

## **Emotional and Behavioral Health Characteristics of Adolescents Who Carry Guns to School**

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### **Abstract**

**Introduction:** Gun-carrying and mental health problems among adolescents are risk factors for youth gun violence. This study sought to identify emotional and behavioral health characteristics of adolescents who carry guns to school. **Methods:** We used data from the 2010 Minnesota Student Survey of 9th and 12th graders to examine mental health characteristics of students with self-reported history of gun carrying on school property. Chi-square tests were used to compare students who carried a gun with those who did not. All analyses were conducted separately for boys and girls. **Results:** Among 41,760 males, 1434 (3.4%) reported carrying a gun to school in the last 30 days, while 226 (0.5%) of 42,343 females reported carrying a gun to school in the last 30 days ( $p < .001$ ). Among both male and female students, gun carriers were more likely to report bullying perpetration, physical fighting, a suicide attempt, suicidal ideation, mental health problems that lasted at least 12 months, irritability and anger, being scared, trouble concentrating, trouble sleeping, impulsivity, symptoms of depression, and anxiety than those who did not carry a gun ( $p < .001$  for all comparisons). For example, 42% of boys and 51% of girls who carried a gun reported bullying others vs. 9.6% of boys and 8.9% of girls who did not carry a gun. Among gun-carrying boys, 44% reported physical fighting and 31% reported a suicide attempt vs. 7.0% and 4.3% respectively among non-gun carriers. Among girls who carried guns, 36% reported physical fighting and 43% a suicide attempt vs. 3.1% and 7.5%, respectively, for girls who did not carry a gun. **Conclusion:** Many students who carry guns to school in Minnesota report emotional and behavioral health problems. It is critical that school staff and health providers identify students who carry guns to school and intervene with appropriate mental health and other resources.

**Keywords:** Adolescents, Gun carrying, Mental health

### **1. Introduction**

Firearm violence is a serious threat in the United States. Among adolescents aged 15 to 19, firearms are the second leading cause of death followed only by motor vehicle accidents<sup>1</sup>. Gun carrying by adolescents is an important risk factor for youth gun violence. There have been recent incidents in the United States that have highlighted public concern for weapon carrying by adolescents. Events like the Sandy Hook Shooting in Newton, Connecticut that

resulted in the death of 20 children in December 2013 heightens the public health concern of weapon carrying among young population.

Past research has shown that there are various factors associated with weapon carrying including poverty, education, and community factors, among others<sup>1,2,3,5,6,7</sup>. In a secondary data analysis of 2005 United States Youth Risk Behavior Surveillance System Survey, Muula, Rudatsikira and Siziya found that various individual psychological attributes like depression, having been threatened or injured with a weapon on a school property, and having been raped are related to carrying a weapon<sup>2</sup>.

In a related study reported by Simon, Richardson, Dent, Chou, and Flay, psychosocial variables like risk taking, stress, and temper were seen to be predictive of handgun carrying among 9th and 12th grade students. These authors found that boys who were teased during 9th grade were more likely to report carrying a handgun in 12<sup>th</sup> grade<sup>3</sup>.

Although there are studies that sought to identify factors associated with gun carrying among adolescents, we found that none look specifically at mental health characteristics from the Minnesota Student Survey (MSS) 2010.

We chose to study mental health characteristics because previous research shows individual level attributes like mental health to be associated with weapon bearing on school property<sup>2</sup>. We identified a gap in current literature and hence sought to identify emotional and behavioral health characteristics of adolescents who carry guns in schools in Minnesota. We assessed the association between 16 variables and carrying a gun to school for male and female students. These variables were chosen based on findings from previous studies, which pointed at their associations with weapon carrying. The variables were bullying perpetration; bullying victimization; suicidal ideation; suicide attempt; physical fighting; mental health problems treated within 12 months; mental health problems lasted at least 12 months; irritable and angry; easily scared; trouble concentrating; troubling sleeping and staying asleep; impulsive; unhappy, depressed or tearful; sadness; discouraged or hopeless; and anxious. All the analyses were stratified by gender. The findings from this study might assist in intervention to reduce gun violence among adolescents.

