Characteristics of School Safety and ACT Test Performance

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Unsafe schools can negatively impact students' wellbeing and educational success. In an introduction to their edited book on school safety and violence prevention, Mayer and Jimerson[1] describe research indicating that there may be multiple short- and long-term detrimental effects on students who experience school violence, disruption, and bullying. These include such things as increased anxiety, cognitive processing difficulty, reduced motivation and attention, health issues, learning problems, and lower academic performance as measured by grade point average, standardized test scores, and graduation rates.

This study focuses on one of the potential effects of unsafe schools, decreased standardized test scores. Recent evidence that standardized test scores can be negatively affected in unsafe schools was provided in a large-scale analysis of student survey and education record data from more than 700 New York City middle schools.[2] That analysis found that students who reported feeling unsafe in the classroom earned lower standardized test scores than did students who reported feeling safe. Moreover, students who reported that they stayed home due to feeling unsafe earned even lower test scores, indicating the presence of both direct (i.e., feeling unsafe) and indirect (i.e., increased absences) negative effects on academic achievement.

Safe schools, in comparison, appear to make a difference even in unsafe neighborhoods. Research suggests that school climates that are positive and provide students with a place where they can feel insulated from neighborhood violence are associated with positive learning outcomes.[3] It was found that students who attended such schools earned higher English language arts standardized test scores than did students who attended schools viewed as less safe or as having a relatively weak sense of community.

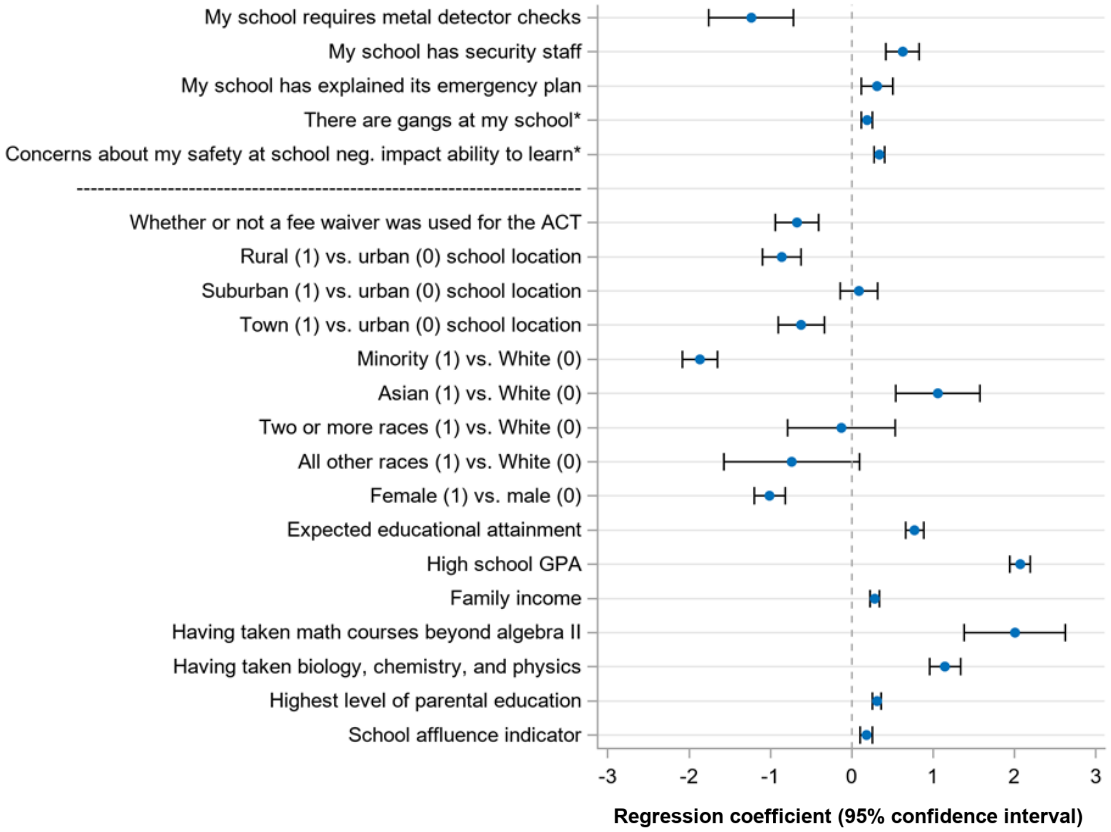
It is likely that performance on the ACT® test is related, to some extent, to students' perceptions of safety at school. This study sought to quantify that relationship, with the goal of providing insights for schools, by surveying a large sample of high school students who took the ACT and asking them questions about the safety of their schools. A total of 14,903 of these students responded to the survey.[4]

Key Findings

After statistically controlling for student background characteristics via multiple linear regression, it was found that several school safety characteristics were related to performance on the ACT test. Equally noteworthy is that a larger number of school safety characteristics were found **not** to be related to ACT performance.

