

# Associations between feelings of safety, concerns about firearms on campus and suicidal thoughts and behaviours among college students

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## ABSTRACT

**Background** Perceptions of safety on campus may be related to a variety of factors such as concerns about campus violence, especially firearm violence, and mental health, particularly suicidal thoughts and behaviours (STBs). The present analyses aim to describe associations between feelings of safety, concerns about firearms on campus and STBs among college students.

**Methods** This study uses data from the American College Health Association—National College Health Assessment wave III (n=24 682 participants across k=29 schools). Multilevel logistic regressions and cumulative link mixed models examine the associations between feelings of safety, concerns about firearm violence on campus and presence of STBs in the past year.

**Results** Participants who reported being concerned about firearm violence felt significantly less safe. Feeling unsafe at night was significantly associated with suicidal ideation and suicide attempts. Individuals with concerns about firearm safety on campus were up to 42% more likely to report suicidal ideation compared with those reporting they were not at all concerned about campus firearm violence.

**Discussion** With associations highlighting increased risk of STBs among those with reduced safety feelings and heightened concerns about firearms, there is a need for college campuses to intervene and promote campus safety, with particular consideration for the presence of firearms on campus and the implications of allowing such weapons to be present in environments with increasing instances of firearm violence.

## INTRODUCTION

College students represent a high-risk group for suicidal thoughts and behaviours (STBs). Data on the health of US college students collected by the American College Health Association (ACHA) through the National College Health Assessment (NCHA) revealed that approximately a quarter of students reported past year suicidal ideation and approximately 9% of students endorsed a suicide attempt in the year prior.<sup>1</sup> Meta-analytic research has highlighted that STBs are particularly common among college students.<sup>2</sup> Moreover, there is a considerable impact of STBs on college students. For instance, research of first-year undergraduates found that a history of suicidal behaviour is associated with worse academic performance.<sup>3</sup>

Some research has examined the role of events that threaten safety, such as domestic violence on STBs<sup>4</sup>; however, there has been limited research on

## WHAT IS ALREADY KNOWN ON THIS TOPIC

- ⇒ College students represent a high-risk group for suicidal thoughts and behaviours (STBs).
- ⇒ Roughly half of suicides in the USA involved a firearm.
- ⇒ There are increasing instances of school-based acts of firearm violence.

## WHAT THIS STUDY ADDS

- ⇒ Feeling unsafe at night was significantly associated with STBs.
- ⇒ Participants who reported being concerned about firearm violence felt significantly less safe.

## HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

- ⇒ Results highlight the importance of campus policies that increase safety.
- ⇒ Campuses should consider the impact of firearm violence on feelings of safety.

the impact of *perceptions* of safety on STBs. This is important to study because perceptions of safety may be a proximal mechanism of how exposure to violence increases risk for STBs and may also be relevant in individuals who have not been exposed to violence. One setting where examining the role of perceptions of safety's effect on suicide risk may be particularly valuable is college campuses. College campuses often act as insular environments, making college students a unique population to consider based on the ability to assess campus safety and broader feelings of safety.

Relevant to suicide risk and feelings of safety is the presence of firearms. Roughly half of suicides in the USA involved a firearm.<sup>5</sup> Regarding feelings of safety, beyond college campuses, some research suggests that Americans are split on whether the presence of firearms confers feelings of safety.<sup>6</sup> Comparatively, investigation into student comfort with firearms at two large universities revealed that most students expressed low levels of comfort with concealed handgun carrying being permitted on campus.<sup>7</sup> Recent research investigating support and opposition towards firearms on campus found that key stakeholders, including students, faculty, campus police and state legislators, were opposed to firearms on campus, whereas white, male and conservative stakeholders were more likely to be in support of campus carry laws.<sup>8</sup>



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**Table 1** Demographics characteristics across wave

Sample size	24 682
Age (years)	23.17 (6.76)
Class year	
First year	18.08%
Second year	16.61%
Third year	22.09%
Fourth year	17.65%
Fifth year	5.75%
Master's student	9.54%
Doctoral student	7.78%
Other	1.70%
Gender	
Woman or female	65.47%
Man or male	30.65%
Trans woman	0.11%
Trans man	0.28%
Agender	0.22%
Non-binary	2.56%
Intersex	0.02%
Another identity	0.44%
Race/ethnicity	
American Indian/Alaska Native	1.90%
Asian	14.13%
Black	6.51%
Hispanic/Latinx	19.22%
Middle Eastern	2.04%
Native Hawaiian	0.65%
White	62.22%
Biracial/multiracial	4.86%
Another identity	1.77%
US geographical areas	
Northeast	5.53%
Midwest	16.79%
South	41.92%
West	35.00%

Race categories add up to greater than 100% due to the option to select multiple.

