

Perceived neighborhood safety, firearm ownership, and firearm storage practices: an update

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Short Report

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Abstract

Background

While the association between neighborhood disadvantages and firearm-related injuries and deaths are well documented, the influence of neighborhood safety on firearm ownership and storage practices remained less visited. This study intends to build on limited extant work to examine how perceived neighborhood safety is associated with having firearms in or around home and firearm storage practices among firearm owners in the United States.

Methods

Using data from the 2024 and 2025 Behavioral Risk Factor Surveillance System (BRFSS) survey on 79,972 U.S. adults residing in 17 states, we estimated multivariable generalized linear models with log link and Poisson distribution to assess the likelihood of firearm ownership by level of neighborhood safety. Next, multivariable multinomial logistic models were estimated to assess the risk of mutually exclusive firearm storage practices. Heterogeneities were assessed by sex, household income, and educational attainment.

Results

No differential likelihood of keeping firearms in or around the home was found by perceived levels of neighborhood safety after accounting for demographic and socioeconomic attributes. However, living in a perceived unsafe neighborhood was found to be associated with a higher likelihood of having firearms loaded and unlocked. Compared to firearm owners in extremely safe neighborhoods, firearm owners in unsafe neighborhoods were 9.12 percentage points (95% CI: 4.31, 13.93) more likely to have firearms loaded and unlocked.

Conclusions

By showing a link between perceived neighborhood safety and firearm storage practices, this study may help initiate concerted efforts to improve neighborhood safety and promote safe firearm storage practices.

Introduction

Safe firearm storage practices can play a vital role in preventing firearm related injuries and deaths. This is of particular importance in the context of the United States, where firearms were associated with over 228,000 deaths from 2019 to 2023 [1]. More than half of firearm-related deaths were suicides, nearly 2,500 were unintentional injuries, and around 95,000 of these deaths took place in decedents' home [1].

Furthermore, nearly 145,000 nonfatal unintentional firearm-related emergency department visits were reported during this 5-year period [2]. Given the association between unsafe firearm storage practices and firearm-related suicide and unintentional injuries [3], it is critical to understand and identify factors that influence firearm storage practices.

Prior studies of the U.S. population have reported that various sociodemographic, socioeconomic, psychosocial factors, and mental health conditions are associated with firearm storage practices [4,5,6]. There is little research on the role of perceived neighborhood safety in firearm storage practices. While neighborhood safety is associated with greater risk of firearm-related injuries and fatalities [7,8,9,10], empirical investigations on the association between neighborhood safety and firearm storage practices is typically limited. Evidence is also limited about association between neighborhood safety and gun ownership.

One recent study by Testa et al. (2026), using data from 10 U.S. states, shows that firearm owners living in unsafe neighborhoods are more likely to have firearms loaded and unlocked [11]. One of the major shortcomings of this study was that while data on both perceived neighborhood safety (from the social determinants module) and firearm storage practices (from the firearm safety module) were available for 13 states in the 2024 Behavioral Risk Factor Surveillance System (BRFSS) survey, the study excluded 3 states (Arizona, Maryland, and Michigan) without any stated reason. The study also did not investigate gun ownership as an outcome.

With the 2025 BRFSS data being available, the current paper intends to reexamine whether perceived crime-related neighborhood safety is associated with firearm ownership and storage practices among U.S. adults, using data from 17 U.S. states, including the 3 excluded states in Testa et al. (2026) study. The secondary aim is to assess probable heterogeneities by sex, income, and educational attainment.

Methods

Data

This observational study used data on 79,972 adults from the “Social Determinants” and “Firearm Safety” modules of the 2024 and 2025 BRFSS surveys to assess the association between perceived neighborhood safety, firearm ownership, and firearm storage practices. Nearly 95% of the observations were from urban areas. Data were available for 17 states, including Arizona, California, Indiana, Louisiana, Maine, Maryland, Michigan, Minnesota, Mississippi, New Jersey, New Mexico, North Carolina, North Dakota, Pennsylvania, South Carolina, West Virginia, and Wyoming.

We used publicly available anonymized data that met the definition of NIH exempt human subject research (Exemption 4). The study was determined “Not Human Subjects Research” by the Augusta University Institutional Review Board.