## 2. Methodology

### 2.1 About The Minnesota Student Survey

This study was based on secondary data analysis from the 2010 Minnesota Student Survey (MSS), an adolescent health survey conducted by Minnesota Department of Education, Health, Human Services and Public Safety every three years. The survey is distributed to a representative sample of 6<sup>th</sup>, 9<sup>th</sup>, and 12<sup>th</sup> grade students in public, charter, tribal, and alternative schools, and in Area Learning Centers and juvenile correctional facilities in Minnesota. In 2010, 296 public school districts in Minnesota volunteered to participate in this anonymous survey (88% of public operating school districts). Seventy nine percent of all public school 6<sup>th</sup> graders, 75% of all public school 9<sup>th</sup> graders, and 59% of all public school 12<sup>th</sup> graders participated in the survey. This represents the 71% of all public school enrollments.

This statewide epidemiological survey examines alcohol, drug and tobacco use, dietary behaviors, physical activity, sexual behaviors, mental health issues, and other topics. Some of the questions, including the one related to gun carrying, inappropriate for younger students were opted out for 6<sup>th</sup> graders; hence they had a shorter survey than 9<sup>th</sup> and 12<sup>th</sup> graders<sup>4</sup>.

### 2.2 Measures

All the questions asked in the 2010 MSS are reported by the Minnesota Department of Health. However, we considered only a few questions that pertained to our study. Following are some of the questions we focused on. Regarding weapon carrying, our question of interest was: "During the last 30 days, on how many days did you carry a gun on school property?" For behavioral problems, some of the questions we considered were: "During the last 30 days, how often have you, on your own or as part of a group, made fun of or teased another student in a hurtful way or excluded another student from friends or activities?" "During the last 30 days how often has another student or group of students made fun of or teased you in a hurtful way, or excluded you from friends or activities?" "Have you ever tried to kill yourself?" "During the last 12 months, how often have you hit or beat up another person?" Following are a few questions we considered for emotional/mental health problems: "Have you ever thought about killing yourself?" "Have you ever been treated for a mental or emotional health problem?" "During the last 30 days, have you felt sad?" "During the last 30 days, have you felt so discouraged or hopeless that you wondered if anything

was worthwhile?” A response to each of the question was dichotomized to yes or no. For example, if the participant reported carrying a gun on school property 1 or more days in the last month, we deemed the response a “yes”, while not carrying a gun was considered a “no”.

Our study was approved by the Institutional Review Board of the University of Minnesota.

## 2.3 Statistical Analysis

In order to assess the frequency of behavioral events and the frequency of emotional events, we computed Chi-Squared analyses of demographic variables like gender (male vs. female), grade in school (9<sup>th</sup> vs. 12 grade), race (white; American Indian; black, African or African American; Mexican American or Chicano-Chicana; Puerto Rican or other Latin American; Asian American, or Pacific Islander; don’t know) recipient of free or reduced price lunch (received vs. did not receive), and area of residence (Twin Cities metropolitan area vs. greater Minnesota). Twin cities metropolitan area represents Minneapolis, St. Paul and the surrounding suburban areas (so the two largest cities in Minnesota, which are adjoining, and surrounding counties), whereas Greater Minnesota represents the rest of the State, which is less urbanized. We computed descriptive statistics and bivariate analysis comparing gun possession (yes/no) in relation to demographics, and behavioral and emotional health variables (suicidal ideation, suicide attempt, physical fighting, easily scared, discouraged or hopeless, impulsive, etc.) The primary method of statistical analysis was Chi-square tests by using SPSS software. Chi-square test was used to determine whether there was a significant association between each emotional/behavioral health variable and the gun-carrying variable. P-values for each variable were also assessed.

## 3. Data

### 3.1 Characteristics Of Study Participants

We analyzed the data of 84,103 students who participated in the survey. 49.5% of the participants were males, 43.3% were 9<sup>th</sup> graders, 80.3% were white youth, 24.6% youth received free or reduced price lunch, and 53.3% were residents of Twin cities metropolitan area.

### 3.2 Demographics Of Students Carrying On School Property

Of the 84,103 participants, 3.4% of the males, and 0.5% of the females reported carrying a gun to school in the last 30 days ( $p\text{-value} < 0.001$ ). Of all the gun carriers, majority was 12<sup>th</sup> grade students (53.7%) compared to 9<sup>th</sup> grade students (46.3%). There was no significant difference in gun carrying between students from the Twin Cities metro area and greater Minnesota, as well as those who received free or reduced lunch, and those who did not. Majority of the gun carriers (61.3%) identified themselves as whites.

