Psychosocial well-being and firearm storage practices: evidence from five US states

Biplab Kumar Datta ,[1,2] Jennifer E Jaremski,[1] J Aaron Johnson[1,3]

[1]Institute of Public and Preventive Health, Augusta University, Augusta, Georgia, USA
[2]Department of Health Management, Economics and Policy, Augusta University, Augusta, Georgia, USA
[3]Department of Community & Behavioral Health Sciences, Augusta University, Augusta, Georgia, USA

Correspondence to
Dr Biplab Kumar Datta; bdatta@augusta.edu
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ABSTRACT

Objective Gun safety practices can play a pivotal role in preventing suicide and unintentional injuries involving a firearm. This study aimed to assess whether psychosocial well-being, measured by emotional support, feeling of social isolation and life satisfaction, influenced safe storage practices among individuals who had firearms in or around their home.

Methods Data are from the firearm safety module of the 2022 Behavioural Risk Factor Surveillance System survey of 11 722 individuals having firearms and living in California, Minnesota, Nevada, New Mexico and Ohio. Respondents were asked to identify how guns were stored in their homes including: (1) not loaded, (2) loaded but locked and (3) loaded and unlocked. Multinomial logistic regression models with controls for sociodemographic correlates assess the relative risks of certain storage measures.

Results Relative to the base outcome of not loaded, the adjusted relative risks of having firearms loaded and unlocked among individuals who usually/always felt socially isolated were 1.72 (95% CI: 1.02 to 2.88) times that of individuals who never felt socially isolated. The adjusted risks among individuals who were dissatisfied with their life were 1.82 (95% CI: 1.02 to 3.24) times that of their counterparts who were very satisfied. The adjusted risks were not statistically significant among individuals who rarely/never received needed emotional support compared with individuals who always received support.

Conclusion The results suggest a strong relationship between social isolation and life satisfaction and safe storage practices at home. Policies designed to improve psychosocial well-being, therefore, may present an important opportunity for preventing unintentional firearm injuries.

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ Firearm storage practices are associated with gun owners' sociodemographic characteristics and socioeconomic attributes.
⇒ Less is known about the role of psychosocial factors in storage practices.

WHAT THIS STUDY ADDS

⇒ This study found that adverse psychosocial conditions were associated with riskier storage practices at home.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ The findings of this study suggest that improving psychosocial well-being may influence safe storage practices at home and may help reduce suicide and unintentional firearm-related injuries.

INTRODUCTION

Injuries involving firearms is a serious public health concern in the USA.[1] An estimated 61.6 emergency department visits per 100 000 involved a firearm injury[2] and nearly 2 in every 10 non-fatal firearm injuries were unintentional.[3] More than half of the suicides in the USA also were from firearm injuries.[4] These unintentional injuries or deaths and intentional self-harm, however, were preventable if safe storage practices, defined as storing a firearm locked, unloaded and separate from ammunition, were employed.[5] While previous studies explored how firearm storage practices were associated with gun owner's household characteristics (eg, presence of children and adolescents), and demographic and socioeconomic attributes,[6–8] less is known on the role of psychosocial factors on storage practices. One study assessed the link between firearm storage practices and mental health indicators including recent poor mental health condition and depressive disorder.[9] Another study assessed the influence of sociocultural characteristics such as masculine norms on firearm owner's storage practices.[10] Several studies also explored firearm storage practices in the context of post-traumatic stress disorder.[11] However, there remains a gap in understanding of storage behaviours in the context of common instruments of psychosocial well-being such as social network and social support. Against this landscape, this study aimed to assess how psychosocial well-being may influence safe storage practices at home.

METHODS

Study sample

Data were from the Firearm Safety module of the 2022 Behavioural Risk Factor Surveillance System (BRFSS) survey. This optional module in the 2022 survey was covered by 5 (out of 50) states including California, Minnesota, Nevada, New Mexico and Ohio. Our sample consisted of 11 722 individuals from these five states who reported having any firearms kept in or around their home.

The BRFSS data used in this analysis is publicly available anonymised secondary data, which met the definition of the National Institute of Health (NIH) exempt human subject research (exemption 4). Institutional Review Board approval for this study, therefore, was not required.