With increasing instances of school-based acts of firearm violence,<sup>9</sup> there is also increasing concern regarding the impact of these experiences on student populations and the general impact of firearm presence on students. There is a need to investigate the extent to which feelings of safety relate to concerns about firearms and how such feelings and concerns impact one's mental health—in particular, STBs. Leveraging ACHA-NCHA data, the present analyses aim to describe associations between feelings of safety, concerns about firearms on campus and STBs among college students.

## METHOD

### Study design and participants

This study uses wave III of data from the ACHA-NCHA,<sup>10</sup> which surveyed undergraduate and graduate students from fall 2019 to spring 2022. Schools opted in to have students complete items related to firearms. The present analyses contain data from the 29 schools that included firearm items, resulting in a sample of 24 682 participants. Participant demographic characteristics are reported in [table 1](#).

## Measures

**Safety.** Participants were asked about feelings of safety in the following settings: 'on my campus (daytime)', 'on my campus (night-time)', 'in the community surrounding my campus (daytime)', 'in the community surrounding my campus (night-time)'. Response options for each setting were: 'not safe at all', 'somewhat unsafe', 'somewhat safe', 'very safe'.

**Firearm violence concern.** Participants were asked: 'to what extent are you concerned about gun violence on campus?' Response options were: 'not at all concerned', 'slightly concerned', 'moderately concerned', 'very concerned' and 'extremely concerned'.

**Past year suicide attempts.** Participants were asked: 'within the last 12 months, have you attempted suicide?' with response options of 'yes' and 'no'.

**Past year suicidal ideation.** Participants were asked: 'how often have you thought about killing yourself in the past year?' with response options of: 'never', 'rarely—one time', 'sometimes—two times', 'often—three to four times' and 'very often—five or more times'. To be consistent with the binary format of past year suicide attempts, 'never' was recoded as *no past year suicidal ideation* and all other endorsements were collapsed to *past year suicidal ideation*.

## Statistical analyses

Descriptive analyses are reported to describe rates of STBs and characterise feelings of safety and concerns about firearms. We conducted a series of multilevel logistic regressions using the *lme4* R package<sup>11</sup> to assess the impact of feelings of safety and concerns about firearm violence on suicidal ideation and suicide attempts. Cumulative link mixed models which handle ordered but non-continuous ordinal were used to assess the impact of concerns about firearm violence on feelings of safety, computed using the *ordinal* R package.<sup>12</sup> All models used a multilevel structure grouped by school, given that features of the school (eg, location, school-wide safety procedures) may affect individual participants' ratings within a school. The Benjamini-Hochberg correction procedure was used on all p values. Corrected and uncorrected p values are reported in all tables. Confusion matrices were calculated for all multilevel logistic regressions.

## RESULTS

**Table 2** reports associations between concerns about firearm safety and STBs. Individuals with concerns about firearm safety on campus were more likely to report suicidal ideation compared with those reporting they were not at all concerned about campus firearm violence. This was not the case for suicide attempts.

**Table 2** also reports associations between feelings of safety and STBs. Suicidal thinking was significantly associated with feeling unsafe at night on campus and in the surrounding area. Suicide attempts were significantly associated with feeling unsafe at night on campus. For feelings of safety at night-time in the surrounding area, there was a significant difference such that individuals who felt 'not safe at all' were 48% more likely to report suicide attempts compared with individuals who felt 'somewhat safe'. Feelings of safety during the day on campus was not significantly associated with STBs. For feelings of safety during the daytime on campus, there was only a significant difference such that individuals who felt 'not safe at all' were 44% more likely to report suicidal ideation compared with individuals who felt 'very safe'. Feeling unsafe during the day in the surrounding area was significantly associated with suicide attempts. Online supplemental

**Table 2** Associations between concerns of firearm violence on campus, feelings of safety and suicidal thoughts and behaviours