Table 1. Comparison Of Females Vs. Males Across Different Demographic Variables.

Variables	Total			Females			Males		
	Carried a gun			Carried a gun			Carried a gun		
	Yes N (%)	No N (%)	$\chi^2$ (Sig *)	Yes N (%)	No N (%)	$\chi^2$ (Sig *)	Yes N (%)	No N (%)	$\chi^2$ (Sig *)
<b>Free Lunch</b>	439 (26.8)	20272 (25.1)	2.6	57 (25.4)	10384 (25.1)	.01	382 (27.0)	9888 (25.2)	2.5
<b>Ethnicity: White</b>	992 (61.3)	66555 (82.0)	454.7***	111 (50.5)	34436 (82.7)	157.9***	881 (63.0)	32119 (81.3)	289.8**
<b>American Indian</b>	116 (7.2)	3371 (4.2)	35.7***	23 (10.5)	1781 (4.3)	20.3 ***	93 (6.6)	1590 (4.0)	23.6***
<b>Black, African, African American</b>	151 (9.2)	6763 (8.4)	1.4	24 (10.8)	4068 (9.9)	.2	127 (8.9)	2695 (6.8)	9.7**
<b>Mexican American, Chicana-Chicano</b>	133 (8.2)	3349 (4.1)	65.8***	21 (9.5)	1746 (4.2)	15.5***	112 (8.0)	1603 (4.1)	52.5***
<b>Peurto Rican or other Latin American</b>	60 (3.7)	1355 (1.7)	39.2***	12 (5.5)	722 (1.7)	17.6***	48 (3.4)	633 (1.6)	27.6***
<b>Asian American, or Pacific Islander</b>	124 (7.7)	5328 (6.6)	3.1	15 (6.8)	2790 (6.7)	.01	109 (7.8)	2538 (6.4)	4.2*
<b>Don't know</b>	146 (9.0)	1916 (2.4)	289.6***	32 (14.5)	804 (1.9)	177.9***	114 (8.1)	1112 (2.8)	132.3***

Key: p&lt;.001\*\*\* p&lt;.01\*\* p&lt;.05\*

Table 2. Comparison Of Females Vs. Males Across Two Demographic Variables: Grade And Region.

Demographic variables	Variables	Total		Females		Males	
		Carried a gun		Carried a gun		Carried a gun	
		Yes N (%)	No N (%)	Yes N (%)	No N (%)	Yes N (%)	No N (%)
<b>Grade</b>	<b>12<sup>th</sup> grade</b>	892 (53.7)	46794 (56.75)	96 (42.5)	18380 (43.6)	796 (55.5)	35938 (43.5)
	<b>9<sup>th</sup> grade</b>	769 (46.3)	35648 (43.24)	129 (57.5)	23738 (56.3)	638 (44.5)	46749 (56.5)
<b>Region</b>	<b>Twin Cities Metro</b>	917 (55.2)	43909 (52.2)	134 (59.3)	23015 (55.5)	783 (54.6)	21000 (52)
	<b>Greater Minnesota</b>	744 (44.8)	40193 (47.8)	92 (40.7)	18389 (44.4)	651 (45.4)	19326 (48)

### 3.3. Factors Associated With Carrying A Gun On School Property: Bivariate Analysis

We found that adolescents who carry guns to school in Minnesota have higher incidence of behavioral and emotional health problems compared to those who do not carry a gun. Forty two percent of boys and 51% of girls who carried a gun reported bullying others vs. 9.6% of boys and 8.9% of girls who did not carry a gun. Among gun-carrying boys, 44% reported physical fighting and 31% reported a suicide attempt vs. 7.0% and 4.3%, respectively, among non-gun carriers. Among girls who carried guns, 36% reported physical fighting and 43% a suicide attempt vs. 3.1% and 7.5%, respectively, for girls who did not carry a gun. Similar significant differences between gun carries and non-carriers were found in emotional health characteristic variables: suicidal ideation, mental health

problems that lasted at least 12 months, irritability and anger, being scared, trouble concentrating, trouble sleeping, impulsivity, symptoms of depression, and anxiety ( $p < 0.001$  for all comparisons).