Measures

Our first outcome variable was a binary variable indicating whether respondents had firearms kept in or around their home. Our second outcome variable was a categorical variable denoting firearm storage practices (among those who had a firearm) as follows: i) firearms not loaded (reference category), ii) firearms loaded but locked, and iii) firearms loaded and unlocked. The last category was considered an unsafe firearm storage practice [5,12].

Our exposure variable was a categorical variable denoting how safe (from crime) the respondents considered their neighborhood as follows: i) extremely safe (reference category), ii) safe, and iii) unsafe or extremely unsafe (henceforth unsafe).

Statistical analysis

For the firearm ownership outcome, we estimated multivariable generalized linear models (GLM) with log link and Poisson distribution. Note that we choose the GLM specification over binomial logistic regression since the outcome variable was a non-rare binary variable [13]. For the storage practice outcome, we estimated multivariable multinomial logistic models. Predictive probabilities for respective outcomes were estimated for the perceived neighborhood safety categories and were compared to the reference category (i.e., extremely safe).

All models were adjusted for age group (18-34, 35-49, 50-64, and 65+ years), sex, race and ethnicity (non-Hispanic White, non-Hispanic Black, non-Hispanic Asian, Hispanic, and non-Hispanic other), marital status (married, widowed/divorced/separated, never married, and unmarried couple), urban/rural residence, educational attainment (high school diploma or less, some college, and college graduate), household income (low, middle, and high), employment status (employed, retired, and other), veteran status, and whether there were children in the household. These are the set of covariates commonly used in firearm storage practices literature [4,14]. Additionally, state of residence fixed effects and interview months fixed effects were controlled to account for state-level variations in firearm control policies [15] and seasonality in crime rates [16].

Sex, educational attainment, and household income were separately interacted with the perceived neighborhood safety variable to assess the association between neighborhood safety and firearm ownership and storage practices at different sociodemographic attributes. Low, middle, and high income was defined as income $\leq$ 200% of Federal Poverty Level (FPL), 200 to $<$ 400% of FPL, $\geq$ 400% of FPL, respectively. Statistical analyses were performed in Stata 18.0 software and estimates were obtained using the complex survey weights entailing the sampling frame of the BRFSS and pooled structure of the data [17].

Results

Around 6.76% (N= 3,840) of respondents reported living in unsafe neighborhoods, while 59.70% (N= 44,012) and 33.54% (N= 32,120) considered their neighborhoods to be safe and extremely safe, respectively. The share of adults with low income and lower educational attainment was

disproportionately higher in perceived unsafe neighborhoods. The share of younger adults aged 18-34 years, adults of Hispanic ethnicity, and adults who were not married was also higher in neighborhoods that were perceived unsafe by the respondents. Table 1 presents descriptive statistics of the study sample by perceived neighborhood safety.

Around 34.51% (N= 33,233) of respondents reported having firearms in or around their home. Unadjusted estimates in Table 1 suggested that firearm ownership among adults living in unsafe neighborhoods was significantly lower ($\Delta=-13.75$, 95% CI: -17.12, -10.39) than in extremely safe neighborhoods. However, no statistically different likelihood in firearm ownership between safe and unsafe neighborhoods was observed after adjusting for demographic and socioeconomic factors (Figure 1). The predicted likelihood of firearm ownership was 35.77%, 33.63%, and 34.80% for extremely safe, safe, and unsafe neighborhoods, respectively. While firearm ownership was relatively higher among males compared to females, no differences in firearm ownership by perceived neighborhood safety were observed within male and female sub-groups. Other than middle income adults ($\Delta=7.33$, 95% CI: 1.18, 13.47), no differential likelihood of firearm ownership was found between extremely safe and unsafe neighborhoods was observed among low- and high- income adults. Except for educational attainment of high school or less ($\Delta=7.17$, 95% CI: 1.76, 12.58), no differential likelihood was observed among other educational attainment sub-groups (Figure 1).