In particular, it was found that not requiring metal detector checks before entering the school building each day, having school security staff, explaining school building-wide emergency plans to students, having a perceived low presence of gangs at school, and having low concerns about safety at school negatively impacting students' ability to learn were all **positively related** to performance on the ACT (See Figure 1; additional information about the first three of these characteristics is provided in Figure 2). Characteristics that were **unrelated** to ACT test performance include, for example, the extent to which students feel welcome and safe at school; teachers' ability to manage out-of-control students; and whether schools are locked during school hours, have security cameras, and provide mental health services for students.[5]

Figure 1. Weighted, Unstandardized Regression Coefficients for Modeling ACT Composite Score as a Function of School Safety and Student Background Characteristics (Final Model)



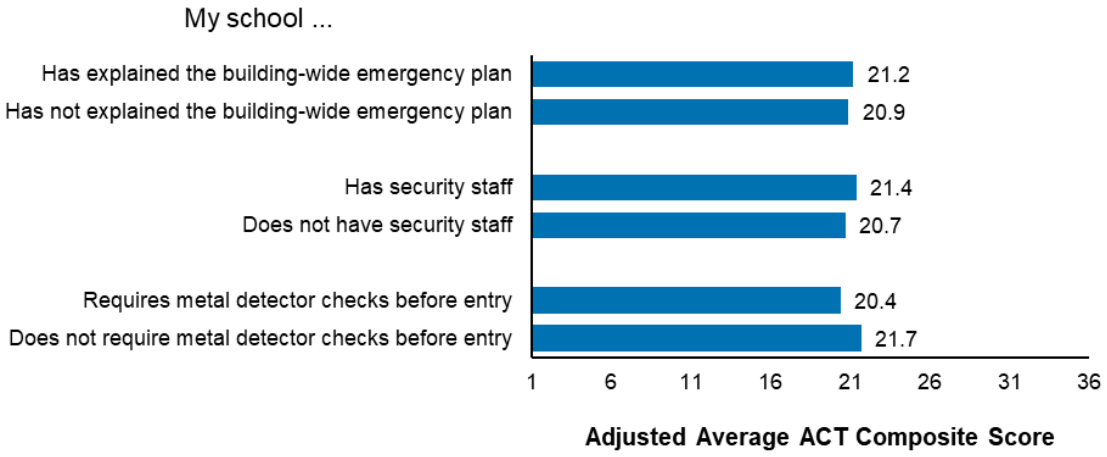
Note. The dashed line in Figure 1 separates the school safety characteristic regression coefficients from the student background characteristic regression coefficients. The regression coefficients are not intended to indicate the relative importance of any of the characteristics, but they do indicate the direction of the relationship with ACT Composite score. For example, requiring school metal detector checks has a negative regression coefficient (-1.24) and was therefore associated with an average decrease of 1.24 ACT Composite score points, while statistically controlling for other student and school safety characteristics.

*These survey items were reverse-coded for analysis purposes.

Note the positive regression coefficient for the gang activity characteristic. This particular survey item was reverse coded for analysis purposes, so that higher values were assigned when students disagreed with the statement "there are gangs at my school," and lower values were assigned when they agreed. The positive regression coefficient therefore indicates that less gang activity (i.e., students generally disagreeing with the statement) was associated with an average **increase** in ACT Composite score. The item about safety concerns negatively impacting ability to learn was also reverse-coded. Table 1 in the Technical Appendix provides additional information about the coding of the survey items.

The first three safety characteristics depicted in Figure 1 (metal detector checks, security staff, and an emergency plan that is explained to students) differ from the others in that students were asked to indicate whether these characteristics were present or not at their schools, rather than to agree or disagree with statements about the characteristics. This allows for an estimation of the effect on ACT test performance when the characteristics are present, compared to the effect when they are not. Further analysis revealed that students attending high schools that have a building-wide emergency plan that was explained to the students, school security staff, and do **not** require metal detector checks before entering the building each day were likely to experience somewhat higher average performance on the ACT, compared to students attending high schools without these characteristics (Figure 2).