Table 3. Behavioral Health Characteristics Of Males And Females Who Do And Do Not Carry A Gun To School.

Type of health characteristic	Variables	Females			Males		
		Carried a gun			Carried a gun		
		Yes N (%)	No N (%)	$\chi^2$ (Sig *)	Yes N (%)	No N (%)	$\chi^2$ (Sig *)
Behavioral	Bullying Perpetration	113 (51.1)	3710 (8.9)	473.5***	599 (42.3)	3793 (9.6)	1537.1 ***
	Bullying Victimization	18 (8.0)	4320 (10.3)	1.3	177 (12.4)	4221 (10.6)	4.4*
	Suicide Attempts	86 (42.8)	3040 (7.5)	349.1***	362 (30.7)	1683 (4.3)	1559.1***
	Physical Fighting	73 (35.6)	1263 (3.1)	677.4***	538 (43.9)	2634 (7.0)	2149.9***

Key:  $p < .001$  \*\*\*  $p < .01$  \*\*  $p < .05$  \*

Table 4. emotional health characteristics of males and females who do and do not carry a gun to school.

Type of health characteristic	Variables	Females			Males		
		Yes N (%)	No N (%)	$\chi^2$ (Sig *)	Yes N (%)	No N (%)	$\chi^2$ (Sig *)
Emotional	Mental Health Problems Treated within 12 months	85 (39.2)	5916 (14.3)	107.9***	354 (26.6)	3864 (19.9)	381.6***
	Suicidal Ideation	120 (60.0)	11250 (27.9)	101.6***	623 (52.8)	6945 (18.6)	598.4***
	Mental Health Problems Lasted at least 12 months	25 (11.3)	4395 (10.7)	.1	157 (11.1)	4320 (11.0)	.01
	Irritable and Angry	116 (58.0)	11595 (28.5)	84.8***	603 (50.61)	8200 (21.7)	552.3
	Easily Scared	93 (47.4)	9604 (23.6)	61.0***	303 (25.7)	2960 (7.8)	472.6***
	Trouble Concentrating	111 (56.3)	16344 (40.4)	20.7 ***	663 (56.2)	13612 (36.3)	194.9***
	Trouble Sleeping and Staying Asleep	113 (56.5)	13340 (32.9)	50.0***	564 (47.7)	10102 (26.9)	248.5***
	Doing Things Before Thinking (Impulsive)	126 (64.3)	16093 (39.9)	48.4***	630 (53.8)	14271 (38.1)	118.0***

	<b>Unhappy, Depressed or Tearful</b>	84 (43.3)	8122 (20.1)	64.7***	410 (35.1)	4706 (12.6)	501.3***
	<b>Sadness</b>	83 (39.9)	6379 (15.6)	92.4***	398 (32.0)	3183 (8.4)	813.2***
	<b>Discouraged or Hopeless</b>	49 (21.8)	10485 (25.2)	1.4	358 (25.1)	10012 (25.3)	.03
	<b>Nervous, Worried or Upset (Anxious)</b>	90 (43.9)	6653 (16.3)	113.0***	443 (36.3)	3513 (9.3)	949.0***

Key: p<.001\*\*\* p<.01\*\* p<.05\*

## 4. Discussion

This study was conducted to examine the relationship between gun carrying at school and a broad array of emotional and behavioral problems in a large statewide student population. Through the Minnesota Student Survey 2010, we found that approximately 1,661 (1.97%) carried a gun on a school property in the last 30 days preceding the survey. We found that more than half of the female gun carriers reported bullying someone; which is six folds higher than their non-gun carrying peers. We found similar results for males as well. Four times as many gun-carrying males reported bullying someone than non-gun carriers. We also found that gun carrying males and females are more likely to be involved in physical fighting than their non gun carrying counterparts. We noticed similar patterns in emotional health characteristics. Twice as many female gun carriers than non-gun carriers reported thinking about committing suicide. Similar pattern were observed for males; almost three times as many gun-carrying males than non-gun carriers reported suicidal ideation. We observed similar differences in emotional and behavioral health problems across other variables as well, including mental health problems that lasted at least 12 months, irritability and anger, being easily scared, trouble concentrating, trouble sleeping, impulsivity, symptoms of depression, and anxiety.

