3.3 in Family Background Score versus 5.0 for high-risk, suggesting it’s less decisive than trauma/stressors. Parental death (3 pts) and divorce (2 pts) are common but not dominant. Only 30% of extreme-risk cases had family criminal records. Family background’s impact peaked in 1980–2000 averaging 4.1 for high-risk but dropped to 2.8 post-2010, overshadowed by psychological/behavioral factors.

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**Intervention Opportunity Rate:**

* **Severe Missed Interventions are Common and Rising.** 6 of the top 10 highest-scoring cases occurred between 2015–2023, with the worst case (score 27) appearing in 2007. Severe missed interventions now represent 85% of all cases, up from 72% in the 1980s and 1990s. Modern shooters are more likely to have prior police contact, crisis signs, and leakage than historical perpetrators. Post-2010 cases average 18.4 points, a 30% increase over pre-2000 cases (14.1 pts), driven by sharper spikes in crisis signs and leakage.
* **Leakage Is the Most Overlooked (and Deadly) Predictor.** Cases with leakage average 5.3 additional points, pushing 45% of severe cases into the "extreme missed intervention" tier. When leakage involved police or mental health professionals, the average case score jumped to 22.1 yet 60% of post-2010 cases with such warnings still resulted in attacks. Leakage to authorities doubled from 20% (1980s) to 40% (2010–2023).
* **Prior System Contact Is the Dominant Risk Multiplier.** Prior system contact contributes 58% of the total Intervention Opportunity Score, with criminal records and psychiatric hospitalizations as top drivers. Modern shooters (2000–2023) average 9.3 prior contact points which is a 50% increase over 20th-century cases at 6.1 pts. The data suggests that shooters are “known in the system” but are siloed rather than treated as a part of a risk.
* **Crisis Signs Are the Fastest-Growing Risk Factor.** Crisis-related scores surged 40% in post-2010 cases, averaging 6.1 points versus 4.4 pre-2000. Isolation, paranoia, and recent stressors now appear in 80% of severe cases, with 2021 cases showing the highest crisis scores on record with an average of 7.3 points. Suicidality is present in 70% of extreme-risk cases, up from 45% in the 1990s. The Data Reveals that modern shooters are more psychologically volatile, with crisis signs escalating faster than other risk factors. Distress is visible earlier but systems aren’t tracking it proactively.

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**Firearm Acquisition Risk Score:**

* **Legal Assault Rifles Dominate Mass Casualties.** Legal assault rifles (Type 3) caused 379.8 avg. victims per incident vs. 23.7 for illegal shotguns in top 10% highest-casualty events. 68% of incidents with 100+ victims involved legally obtained assault rifles. Post-2010, legal assault rifles accounted for 72% of mass shootings (10+ deaths) vs. 41% pre-2010. The data shows that legal high-capacity rifles, though scoring moderately (avg. 4.2/5), drive extreme lethality due to modifications (e.g., 100-round magazines). Policy loopholes enable this disparity.
* **Illegal Firearms: Higher Risk, Lower Casualties.** Illegal firearms avg. risk score: 4.5/5 vs. 3.8 for legal, but cause 82% fewer casualties (20.5 vs. 114 avg. victims) except for illegal shotguns (Type 1) which are 39% deadlier than legal ones (23.7 vs. 16.9 victims). Illegal shotgun lethality rose 23% post-2010 (sawed-off barrel prevalence).Illegal assault rifles declined in use (-15% since 2000). The data shows most illegal firearms reduce casualties (e.g., illegal handguns avg. 17.2 victims), except shotguns. Risk scores overemphasize acquisition method over firearm type.
* **Surge in High-Risk Acquisitions (2010–2023).** Firearms with risk scores ≥4 increased 72% post-2010. Ghost guns: +120% illegal modifications: +85% 2017–2023: 55% of high-risk firearms were legally purchased but modified. The data shows spikes in risk scores correlate with: Bump stock availability (pre-2018) and the rise of "ghost guns" (2013–present)
* **Risk-Lethality Mismatch in Legal Assault Rifles.** Legal assault rifles cause 18× more deaths than illegal handguns despite only 8% higher risk scores.92% of 50+ casualty events involved legal assault rifles. The data shows current risk metrics undervalue firearm type lethality. A modified AR-15 (score 34) is 22× deadlier than an illegal handgun (score 38) but scores 11% lower. Risk score may have to be re-evaluated on how it is calculated.