Among those who had firearms in or around their home, 17.00% (N= 5,644) reported storing their firearms loaded and unlocked. While this percentage was 17.05% in extremely safe neighborhoods, it was 7.19 percentage points (95% CI: 2.35, 12.04) higher among firearm owners living in unsafe neighborhoods (Table 1). The difference persisted after adjusting for demographic, socioeconomic, and other relevant covariates (Figure 2). While predicted likelihood of having firearms loaded and unlocked was 16.98% and 16.23% among firearm owners living in extremely safe and safe neighborhoods, respectively, the likelihood was 26.10% ($\Delta \approx 9$ percentage points) among firearm owners living in unsafe neighborhoods. The differential likelihood of unsafe firearm storage practice between extremely safe and unsafe neighborhoods was evident in males, in low-income adults, and in each educational attainment. The difference was positive but not statistically significant in females and middle- and high-income adults. Thus, some heterogeneities by sex and income were observed.

Discussion

In this paper, we assessed whether firearm ownership and firearm storage practices were associated with perceived neighborhood safety among U.S. adults residing in 17 states. Our findings suggested that while firearm ownership was not impacted by crime-related neighborhood safety perceptions, after accounting for demographic and socioeconomic attributes, the risk of unsafe firearm storage practices was higher among firearm owners in perceived unsafe neighborhoods.

Neighborhood safety has long been investigated as a critical factor influencing specific health outcomes and overall health and wellbeing [18,19,20]. As stated earlier, the role of neighborhood attributes in

firearm-related violence has also been widely studied [8,9]. However, prior empirical evidence about the link between perceived neighborhood safety and firearm ownership and storage practices has been scant. Only one study explored firearm storage practices across perceived levels of neighborhood safety [11], though the findings of that study might suffer from bias due to arbitrary omission of data from 3 states. As such, our contribution to literature is twofold. First, we expand the neighborhood safety literature to assess its influence on firearm ownership and storage practices. And second, we add to safe storage practice literature by identifying perceived neighborhood safety as a factor influencing firearm storage practices.

We, however, urge the readers to cautiously interpret this relationship. We do not claim that unsafe neighborhoods cause unsafe firearm storage practices. Rather we claim that the risk of unsafe firearm storage practices is higher among firearm owners who live in a crime-related unsafe neighborhood, after controlling for other demographic and socioeconomic factors, which potentially influence an individual's firearm storage practice. The findings were also persistent across most of the demographic and socioeconomic sub-groups, indicating a strong association between neighborhood safety and firearm storage practices, in general. However, no statistically significant association was observed among females and middle- and high- income adults. Future studies, especially of qualitative nature, are warranted to better understand the underlying perspectives that govern the heterogeneities of this association.

Another interesting finding of the study is that firearm ownership was not found associated with perceived neighborhood safety after adjusting for sociodemographic and socioeconomic factors. Previous studies reported a higher likelihood of firearm ownership among men, non-Hispanic Whites, veterans, adults with higher household income, and adults without a college degree [21]. Once we accounted for these factors, the statistically significant crude differences in firearm ownership between safe and unsafe neighborhoods were no longer observed. This suggests that the role of perceived neighborhood safety in firearm ownership may be limited after considering sociodemographic and socioeconomic factors. In contrast, perceived neighborhood safety may play a critical role in firearm storage practices. Therefore, targeted interventions to promote safe firearm storage practices could be helpful in reducing the risk of firearm-related injuries and deaths in certain neighborhoods.

Conclusion

Findings of this study that crime-related unsafe neighborhoods are associated with a greater risk of unsafe firearm storage practice may help boost policy attention to improve neighborhood safety and concurrently promote safe firearm storage practices among those living in an unsafe neighborhood. Public health practitioners and law enforcement authorities may develop partnerships to execute concerted efforts aimed at improving neighborhood safety, promoting safe firearm storage practices, and reducing firearm related injuries and fatalities.

Declarations

Ethics approval and consent to participate

This research used publicly available anonymized secondary data that met the definition of NIH exempt human subject research (Exemption 4). The study was determined “Not Human Subjects Research” by the Augusta University Institutional Review Board.

Consent for publication

Not applicable.

Availability of data and materials

Data used in this analysis are publicly available from the Centers for Disease Control and Prevention's Behavioral Risk Factor Surveillance System (BRFSS) website:

https://www.cdc.gov/brfss/annual_data/annual_2024.html (2024 wave) and

https://www.cdc.gov/brfss/annual_data/annual_2025.html (2025 wave).

Competing interests

The authors declare that they have no competing interests.

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Author's contributions

BKD conducted data analysis and prepared the first draft. JEJ contributed to investigation and discussion. JAJ supervised the research and contributed to review and editing. All authors read and approved the final manuscript.