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Measures

In the Firearm Safety module of the BRFSS, individuals who reported having firearms in or around their home were asked if any of those firearms were loaded at the time of the survey. If loaded, respondents were further asked if any of the loaded firearms were unlocked. Based on responses to these questions, we constructed a categorical measure of firearm storage practices entailing the following three categories: (1) not loaded, (2) loaded but locked and (3) loaded and unlocked. The outcome variable was a three-category polychotomous variable with not loaded serving as the base, or reference, category. Non-adherence to safe storage practice was defined as having firearms loaded and unlocked.

In the Social Determinants and Health Equity module of the BRFSS, respondents were asked several questions on their psychosocial well-being. These measures included life satisfaction, receipt of needed emotional support and feeling socially isolated from others, which served as three separate exposure variables.

Respondents were asked how satisfied they were with their life. Based on the responses they were categorised into three groups—very satisfied (reference category), satisfied and dissatisfied/very dissatisfied (henceforth dissatisfied). Respondents were then asked how often they got the emotional support that they needed. Based on the answers, they were grouped in four categories—always (reference category), usually, sometimes and rarely/never. Lastly, respondents were asked how often they felt socially isolated from others. Based on responses, respondents were sorted in four categories—never (reference category), rarely, sometimes and always/usually.

Statistical analysis

Multinomial logistic regressions were estimated to obtain the relative risks of having firearms that were loaded but locked, and having firearms that were loaded and unlocked, relative to the base outcome of having firearms that were not loaded. We estimated the models with and without other covariates (listed in table 1) that are commonly used in the safe storage practice literature.[6 12] Unlike previous studies that estimated the independent influence of these covariates on safe storage practices, we examined whether after accounting for the joint influences of these correlates, psychosocial factors played any role in storage behaviours. Accounting for these correlates thus enhanced the internal validity of our estimates. In addition, we accounted for state of residence fixed effects to proxy for state law and regulations,[13] and interview month fixed effects to account for timing of any events that could influence safe storage practices.

All models were estimated using complex survey waves. The level of significance was set at 5% level. Analyses were done using Stata 18.0 software.

RESULTS

Around 5.2% (N=518) of respondents reported being dissatisfied with their life, 8.3% (N=713) rarely/never received needed emotional support, and 7.9% (N=779) always/usually felt socially isolated from others. Around 70.3% (N=8371) of respondents had firearms that were not loaded, 14.4% (N=1544) had firearms loaded but locked and 15.4% (N=1807) had firearms loaded and unlocked in or around home.

Table 1 presents the characteristics of study participants by storage practices. Respondents who had firearms loaded and unlocked were predominantly men, aged 65+ years, maritally disrupted, retired, did not have children (aged <18 years) in household, had served on active duty in the armed forces and had not completed a college degree.

Figure 1 shows safe storage practices across each category of the three psychosocial constructs. Among respondents who rarely/never got emotional support, prevalence of non-adherence to safe storage practice was 7.7 percentage-points (pp) higher than that among those who always/usually received needed support. The non-adherence rate was 11.1 pp higher among respondents who were dissatisfied with their life compared to

Table 1 Characteristics of study participants by firearm storage practices

	All	Firearm storage practices			
		Not loaded	Loaded but locked	Loaded and unlocked	χ^2 test p value
Age					
18–49	44.37	44.78	46.66	40.32	0.012
50–64	27.59	27.22	31.49	25.65	
65+	28.05	28.01	21.84	34.04	
Sex					
Male	58.35	54.08	65.79	71.02	
Female	41.65	45.92	34.21	28.98	
Race and ethnicity					
White	61.95	62.02	62.29	61.29	0.066
Black	5.57	4.10	9.90	8.26	
Hispanic	17.73	19.19	12.91	15.57	
Asian	5.97	6.01	6.37	5.43	
Other	8.78	8.69	8.53	9.44	
Residence					
Urban	94.11	93.74	95.81	94.19	0.092
Rural	5.89	6.26	4.19	5.81	
Marital status					
Married	59.59	60.49	59.79	55.29	0.035
Widowed/ divorced/ separated	16.20	14.74	17.05	22.11	
Never married	19.15	19.72	17.07	18.48	
Unmarried couple	5.06	5.05	6.09	4.12	
Education					
High school or less	31.76	31.28	28.16	37.38	<0.001
Some college	35.33	33.48	39.77	39.68	
College graduate	32.91	35.24	32.07	22.95	
Employment					
Employed	58.02	57.89	66.22	50.87	0.004
Retired	26.45	25.90	20.93	34.18	
Other	15.53	16.21	12.85	14.95	
Children in household					
No	66.60	65.68	61.12	76.14	0.001
Yes	33.40	34.32	38.88	23.86	
Veteran					
No	83.90	86.21	79.30	77.59	<0.001
Yes	16.10	13.79	20.70	22.41	
Obs.	11 722	8371	1544	1807	