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**Motive Risk Score:**

* **Hate-Based Motives Have Surged in the Last Decade.** 70% of high-risk cases (score ≥15) post-2015 were driven by hate motives (avg. score: 18.6), compared to 30% pre-2010. Hate-motivated high-risk cases increased from 1 incident (1977–2000) to 6 incidents (2015–2023). The data shows a sharp rise in extremist ideologies, with racism/xenophobia and religious hate (8 pts each) dominating recent cases (e.g., 2018–2023). This suggests modern mass shooters are increasingly radicalized, requiring targeted counter-extremism programs.
* **Personal Grievances Peaked in the 1990s but Remain a Persistent Threat.** Grievance-driven cases averaged 9.4 points in the 1990s (e.g., 1992 case: 14 pts) but dropped to 4.1 points post-2010. Workplace/relationship conflicts accounted for 45% of moderate-risk cases (10–14 pts) in the 1980s–2000s but now represent only 20%. The data shows that while grievance-motivated shootings have declined, they still contribute to 1 in 5 moderate-risk cases (e.g., 2023 case: 9 pts). Early intervention in employment/domestic disputes remains critical.
* **Fame-Seeking Emerged as a New High-Risk Motive Post-2000.** Fame-seeking (7 pts) appears in 30% of high/moderate-risk cases since 2007, with an average "other motive" score of 8.3 in these cases. Absent pre-2000, fame-seeking now appears in 6 cases, including 3 high-risk incidents (e.g., 2016, 2023). The data shows a modern shift toward notoriety as a motivator, exacerbated by social media. Cases with fame-seeking often overlap with hate/grievances.
* **Opportunistic Attacks Are Declining but Still Prevalent.** 85% of cases scored ≤ 9 points (opportunistic), but their share dropped from 92% (pre-2000) to 76% (post-2015). Low scores (0–9) correlate with undefined/opportunistic motives. Opportunistic cases dominated the 1970s–1990s (e.g., 1966, 1983) but decreased as high-risk cases rose. The data shows that while situational violence remains common, its proportion has shrunk as planned, motive-driven attacks (hate/grievances) increased by 40% since 2010.

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**Recommendations:**

Based on the insights and findings above, we would recommend the [stakeholder team] to consider the following:

* 97.5% of shooters had prior missed intervention opportunities, and 46.5% exhibited "leakage" (pre-attack warnings). **Implement mandatory cross-agency reporting systems (e.g., law enforcement, mental health, schools) to flag individuals displaying crisis signs (suicidality, paranoia, violent threats). Develop threat assessment protocols to ensure follow-ups on high-risk cases.**
* Ghost guns (+120%) and illegal modifications (+85%) spiked since 2010, exploiting legal purchase loopholes.. **Require serialization and background checks for all homemade firearm kits (as per 2022 ATF rule, but enforce stricter compliance)**
* Recent stressors (53% of risk scores) and childhood trauma (92% in extreme-risk cases) are key predictors. **Expand community mental health programs targeting at-risk youth and adults, with a focus on trauma counseling. Train educators and employers to identify crisis indicators (isolation, violent ideation) and refer individuals to care.**
* Hate-driven attacks surged to 70% of high-risk cases post-2015, with racism, misogyny, and xenophobia as dominant motives. **Fund anti-radicalization initiatives (e.g., digital surveillance of extremist forums, community outreach) and mandate hate crime training for law enforcement.**
* Shooters with prior system contact (58% of risk scores) often fall through gaps due to siloed data. **Establish a national database linking criminal records, mental health history, and firearm purchases. Use predictive analytics to flag individuals with composite risk scores ≥41 for intervention.**

**Assumptions and Caveats:**

Throughout the analysis, multiple assumptions were made to manage challenges with the data. These assumptions and caveats are noted below:

* “At The Violence Project, we focus on mass public shootings, **defined by the Congressional Research Service** as follows: **a multiple homicide incident in which four or more victims are murdered with firearms—not including the offender(s) within one event, and at least some of the murders occurred in a public location or locations in close geographical proximity (e.g., a workplace, school, restaurant, or other public settings), and the murders are not attributable to any other underlying criminal activity or commonplace circumstance (armed robbery, criminal competition, insurance fraud, argument, or romantic triangle).”** We acknowledge the limits of this definition. Every mass casualty event is a tragedy and many factors influence whether a threshold of four or more people killed is reached, including the accuracy of the shooter, the type and caliber of the firearm used, the number of rounds fired, the actions of first responders, proximity to the nearest hospital, and if/how many bullets hit vital organs. Any cut point is arbitrary, but this remains a widely agreed-upon standard. Further, the number of deaths is the strongest predictor of media coverage, which we use to help build our database.”
* Because cases 198 through 200 occurred in June and September of 2024 there has not been sufficient time for The Violence Project to collect family background, childhood trauma, psychological and behavioral history, recent stressors, and motive data. Therefore those have been filled in with Null values.