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References

1. Centers for Disease Control and Prevention. Multiple Cause of Death, 2018–2023, Single Race Request. Published online 2026. Accessed February 9, 2026. <https://wonder.cdc.gov/mcd-icd10-expanded.html>
2. Centers for Disease Control and Prevention. CDC WISQARS - Web-based Injury Statistics Query and Reporting System. Published online 2026. Accessed February 9, 2026. <https://wisqars.cdc.gov/>

3. Rowhani-Rahbar A. Firearm Storage Practices—What Constitutes Safe? JAMA Netw Open. 2023;6(3):e231452. 10.1001/jamanetworkopen.2023.1452.
4. Anestis MD, Mocerri-Brooks J, Johnson RL, et al. Assessment of Firearm Storage Practices in the US, 2022. JAMA Netw Open. 2023;6(3):e231447. 10.1001/jamanetworkopen.2023.1447.
5. Datta BK, Jaremski JE, Johnson JA. Psychosocial well-being and firearm storage practices: evidence from five US states. Inj Prev. 2024;30(5):432–6. 10.1136/ip-2023-045154.
6. Horn DL, Butler EK, Stahl JL, Rowhani-Rahbar A, Littman AJ. A multi-state evaluation of the association between mental health and firearm storage practices. Prev Med. 2021;145:106389. 10.1016/j.ypmed.2020.106389.
7. Dalve K, Gause E, Mills B, Floyd AS, Rivara FP, Rowhani-Rahbar A. Neighborhood disadvantage and firearm injury: does shooting location matter? Inj Epidemiol. 2021;8(1):10. 10.1186/s40621-021-00304-2.
8. Henry OS, Batchu S, Lachant J, et al. Disadvantaged Neighborhoods Continue to Bear the Burden of Gun Violence. J Surg Res. 2024;293:396–402. 10.1016/j.jss.2023.09.002.
9. Shour AR, Anguzu R, Zhou Y, et al. Your neighborhood matters: an ecological social determinant study of the relationship between residential racial segregation and the risk of firearm fatalities. Inj Epidemiol. 2023;10(1):14. 10.1186/s40621-023-00425-w.
10. Kravitz-Wirtz N, Bruns A, Aubel AJ, Zhang X, Buggs SA. Inequities in Community Exposure to Deadly Gun Violence by Race/Ethnicity, Poverty, and Neighborhood Disadvantage among Youth in Large US Cities. J Urban Health. 2022;99(4):610–25. 10.1007/s11524-022-00656-0.
11. Testa A, Fu K, Ahmed M, et al. Perceived neighborhood safety and firearm secure storage: findings from the 2024 behavioral risk factor surveillance system. Inj Epidemiol. 2026;13(1):16. 10.1186/s40621-026-00657-6.
12. Parekh T, Pena A, Bhaskar M, Park JW. Social Drivers of Health and Firearm Storage Practices. JAMA Netw Open. 2025;8(6):e2513280. 10.1001/jamanetworkopen.2025.13280.
13. Zou G. A Modified Poisson Regression Approach to Prospective Studies with Binary Data. Am J Epidemiol. 2004;159(7):702–6. 10.1093/aje/kwh090.
14. Conrick KM, Banks S, Schleimer JP, et al. Household Firearm Storage Practices. JAMA Netw Open. 2025;8(7):e2518960. 10.1001/jamanetworkopen.2025.18960.
15. Pomeranz JL, Silver D, Lieff SA. State Gun-Control, Gun-Rights, and Preemptive Firearm-Related Laws Across 50 US States for 2009–2018. Am J Public Health. 2021;111(7):1273–80. 10.2105/AJPH.2021.306287.
16. McDowall D, Loftin C, Pate M. Seasonal Cycles in Crime, and Their Variability. J Quant Criminol. 2012;28(3):389–410. 10.1007/s10940-011-9145-7.
17. Centers for Disease Control and Prevention. Complex Sampling Weights and Preparing 2025 BRFSS Module Data for Analysis. Published online Sep 9, 2026. Accessed Sep 14, 2026 https://www.cdc.gov/brfss/annual_data/2025/pdf/Complex-Sampling-Weights-and-Preparing-Module-Data-for-Analysis-2025-508.pdf