	Predictor	Suicidal ideation		Suicide attempts			
		OR (95% CI)	P value	Corrected p value	OR (95% CI)	P value	Corrected p value
Firearm violence concern*	Slightly concerned	1.14 (1.07 to 1.22)	<0.001	<0.001	0.91 (0.73 to 1.13)	0.389	0.421
	Moderately concerned	1.40 (1.30 to 1.52)	<0.001	<0.001	1.17 (0.92 to 1.50)	0.205	0.241
	Very concerned	1.35 (1.21 to 1.51)	<0.001	<0.001	1.29 (0.92 to 1.82)	0.138	0.177
	Extremely concerned	1.42 (1.24 to 1.63)	<0.001	<0.001	1.33 (0.88 to 2.00)	0.172	0.211
Daytime campus safety†	Somewhat unsafe	1.42 (0.90 to 2.24)	0.183	0.219	1.08 (0.37 to 3.17)	0.764	0.784
	Somewhat safe	1.14 (0.75 to 1.73)	0.627	0.649	0.68 (0.25 to 1.83)	0.496	0.522
	Very safe	0.77 (0.51 to 1.16)	0.150	0.186	0.38 (0.14 to 1.01)	0.055	0.075
Night-time campus safety†	Somewhat unsafe	0.88 (0.76 to 1.01)	0.059	0.078	0.63 (0.43 to 0.91)	0.013	0.019
	Somewhat safe	0.59 (0.52 to 0.68)	<0.001	<0.001	0.47 (0.33 to 0.67)	<0.001	<0.001
	Very safe	0.47 (0.41 to 0.54)	<0.001	<0.001	0.45 (0.30 to 0.65)	<0.001	<0.001
Daytime surrounding area safety†	Somewhat unsafe	1.07 (0.81 to 1.41)	0.638	0.649	0.72 (0.36 to 1.45)	0.360	0.400
	Somewhat safe	0.86 (0.66 to 1.12)	0.258	0.298	0.52 (0.27 to 0.98)‡	0.044	0.060
	Very safe	0.56 (0.43 to 0.73)	<0.001	<0.001	0.48 (0.25 to 0.92)	0.026	0.037
Night-time surrounding area safety†	Somewhat unsafe	0.81 (0.74 to 0.89)	<0.001	<0.001	0.86 (0.65 to 1.14)	0.288	0.326
	Somewhat safe	0.56 (0.51 to 0.61)	<0.001	<0.001	0.65 (0.49 to 0.87)	0.003	0.005
	Very safe	0.43 (0.38 to 0.48)	<0.001	<0.001	0.77 (0.55 to 1.07)	0.118	0.154

\*Reference group is 'not at all concerned'.

†Reference group is 'not safe at all'.

‡A p value that did not survive correction at significance defined as  $p < 0.05$ .

table S1 provides confusion matrices for the multilevel logistic regressions displayed in table 2.

Tables 3 and 4 report associations between concerns of firearm violence on campus and feelings of safety. Participants who reported being concerned about firearm violence felt significantly less safe on campus during the daytime and night-time and less safe in the surrounding areas in the daytime and night-time.

## DISCUSSION

Findings from this large study of college students highlight important relationships between feelings of campus safety, firearm safety concerns and STBs. Some consistent patterns emerged. For instance, participants who reported being concerned about firearm violence felt significantly less safe on and off campus, and during the daytime and night-time, revealing a consistent relationship between firearm concern and

decreased safety feelings, regardless of setting and time of day. Regarding safety, feeling unsafe at night was associated with both suicidal ideation and suicide attempts. Accordingly, with feelings of safety on campus associated both with increased concerns about firearm violence and increased STBs, there may be value in seeking to promote safety on campus.

These results support existing research regarding college campus stakeholders being opposed to firearms on campus,<sup>7 8</sup> with the present results particularly highlighting the association between firearm concern and safety concern among a large sample of college students. Therefore, efforts to specifically address concerns about firearm safety may also help to increase feelings of safety. Future longitudinal research would help to increase the ability to comment on the directional nature of these variables to determine whether improving firearm safety would improve overall safety feelings, and accordingly lead to decreased STBs.

**Table 3** Associations between concerns of firearm violence on campus and feelings of campus safety

	Predictor	Daytime campus safety			Night-time campus safety		
		OR (95% CI)	P value	Corrected p value	OR (95% CI)	P value	Corrected p value
Firearm violence concern	Threshold						
	1 2	0.00 (0.00 to 0.00)	<0.001	<0.001	0.02 (0.01 to 0.02)	<0.001	<0.001
	2 3	0.01 (0.01 to 0.01)	<0.001	<0.001	0.15 (0.13 to 0.18)	<0.001	<0.001
	3 4	0.19 (0.16 to 0.24)	<0.001	<0.001	1.69 (1.42 to 2.01)	<0.001	<0.001
	Slightly concerned	0.61 (0.56 to 0.66)	<0.001	<0.001	0.46 (0.44 to 0.49)	<0.001	<0.001
	Moderately concerned	0.39 (0.35 to 0.42)	<0.001	<0.001	0.29 (0.27 to 0.31)	<0.001	<0.001
	Very concerned	0.30 (0.27 to 0.34)	<0.001	<0.001	0.22 (0.20 to 0.24)	<0.001	<0.001
	Extremely concerned	0.25 (0.22 to 0.29)	<0.001	<0.001	0.18 (0.15 to 0.20)	<0.001	<0.001