Our conclusions are consistent with the literature. For example, a secondary data analysis of United States Youth Risk Behavior Surveillance System Survey by Muula *et. al* found that variables like depression and suicidal ideation were positively associated with weapon carrying at school<sup>2</sup>. Another study by DuRant *et. al* found that physical fighting was positively associated with weapon carrying in school property<sup>5</sup>. Meta analysis by conducted by Geel *et. al* found involvement in bullying to be related to gun carrying<sup>6</sup>. The reason for the emotional and behavioral health characteristics to be associated with gun carrying could be the rate of antisocial activity. Cunningham *et. al* found that rate of gun ownership; either for sporting reasons, or for personal safety or to frighten others was strongly associated with the rates of antisocial activity<sup>7</sup>. Such antisocial activity could induce emotional and behavioral health problems.

There were notable sex differences with regard to prevalence of emotional and behavioral issues like bullying perpetration, impulsivity, anxiety, physical fighting, among others. More males, reported being involved in physical fighting than compared to females (43.9% versus 35.6%). However, higher percentage of female gun carriers attempted suicide (42.8%) compared to the males (30.7%). These differences may reflect dissimilarities in the mental health issues between males and females.

There are some limitations to the study. First, this research was based on self-reports, which could include misreports by participants. Even though the survey is anonymous, some adolescents might not be comfortable mentioning if they carry a gun. Second, this is a cross-sectional study; hence no causal arguments can be made. We can only make conclusions about correlations. Lastly, we might not be able to generalize the results to all the students in the United States as the survey included only the students from Minnesota.

## 5. Conclusion

Many students who carry guns to school in Minnesota report emotional and behavioral health problems. Youth with gun possession are more likely to have been bullying perpetrators, impulsive, irritable and angry, etc. It is critical

that school staff and health providers identify students who carry guns to school and intervene with appropriate mental health and other resources.

This study might be useful in designing intervention programs that are aimed at providing mental and behavioral health services to adolescents who are at risk of gun carrying. Further research could involve identifying substance abuse, and history of physical harm as potential correlates of gun carrying. Qualitative research that involves focus groups could provide us with a more comprehensive understanding of various factors unfathomed by the Minnesota Student Survey. Longitudinal studies might also suggest some causal factors associated with gun carrying.

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## 7. References

1. Bergstein J.M., David Hemenway, Bruce Kennedy, Sher Quaday, and Roseanne Ander, "Guns in young hands: A survey of urban teenagers' attitudes and behaviors related to handgun violence," *The Journal of Trauma* 41:5 (November 1996): 794-8.
2. Muula AS, Emmanuel Rudatsikira, and Seter Siziya, "Correlates of weapon carrying among high school students in the United States," *Annals of General Psychiatry* 7:8 (July 2008), [http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2467418/#\\_ffn\\_sectitle](http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2467418/#_ffn_sectitle).
3. Simon TR, Jean L. Richardson, Clyde W. Dent, Chih-Ping Chou, and Brian R. Flay, "Prospective Psychosocial, Interpersonal, and Behavioral Predictors of Handgun Carrying among adolescents," *American Journal of Public Health* 88:6 (June 1998), <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1508214/>
4. Minnesota Department of Health, "2010 Minnesota Student Survey Statewide Tables", 2010, <http://www.health.state.mn.us/divs/chs/mss/statewidetables/mss10statetablesfinal.pdf>.
5. DuRant RH, Jefferey Kahn, Patricia Hayden Beckford, and Elizabeth Woods, "The association of weapon-carrying and fighting on school property and other health risk and problem behaviors among high school students," *Archives of Pediatrics Adolescent Medicine* 151 (April 1997): 360-6, <http://archpedi.jamanetwork.com/article.aspx?articleid=518324>.
6. Mitch van Geel, Paul Vedder, and Jenny Tanilon, "Bullying and Weapon Carrying, A Meta-analysis," *JAMA Pediatrics* 2014.213 (June 2014), <http://archpedi.jamanetwork.com/article.aspx?articleid=1879724>.
7. Cunningham R, Maureen Walton, Michael Trowbridge, Jim Weber, Ryan Outman, Andy Benway, and Ronald Maio, "Correlates of violent behavior among adolescents presenting to an urban emergency department," *JAMA Pediatrics* 149 (2006): 770-6, <http://www.ncbi.nlm.nih.gov/pubmed/17137890>.