18. Won J, Lee C, Forjuoh SN, Ory MG. Neighborhood safety factors associated with older adults' health-related outcomes: A systematic literature review. *Soc Sci Med*. 2016;165:177–86. 10.1016/j.socscimed.2016.07.024.
19. Carter JG, Feinglass JM, Yee LM. Perception of Neighborhood Safety and Maternal and Neonatal Health Outcomes. *JAMA Netw Open*. 2023;6(5):e2317153. 10.1001/jamanetworkopen.2023.17153.
20. Kim Y, Jang S, Ullahansari S, Vo J, Hyun K, Fadel PJ. Neighborhood Safety and Hypertension Risk: A Systematic Review. *JAHA*. 2025;14(8):e035381. 10.1161/JAHA.124.035381.
21. Hamilton D, Lemeshow S, Saleska JL, Brewer B, Strobino K. Who owns guns and how do they keep them? The influence of household characteristics on firearms ownership and storage practices in the United States. *Prev Med*. 2018;116:134–42. 10.1016/j.ypmed.2018.07.013.

Tables

Table 1
Descriptive statistics by perceived neighborhood safety

	All	Neighborhood safety			
		Extremely safe	Safe	Unsafe	χ^2 test p-value
Outcome					
Firearm ownership	34.51	40.92	31.91	25.66	< 0.001
Firearm storage practice					
Unloaded	64.34	64.76	64.97	54.05	0.003
Loaded but locked	18.67	18.18	18.73	21.71	
Loaded and unlocked	17.00	17.05	16.29	24.24	
Covariates					
Age					
18–34	24.41	20.27	25.64	34.02	< 0.001
35–49	25.10	23.64	25.64	27.51	
50–64	25.71	25.84	25.69	25.26	
65+	24.79	30.25	23.03	13.21	
Sex					
Male	48.89	49.41	48.75	47.59	0.537
Female	51.11	50.59	51.25	52.41	
Race & Ethnicity					
White	57.50	71.09	52.42	34.97	< 0.001
Black	11.55	8.12	12.86	17.06	
Hispanic	18.75	10.30	22.08	31.21	
Asian	7.87	6.56	8.54	8.46	
Other	4.32	3.93	4.09	8.31	
Marital Status					
Note: Estimates were obtained using complex survey weights. Percentages add to 100 across rows for respective characteristics. FPL refers to Federal Poverty Line. Observations for firearm storage practices outcome was 32,380.					

	All	Neighborhood safety			
		Extremely safe	Safe	Unsafe	χ^2 test p-value
Married	52.47	59.61	50.86	31.32	< 0.001
Widowed/divorced/separated	19.45	19.00	19.33	22.63	
Never married	22.18	17.26	23.50	34.92	
Unmarried couple	5.90	4.13	6.30	11.14	
Residence					
Urban	94.47	92.60	95.25	96.76	< 0.001
Rural	5.53	7.40	4.75	3.24	
Education					
≤ High school diploma	35.43	28.12	38.33	45.99	< 0.001
Some college	30.39	29.66	30.62	31.92	
College graduate	34.19	42.22	31.05	22.09	
Income					
Low (< 200% of FPL)	34.48	22.77	38.34	58.53	< 0.001
Middle (200 to < 400% of FPL)	27.26	27.97	27.55	21.26	
High (≥ 400% of FPL)	38.25	49.26	34.11	20.21	
Employment					
Employed	58.28	57.22	59.15	55.82	< 0.001
Retired	21.79	27.04	20.02	11.48	
Other	19.93	15.74	20.83	32.70	
Children in household					
No	67.24	68.55	66.95	63.31	0.006
Yes	32.76	31.45	33.05	36.69	
Veteran status					
No	90.85	89.83	91.22	92.59	0.003
Note: Estimates were obtained using complex survey weights. Percentages add to 100 across rows for respective characteristics. FPL refers to Federal Poverty Line. Observations for firearm storage practices outcome was 32,380.					

	All	Neighborhood safety			χ^2 test p-value
		Extremely safe	Safe	Unsafe	
Yes	9.15	10.17	8.78	7.41	
Observations	79,972	32,120	44,012	3,840	

Note: Estimates were obtained using complex survey weights. Percentages add to 100 across rows for respective characteristics. FPL refers to Federal Poverty Line. Observations for firearm storage practices outcome was 32,380.