Reference group is 'not at all concerned'; 1=slightly concerned, 2=moderately concerned, 3=very concerned, 4=extremely concerned; notation of, for example, 1|2 shows OR for each level of firearm violence concern compared with the next higher level.

**Table 4** Associations between concerns of firearm violence on campus and feelings of surrounding area safety

		Daytime surrounding area safety			Night-time surrounding area safety		
	Predictor	OR (95% CI)	P value	Corrected p value	OR (95% CI)	P value	Corrected p value
Firearm violence concern	Threshold						
	1 2	0.01 (0.00 to 0.01)	<0.001	<0.001	0.06 (0.05 to 0.09)	<0.001	<0.001
	2 3	0.06 (0.04 to 0.07)	<0.001	<0.001	0.47 (0.36 to 0.61)	<0.001	<0.001
	3 4	0.88 (0.65 to 1.18)	0.393	0.421	3.96 (3.01 to 5.21)	<0.001	<0.001
	Slightly concerned	0.63 (0.59 to 0.67)	<0.001	<0.001	0.55 (0.52 to 0.58)	<0.001	<0.001
	Moderately concerned	0.48 (0.45 to 0.52)	<0.001	<0.001	0.41 (0.39 to 0.44)	<0.001	<0.001
	Very concerned	0.39 (0.35 to 0.44)	<0.001	<0.001	0.32 (0.29 to 0.35)	<0.001	<0.001
	Extremely concerned	0.34 (0.30 to 0.39)	<0.001	<0.001	0.27 (0.24 to 0.30)	<0.001	<0.001

Reference group is 'not at all concerned'; 1=slightly concerned, 2=moderately concerned, 3=very concerned, 4=extremely concerned; notation of, for example, 1|2 shows OR for each level of firearm violence concern compared with the next higher level.

Beyond the distinct relationships between feelings of safety with concerns about firearm violence and STBs, concerns about firearm safety were also related to STBs. Individuals with concerns about firearm safety on campus were up to 42% more likely to report suicidal ideation compared with those reporting they were not at all concerned about campus firearm violence. While limited prior research has examined the impact of firearm violence on suicide-related outcomes, previous research has demonstrated that anxiety, stress and depression all increased following the increase in active shooter drills,<sup>13</sup> which represents a direct response to firearm violence. However, this relationship of firearm concerns associated with suicide-related outcomes, did not hold up with suicide attempts in the present analyses. This may demonstrate a negative impact of the presence of firearms on mental health in the form of suicidal ideation. However, because of firearm concerns, these individuals may be more prone to engage in safety planning, which may include limiting access to lethal means,<sup>14</sup> thereby not having an association with suicide attempts.

It is worth considering that the present analyses focus on safety perceptions. Both the campus safety item and the concern of firearms item refer to one's own feelings and level of concern. Notably, this means that the results do not speak to actual safety. Importantly, long-standing evidence consistently suggests that the presence of firearms reduces safety.<sup>15</sup> Therefore, for schools where firearms are prohibited, it may be worthwhile enacting public health messaging initiatives that highlight this information as a way to increase knowledge and potentially increase feelings of safety.<sup>16</sup>

There are several limitations to consider. First, universities had to opt in to have their students respond to questions related to firearms, thereby potentially introducing bias. Schools both firmly supportive and against the presence of firearms may have been inclined to opt out. Additionally, due to not having identifiers to link survey respondents across semesters, we lack the ability to comment on the longitudinal nature of these findings. Future research should seek to build on the current findings by leveraging prospective data.

Overall, these analyses highlight nuanced relationships between feelings of safety, concerns about firearms on campus and STBs among college students. The results highlight increased risk of STBs among those with reduced safety feelings and heightened concerns about firearms. There is a need for college campuses to intervene and promote campus safety, with consideration for the presence of firearms on campus and the implications of allowing

such weapons to be present in environments with increasing instances of firearm violence.