Figure 2. School Safety Characteristics and Average ACT Test Performance



These findings apply irrespective of students' race/ethnicity, gender, family income, expected educational attainment, and high school grade point average; whether a fee waiver was used for the ACT test or not; geographical area in which students' schools are located (e.g., rural, urban); the level of affluence of their schools[6]; whether math courses beyond algebra II were taken or not; whether biology, chemistry, and physics were taken or not; highest level of education achieved by a parent/guardian; and additional characteristics, such as students' perspectives on the presence of gangs at their schools and whether or not concerns about their safety at school negatively impacted their ability to learn.[7] All these student and school characteristics were statistically controlled in this study.

Discussion

Building on prior work in this area, this study found that students' perceptions of school safety for several of the characteristics examined were positively related to academic achievement, as measured by standardized test scores. However, the results were nuanced in that some characteristics of school safety showed no substantive relationship with ACT performance. For schools that are considering implementing and/or changing safety characteristics, this finding is especially important to keep in mind. In addition, even though a particular safety characteristic may have been found in this study to be related to ACT performance, consideration of several factors should precede a school's implementation or changing of that characteristic.

For example, should schools that do not have an emergency plan that has been explained to students, do not have school security staff, or do require metal detector checks before entering the building each day implement and/or change one or more of these characteristics to try to improve students' performance on the ACT? Not necessarily.

This study focused on the relationship of school safety characteristics to ACT Composite score. However, there are almost certainly other aspects of the student experience, besides ACT test performance, that should be considered before implementing or changing any safety characteristics. Moreover, students will likely have differing opinions of the usefulness of such safety measures as school security staff and metal detector checks. Students' widely varying perspectives on school safety measures prompted Croft, Moore, and Guffy[8] to recommend that policymakers ensure the collection and use of student input when deliberating the implementation of such measures.

The implementation of school security staff may require particularly careful forethought, given recent research indicating that increasing school resource officers is associated with immediate increases in weapon- and drug-related offenses, which persist for 20 months after the resource officer increase occurs.[9] Moreover, the quality of security staff may vary, at least from the perspective of students. When examining student responses to an open-ended question about the safety of their schools, Moore, Croft, and Heisdorf[10] observed that some students were concerned about security staff members' lack of preparation for an emergency, lack of professional security training, and distractions from focusing on student safety as a result of other responsibilities, such as teaching courses. Other students, in comparison, described positive experiences with security staff quality, including their ability to make students feel safe and welcome. It is important to keep in mind that the survey instrument in the present study, which was also used in the Moore et al. (2020) study, asked not about school resource officers but about "security staff," which could be broadly defined from the perspective of students and may or may not include school resource officers.

Although the observed differences in average ACT Composite score in this study indicate a relationship with school safety characteristics, they do not provide evidence of causality. For example, although larger average adjusted ACT Composite scores occurred for students in schools that have safety staff, compared with students in those that do not, the presence of school safety staff was not demonstrated in this study to **cause** the larger scores.

It is interesting that requiring daily metal detector checks prior to entering the school building was associated with a decrease in ACT Composite score, on average. This finding could be related to the decreased perception of school safety associated with the presence of metal detectors observed in some studies (for example, see: Perumean-Chaney and Sutton[11]; and Hankin, Hertz, and Simon[12]).

It is possible that unobserved factors might be related to some of this study's observed effects. For example, school factors that were not addressed in the survey and therefore were not included in the analyses could be related to the observed negative association between daily metal detector checks and ACT performance.

Before deciding to either change existing school safety characteristics or implement new ones, schools are strongly encouraged to collect their own data and to draw their own conclusions about relationships between school safety characteristics and performance on the ACT. Although some school-level data were analyzed in this study and used for statistical control purposes, there are likely other, local data that schools may wish to incorporate in their own analyses. The use of such local data could result in findings that differ from those observed in this study.

Technical Appendix

The Survey and the Student Sample

In October 2018, ACT researchers surveyed a sample of approximately 95,000 students in grades 10-12 who had registered to take the National ACT test. The purpose of the survey was to gauge students' perception of the physical safety of their schools. The sample was stratified on gender, race/ethnicity, and school geographical area (urban, suburban, rural, town), resulting in 50 strata. Simple random sampling was performed within each stratum. In general, the number of students sampled from a particular stratum was disproportional to the number in the target population for that stratum. This was done intentionally to ensure that the number of respondents in each stratum was sufficient for subgroup analyses. For example, researchers might want to compare the survey responses of female, Hispanic students from suburban areas with those of female, Hispanic students from urban areas. Croft et al. (2019) provide a report of students' perceptions of physical safety at school based on the data from this survey, with some findings disaggregated by the demographic variables mentioned above.