Figures

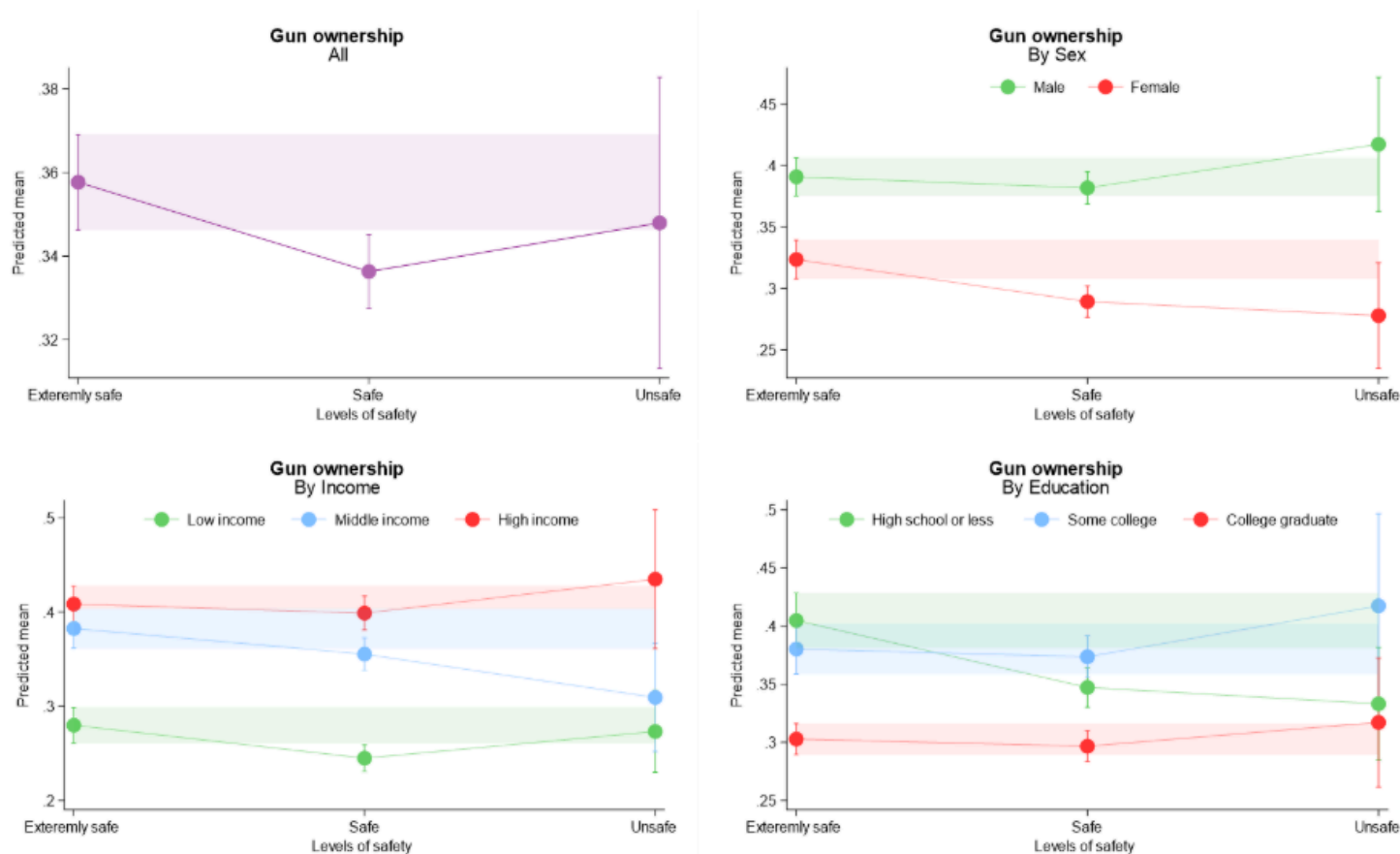


Figure 1

Predictive margins of firearm ownership by neighborhood safety

Note: Estimates were obtained using the complex survey weights entailing the survey frame of the BRFSS and pooled structure of data. All models were adjusted for age group, sex, race and ethnicity, marital status, educational attainment, household income, employment status, veteran status, presence of children in the household, interview month fixed effects, and state of residence fixed effects.

