High-Risk Behavior of Students Carrying weapons to School

Nan Lin Wah Sin Htoo and Naima Shifa

Department of Mathematics, DePauw University, Greencastle, IN 46135

Introduction

Firearms is one of the main sources of death and injuries among adolescents in the United States, and the most vulnerable children in the country are impacted more by gun violence. The rise of personal and mental issues in students has been accompanied by an increase in the number of students carrying guns and the frequency of mass shootings at schools in the US. In a study by the Secret Service and Department of Education, bystanders observed warning signs and alerts prior to 93% of school shooting cases, which could have been prevented if more attention had been paid to many other important factors contributing to these tragedies (Vossekuil, 2002). A recent study (Dong, 2021) pointed out that future researchers should focus on recognizing high-risk youths and tackle their issues early on in life most appropriately according to individual differences such as age and personal circumstances. American Psychological Association (2013) mentioned that banning guns from high-risk groups has also been shown to minimize gun violence; therefore, effectively enforced gun policies and a multifaceted approach will diminish weapon violence cases (Style, 2013). This research discusses the contributing factors to youths carrying guns to schools and analyzes the high-risk behaviors of students. It was hypothesized that their personal issues such as their mental wellness, high-risk behavior, and attitude towards school correlate with their decision to carry weapons, particularly guns on school property.

Results and Discussion

Due to the nature of the issue addressed, a statistical mathematics approach is chosen for an in-depth analysis of a set of data using linear regression and categorical data analytical methods. The methodology is implemented on the 2019 Youth Risk Behavior Surveillance System (YRBSS) datasets and documentation provided by the content source from the Centers For Disease Control and Prevention (CDC). It is found that the group of students who do not feel safe at school and carry weapons has a higher percentage of students who are showing depression and suicidal symptoms than the overall group of students. These students also tend to get into fights in school or outside school more often. It is also found that students who experience dating violence (sexual or physical), who do binge drinking more often, who have higher sexual activities and higher number of sexual partners, students who were bullied, and those who have been threatened or injured by a weapon at school property with a weapon are also more likely to carry guns than those who are not. The results of the analysis also indicate that the feeling of being unsafe at school has a significant effect on whether students carry guns or not.

Methods:
1. Finding and comparing proportions,
2. Finding Confidence Interval
3. Hypothesis testing
4. Drawing 2x2 Contingency table
5. Finding odds ratio

Contingency Table for Students who are Bullied on School Property

Q23/ Q14	Carry gun	Don't carry gun	Total
Bullied	308	4344	4652
Not Bullied	864	19268	20132
Total	1172	23612	24784

Odds ratio analysis outcome using R

```
$measure
           odds ratio with 95% C.I.
Predictor  estimate  lower     upper
  Exposed1 1.000000      NA       NA
  Exposed2 1.581189 1.382655 1.808231

$p.value
             two-sided
Predictor   midp.exact fisher.exact  chi.square
  Exposed1      NA          NA          NA
  Exposed2 9.743917e-11 1.012718e-10 1.525169e-11
```
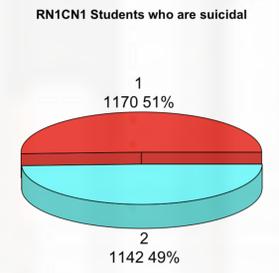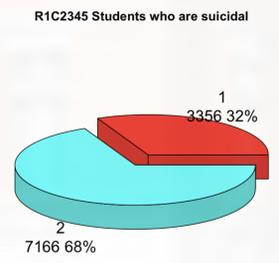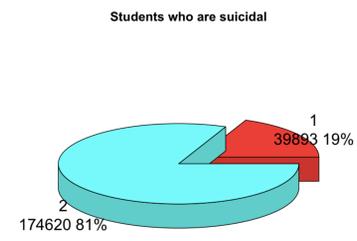
A contingency table was conducted to analyze the data of students regarding two variables (fig.2). We use the method of comparing proportions in 2 x 2 contingency tables to examine the association between the students' being bullied on school property and their decision to carry guns. The analysis yielded a chi-square (1, N=24784) = 45.502, with a very small p-value close to 0 (p= 1.525e-11). A 95% confidence interval for the probability of carrying a gun is (0.06620808, 0.04291675). Thus, the null hypothesis of no association was rejected (p< 0.05). This indicates being bullied on school property has a significant effect on whether students carry guns or not.

We're 95% confident that the odds of bullied students carrying guns are between 1.38 to 1.81 times greater than for students who are not bullied.

In simple words: Bullied students are 1.58 times more likely to carry guns than those who don't.

Finding percentages and data visualization using R program

Overall Student Body of 21730 Students	Students who **do not carry weapon** to school and feel unsafe at school	Students who **carry gun** to school and feel unsafe at school

Students who are suicidal

R1C2345 Students who are suicidal

RN1CN1 Students who are suicidal

Q. NO.	Variables	All Student Body (21730 Students)	Those who don't feel safe and **don't carry weapon to school** (10638 Students)	Those who don't feel safe and carry **weapon to school** (2398 Students)	Those who don't feel safe and carry gun (276 students)
25	Depression Symptoms	31%	56%	62%	53%
26	Suicidal	19%	32%	51%	45%
28	Attempted Suicide	9%	22%	51%	21%
29	Seriously injured from suicide attempt	3%	8%	30%	26%
17	Violent Nature overall	2%	4%	31%	27%
18	Violent Nature at school	1%	1%	17%	18%
42	Binge Drinking Frequency (20 times or more per month)	1%	1%	24%	19%
43	Binge Drinking Quantity (10 or more drinks in a row)	4%	6%	37%	38%
60	Multiple sex partners (6+)	10%	12%	42%	38%
61	Current sexual activity (6 or more partner in 3 months)	2%	2%	23%	20%
23	Bullied on school campus	19%	43%	50%	44%

Future Work

This research identifies and addresses unobvious factors that contribute to this most concerning issue of gun violence in schools. This study is an attempt to fill certain gaps in current knowledge using mathematical data analysis. We hope that the results and discussion we have finalized from this research will be a helpful resource for future researchers, leaders, and scholars to investigate this topic in greater detail while innovating effective solutions to this issue of mass shootings.

Acknowledgements

References

1. Style, A. P. A. Gun Violence: Prediction, Prevention, and Policy.

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3. Vossekuil, B., Fein, R. A., Reddy, M., Borum, R., & Modzeleski, W. (2002). The final report and findings of the Safe School Initiative. *Washington, DC: US Secret Service and Department of Education*.

Figure 1: Put figure 1 here