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#### REFERENCES

- 1 Liu CH, Stevens C, Wong SHM, et al. The prevalence and predictors of mental health diagnoses and suicide among U.S. college students: implications for addressing disparities in service use. *Depress Anxiety* 2019;36:8–17. 10.1002/da.22830 Available: <https://doi.org/10.1002/da.22830>
- 2 Mortier P, Cuijpers P, Kiekens G, et al. The prevalence of suicidal thoughts and behaviours among college students: a meta-analysis. *Psychol Med* 2018;48:554–65. 10.1017/S0033291717002215 Available: <https://doi.org/10.1017/S0033291717002215>
- 3 Mortier P, Demyttenaere K, Auerbach RP, et al. The impact of lifetime suicidality on academic performance in college freshmen. *Journal of Affective Disorders* 2015;186:254–60. 10.1016/j.jad.2015.07.030 Available: <https://doi.org/10.1016/j.jad.2015.07.030>
- 4 Devries K, Watts C, Yoshihama M, et al. Violence against women is strongly associated with suicide attempts: evidence from the WHO multi-country study on women's health and domestic violence against women. *Social Science & Medicine* 2011;73:79–86. 10.1016/j.socscimed.2011.05.006 Available: <https://doi.org/10.1016/j.socscimed.2011.05.006>



- 5 Centers for Disease Control and Prevention (CDC). Firearm deaths grow, disparities widen. 2022. Available: <https://www.cdc.gov/vitalsigns/firearm-deaths/index.html>
- 6 Pew Research Center. American's Complex Relationship with Guns. . 2017 Available: [https://www.pewresearch.org/social-trends/2017/06/22/views-of-gun-safety-and-the-key-responsibilities-of-gun-owners/psdt\\_2017-06-22-guns-03-04/](https://www.pewresearch.org/social-trends/2017/06/22/views-of-gun-safety-and-the-key-responsibilities-of-gun-owners/psdt_2017-06-22-guns-03-04/)
- 7 Cavanaugh MR, Bouffard JA, Wells W, et al. Student attitudes toward concealed handguns on campus at 2 universities. *Am J Public Health* 2012;102:2245–7. 10.2105/AJPH.2011.300473 Available: <https://doi.org/10.2105/AJPH.2011.300473>
- 8 Price JH, Khubchandani J. Firearms on college campuses: an empirical review of support and opposition. *Violence and Gender* 2022;9:63–72. 10.1089/vio.2021.0046 Available: <https://doi.org/10.1089/vio.2021.0046>
- 9 Towers S, Gomez-Lievano A, Khan M, et al. Contagion in mass killings and school shootings. *PLoS ONE* 2015;10:e0117259. 10.1371/journal.pone.0117259 Available: <https://doi.org/10.1371/journal.pone.0117259>
- 10 American college health Association. In: *American College Health Association-National College Health Assessment*. 2022.
- 11 Bates D, Mächler M, Bolker B. Fitting linear mixed-effects models using **Lme4**. *J Stat Soft* 2015.
- 12 Christensen RHB. ordinal—Regression Models for Ordinal Data, Available: <https://CRAN.R-project.org/package=ordinal>
- 13 ElSherief M, Saha K, Gupta P, et al. Impacts of school shooter drills on the psychological well-being of American K-12 school communities: a social media study. *Humanit Soc Sci Commun* 2021;8. 10.1057/s41599-021-00993-6 Available: <https://doi.org/10.1057/s41599-021-00993-6>
- 14 Zalsman G, Hawton K, Wasserman D, et al. Suicide prevention strategies Revisited: 10-year systematic review. *The Lancet Psychiatry* 2016;3:646–59. 10.1016/S2215-0366(16)30030-X Available: [https://doi.org/10.1016/S2215-0366\(16\)30030-X](https://doi.org/10.1016/S2215-0366(16)30030-X)
- 15 Anglemeyer A, Horvath T, Rutherford G. The accessibility of firearms and risk for suicide and Homicide Victimization among household members: a systematic review and meta-analysis. *Ann Intern Med* 2014;160:101–10. 10.7326/M13-1301 Available: <https://doi.org/10.7326/M13-1301>
- 16 Marino E, Wolsko C, Keys S, et al. Addressing the cultural challenges of firearm restriction in suicide prevention: A test of public health Messaging to protect those at risk. *Archives of Suicide Research* 2018;22:394–404. 10.1080/13811118.2017.1355285 Available: <https://doi.org/10.1080/13811118.2017.1355285>