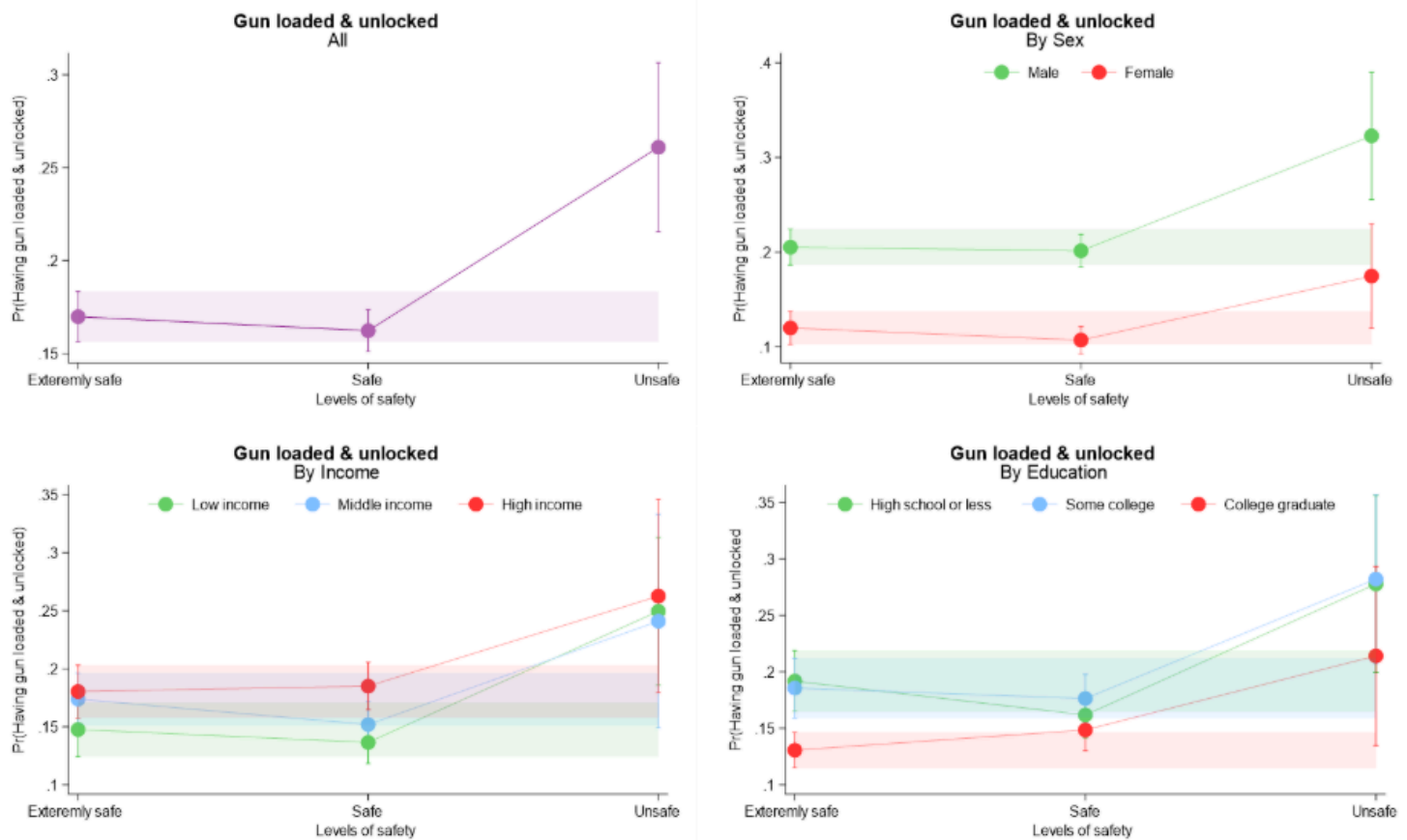


Figure 2

Predicted probability of having firearms loaded and unlocked by neighborhood safety

Note: Estimates were obtained using the complex survey weights entailing the survey frame of the BRFSS and pooled structure of data. All models were adjusted for age group, sex, race and ethnicity, marital status, educational attainment, household income, employment status, veteran status, presence of children in the household, interview month fixed effects, and state of residence fixed effects. Having firearms not loaded was the base outcome.