Approximately 16,000 students completed the school physical safety survey. Some of these students did not actually take the ACT test, even though they were registered to do so. A total of 14,903 students completed the survey and took the test.

Data

The survey responses of each student were combined with their ACT test record and registration data, which include test scores and self-reported background characteristics. In addition, school-level data (e.g., school geographic area and enrollment counts) from MDR's education database were appended to student records. (MDR is a division of Dun & Bradstreet specializing in education data.) Standard statistical methods for imputing missing values were used to ensure that data from all 14,903 students were represented in the analysis.

Multiple Linear Regression

Multiple linear regression was used to model ACT Composite score as a function of student background characteristics and survey response data (Table 1). The regression analyses incorporated features of the complex sampling design described above, including sampling weights that adjusted for disproportional sampling within strata.

Table 1. Student Background Characteristics and Items from Physical Safety Survey Instrument

Student Background Characteristics (primarily self-reported, collected when students register for the ACT test)	Items from Physical Safety Survey Instrument†
• Race/ethnicity*	1. I feel welcomed at my school
• Gender*	2. Theft doesn't happen much at my school
• Grade level	3. My school has rules that keep people safe
• Expected educational attainment*	4. I feel safe at school
• Having taken math courses beyond algebra II*	5. Teachers are able to manage students who get out of control
• Having taken biology, chemistry, and physics*	6. People rarely get physically hurt at my school
• Highest level of parental education*	7. None of the students at my school carry weapons
• Family income*	8. Students at my school don't get in trouble with the law
• High school GPA*	9. Students treat the teachers with respect at my school
• Geographical area of school (e.g., urban, rural)^*	10. There are gangs at my school*
• Whether or not a fee waiver was used for the ACT*	11. School classrooms and hallways are clean
• School affluence indicator^^*	12. I feel safe traveling between home and my school
• School enrollment^	13. Students from various racial/ethnic backgrounds get along well with each other at my school
• School poverty level^	14. Students of different sexual orientations get along well with each other at my school
• School type (public, private)^	15. Concerns about my safety at school negatively impact my ability to learn*
• School per-pupil expenditure^	16. My school requires metal detector checks before entering the building each day*
• ACT Composite score (dependent variable)*	17. My school is locked during school hours
	18. My school has security cameras inside the school
	19. My school has security cameras outside the school
	20. My school has security staff*
	21. My school only allows students to carry clear/see-through book bags
	22. My school has explained to me our building-wide emergency plan*
	23. My school provides mental health services for students who need them

†Scale for Items 1-15: 6=strongly agree, 5=agree, 4=somewhat agree, 3=somewhat disagree, 2=disagree, 1=strongly disagree (scale is reversed numerically for items 10 and 15). For Items 16-23, students indicated which of the school safety elements pertained to them.

*Included in final regression model

^Obtained from MDR

^^Obtained from MDR; this variable is based on a proprietary algorithm incorporating various data points, including census data, to rank the socioeconomic status of a school.

A total of 23 items pertaining to students' perception of physical safety in school were examined in regression models. Using standard methods for determining whether to include an independent variable in a regression model (e.g., statistical significance, degree of multicollinearity), 5 of the 23 items were identified for inclusion in the final model.

Descriptive statistics for the student background characteristics and physical safety items included in the final regression model are provided in Table 2, and corresponding regression statistics are provided in Table 3.

Table 2. Descriptive Statistics for Student Background Characteristics and School Physical Safety Items

Characteristic/Item	Weighted Percent (or Mean)	Weighted *N*
Race/Ethnicity		
American Indian/Alaska Native	0.9%	130
Asian	5.7%	847
Black/African American	14.8%	2,204
Hispanic/Latino	18.7%	2,786
Native Hawaiian/Other Pacific Islander	0.1%	19
White	51.3%	7,645
Two or more races	5.2%	780
Prefer not to respond	3.3%	493
Gender		
Female	59.4%	8,857
Male	40.6%	6,046
Expected Educational Attainment		
Business/technical school or certificate program	0.7%	111
Associate degree	2.2%	321
Bachelor's degree	47.9%	7,131
One or 2 years of graduate study (MA, MBA, etc.)	19.4%	2,888
Doctorate or professional degree (PhD, MD, JD, etc.)	29.9%	4,452
Having Taken Math Courses Beyond Algebra II		
No	1.5%	230
Yes	98.5%	14,673
Having Taken Biology, Chemistry, and Physics		
No	61.8%	9,212
Yes	38.2%	5,691