Estimates were obtained using complex survey weights. Shares add to 100 across rows for respective characteristics. Life satisfaction data were missing for 80 observations, emotional support data were missing for 133 observations, social isolation data were missing for 75 observations. Data for marital status, education and employment status were missing for 44, 15 and 48 observations, respectively.

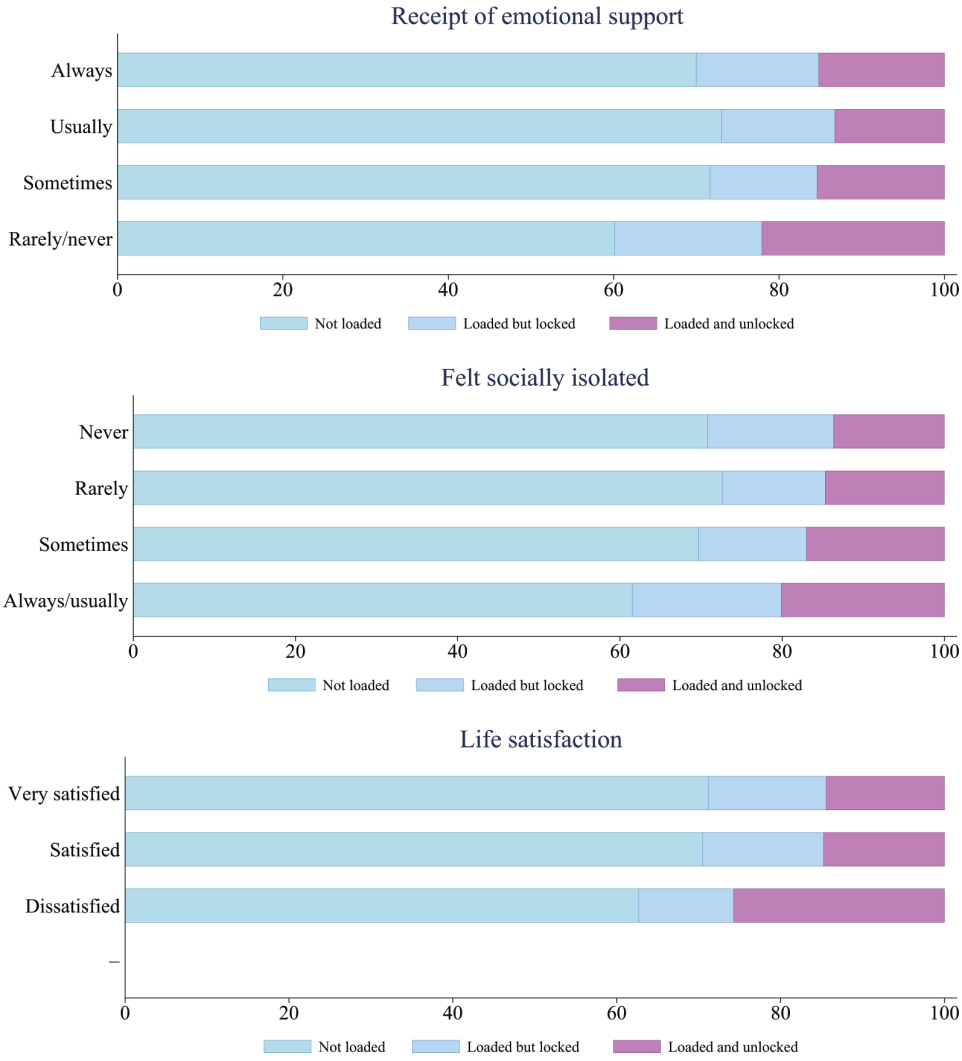

Figure 1 Distribution of gun safety practices by psychosocial factors. Note: Estimates were obtained using complex survey weights. Adjusted Wald tests were performed to assess differences in non-adherence to safe storage practice across categories of certain psychosocial well-being measures.