Table 2. Descriptive Statistics for Student Background Characteristics and School Physical Safety Items—continued

Characteristic/Item	Weighted Percent (or Mean)	Weighted *N*
Highest Level of Parental Education		
Less than high school	6.1%	913
High school graduate/GED	13.5%	2,010
Business/technical school or certificate program	3.0%	451
Some college, no degree or certificate	11.0%	1,636
Associate degree	9.5%	1,412
Bachelor's degree	28.7%	4,283
One or 2 years of graduate study (MA, MBA, etc.)	18.6%	2,771
Doctorate or professional degree (PhD, MD, JD, etc.)	9.6%	1,428
Family Income		
Less than $24,000	14.3%	2,136
About $24,000 to $36,000	12.2%	1,818
About $36,000 to $50,000	11.0%	1,638
About $50,000 to $60,000	7.6%	1,136
About $60,000 to $80,000	11.3%	1,690
About $80,000 to $100,000	10.6%	1,579
About $100,000 to $120,000	10.2%	1,527
About $120,000 to $150,000	8.0%	1,200
More than $150,000	14.6%	2,180
High School GPA		
(D- to D) 0.5–0.9 or lower	0.0%	7
(D to C-) 1.0–1.4	0.1%	19
(C- to C) 1.5–1.9	0.6%	91
(C to B-) 2.0–2.4	2.5%	372
(B- to B) 2.5–2.9	7.9%	1,183
(B to B+) 3.0–3.4	22.0%	3,276
(A- to A) 3.5–4.0 or higher	66.8%	9,954
Geographical Area of School		
Rural	15.2%	2,271
Suburban	36.7%	5,465
Town	19.5%	2,903
Urban	28.6%	4,265
School Affluence Indicator		
Low	19.6%	2,918
Below Average	19.6%	2,927
Average	20.7%	3,088
Above Average	21.1%	3,136
High	19.0%	2,834

Table 2. Descriptive Statistics for Student Background Characteristics and School Physical Safety Items—continued

Characteristic/Item	Weighted Percent (or Mean)	Weighted *N*
Fee Waiver Used for the ACT		
No	69.2%	10,310
Yes	30.8%	4,593
There Are Gangs at My School		
Strongly Disagree	35.6%	5,306
Disagree	31.0%	4,620
Somewhat Disagree	12.3%	1,835
Somewhat Agree	11.7%	1,736
Agree	6.1%	907
Strongly Agree	3.3%	498
Concerns About My Safety at School Negatively Impact My Ability to Learn		
Strongly Disagree	28.5%	4,240
Disagree	35.8%	5,339
Somewhat Disagree	13.0%	1,943
Somewhat Agree	11.8%	1,751
Agree	7.3%	1,084
Strongly Agree	3.7%	546
My School Requires Metal Detector Checks Before Entering the Building Each Day		
No	96.7%	14,412
Yes	3.3%	491
My School Has Security Staff		
No	32.1%	4,788
Yes	67.9%	10,115
My School Has Explained to Me Our Building-Wide Emergency Plan		
No	34.6%	5,154
Yes	65.4%	9,748
ACT Composite Score (Mean)	22.8	14,903

Note. Each percentage in this table is a weighted percentage, averaged over all 20 imputations. Similarly, the *n*-counts corresponding to each of the percentages are weighted *n*-counts averaged over all imputations. Due to rounding, the weighted percentages for some background characteristics might not sum to 100%, and the weighted *n*-counts might not sum to 14,903.

Table 3. Weighted Regression Statistics for Modeling ACT Composite Score as a Function of Student Background Characteristics and Survey Response Data (Final Model)

Independent Variable	Unstandardized Regression Coefficent	Std. Error	*t*
Intercept	-0.89	0.55	-1.62
Fee Waiver Used for the ACT	-0.67	0.14	-4.91
Rural (1) vs. Urban (0) School Location	-0.86	0.12	-7.10
Suburban (1) vs. Urban (0) School Location	0.09	0.12	0.77*
Town (1) vs. Urban (0) School Location	-0.62	0.14	-4.31
Minority (1) vs. White (0)	-1.87	0.11	-16.98
Asian (1) vs. White (0)	1.06	0.27	3.99
Two or More Races (1) vs. White (0)	-0.13	0.34	-0.38*
All Other Races (1) vs. White (0)	-0.74	0.42	-1.74*
School Requires Metal Detector Checks (1=selected, 0=not selected)	-1.24	0.27	-4.66
School Has Security Staff (1=selected, 0=not selected)	0.63	0.10	6.01
School Has Explained its Emergency Plan (1=selected, 0=not selected)	0.31	0.10	3.14
There are Gangs at my School	0.19	0.03	5.45
Concerns About my Safety at School Negatively Impact my Ability to Learn	0.34	0.03	10.01
Female (1) vs. Male (0)	-1.01	0.10	-10.25
Expected Educational Attainment	0.77	0.06	13.37
High School GPA	2.07	0.06	31.98
Family Income	0.28	0.03	10.14
Having Taken Math Courses Beyond Algebra II (1=yes, 0=no)	2.00	0.32	6.29
Having Taken Biology, Chemistry, and Physics (1=yes, 0=no)	1.15	0.10	11.74
Highest Level of Parental Education	0.31	0.03	11.29
Affluence Indicator	0.18	0.04	4.78

*Although these variables were not statistically significant (*p*-values of 0.71 for two or more races vs. White, 0.08 for all other races vs. White, and 0.44 for suburban vs. urban), they were part of two series representing racial/ethnic group membership and geographical area of the school and were included for control purposes.

Notes

1. Matthew J. Mayer and Shane R. Jimerson, “The Importance of School Safety and Violence Prevention,” in *School Safety and Violence Prevention: Science, Practice, Policy,* (Washington, DC: American Psychological Association, 2019), pp. 3–14.

2. Johanna Lacoe, “Too Scared to Learn? The Academic Consequences of Feeling Unsafe in the Classroom,” *Urban Education* 55, no. 10 (October 2016): 1–34. doi: 10.1177/0042085916674059.

3. Agustina Laurito, Johanna Lacoe, Amy E. Schwartz, Patrick Sharkey, and Ingrid G. Ellen, “School Climate and the Impact of Neighborhood Crime on Test Scores,” *The Russell Sage Foundation Journal of the Social Sciences* 5, no. 2 (March 2019): 141–166. doi: 10.7758/RSF.2019.5.2.08.

4. Additional information about the survey, student sample, data sources, and statistical methods is provided in the Technical Appendix.

5. Table 1 in the Technical Appendix lists all 23 school safety characteristics that were examined in this study and identifies those that were statistically related to ACT test performance.

6. See Table 1 in the Technical Appendix for a description of the school affluence indicator.

7. See Table 1 in the Technical Appendix for a summary of student background characteristics and items from the physical safety survey instrument.

8. Michelle Croft, Raeal Moore, and Gretchen Guffy, *Creating Safe Schools: Examining Student Perceptions of Their Physical Safety at School*. (Iowa City, IA: ACT, 2019). Retrieved from https://www.act.org/content/dam/act/unsecured/documents/R1767-school-safety-brief.pdf.

9. Denise C. Gottfredson, Scott Crosse, Zhiqun Tang, Erin L. Bauer, Michele A. Harmon, Carol A. Hagen, and Angela D. Greene, “Effects of School Resource Officers on School Crime and Responses to School Crime,” *Criminology and Public Policy* 19, no. 3 (August 2020): 905–940. doi: 10.1111/1745-9133.12512.

10. Raeal Moore, Michelle Croft, and Sarah Heisdorf, *What Do Students Say About School Safety?* (Iowa city, IA: ACT, 2020). Retrieved from https://www.act.org/content/dam/act/unsecured/documents/R1820-physical-safety-in-schools.pdf.

11. Suzanne E. Perumean-Chaney and Lindsay M. Sutton, “Students and Perceived School Safety: The Impact of School Security Measures,” *American Journal of Criminal Justice* 38 (September 2012): 570–588.

12. Abigail Hankin, Marci Hertz, and Thomas Simon, “Impacts of Metal Detector Use in Schools: Insights From 15 Years of Research,” *Journal of School Health* 81, no. 2 (February 2011): 100–106.

Acknowledgements

The author thanks Michelle Croft, Gretchen Guffy, and Raeal Moore for their assistance in designing the survey instrument and collecting the data for this study; and Michelle Croft, Emily Gallenberg, and Krista Mattern for their helpful reviews and suggestions.

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