their counterparts who were satisfied/very satisfied. The rate was higher but not statistically significant among respondents who always/usually felt being socially isolated.

Relative risk ratios of storage practices relative to the base outcome of not loaded are presented in table 2. Respondents who rarely/never got needed emotional support were 1.69 times more likely to have firearms loaded and unlocked compared with their counterparts who always received support. The estimate was similar, though not statistically significant, when other covariates were accounted for. The unadjusted and adjusted relative risk of having firearms loaded and unlocked for respondents who usually/always felt being socially isolated were 1.70 and 1.72 times, respectively, compared with those of their counterparts who never felt being socially isolated. Lastly, respondents who were dissatisfied with their life were 2.02 times more likely to have firearms loaded and unlocked compared with those who were very satisfied with their life. The adjusted relative risks were also very similar, 1.82, when model covariates were accounted for.

DISCUSSION

This study showed that adverse psychosocial conditions were associated with non-adherence to safe storage practices at home. Individuals who were dissatisfied with their life and who usually/always felt socially isolated from others had a significantly higher risk of having firearms around them that were loaded and unlocked.

These findings were in line with existing evidence on the link between unsafe firearm storage and psychological issues including depression, suicidal ideation and perceived likelihood of a future suicide attempt.[14] Since psychosocial well-being is a predictor of suicidal ideation,[15] it may exert a complex influence on safe storage practices. Extant evidence suggests that firearm accessibility increases the risk of intentional self-harm and being a victim of homicide.[16] In contrast, adherence to safe storage practices may facilitate decrease the number of suicide and unintentional injuries especially involving children and adolescents.[17] As such, gun owner's psychosocial well-being could be used as a protective tool against firearm related suicide, and unintended injury and deaths.

A limitation of our analyses was that we did not have information about the number of firearms owned by the respondent. Neither did we know about the type of firearms or the reasons for owning firearms. Some studies suggested that these factors can be associated with safe storage practices,[18] and, therefore, controlling for these factors might yield more nuanced understanding of the relationship between safe storage practices and psychosocial factors. Further, we were unable to assess

Table 2 Relative risk ratios of firearm storage practices

	Unadjusted		Adjusted	
	Outcome I: Loaded but locked	Outcome II: Loaded and unlocked	Outcome I: Loaded but locked	Outcome II: Loaded and unlocked
Emotional support				
Always	Ref.	Ref.	Ref.	Ref.
Usually	0.887	0.835	0.869	0.901
	(0.697 to 1.129)	(0.625 to 1.116)	(0.678 to 1.113)	(0.681 to 1.192)
Sometimes	0.854	0.990	0.716	0.915
	(0.534 to 1.364)	(0.655 to 1.495)	(0.468 to 1.097)	(0.572 to 1.462)
Rarely/never	1.396	1.691*	1.263	1.458
	(0.914 to 2.132)	(1.089 to 2.625)	(0.821 to 1.945)	(0.893 to 2.383)
Socially isolated				
Never	Ref.	Ref.	Ref.	Ref.
Rarely	0.795	1.049	0.799	1.129
	(0.619 to 1.021)	(0.783 to 1.407)	(0.616 to 1.037)	(0.844 to 1.510)
Sometimes	0.868	1.266	0.870	1.270
	(0.634 to 1.188)	(0.888 to 1.807)	(0.624 to 1.213)	(0.881 to 1.831)
Usually/always	1.360	1.697*	1.324	1.716*
	(0.796 to 2.324)	(1.019 to 2.828)	(0.809 to 2.165)	(1.024 to 2.875)
Life satisfaction				
Very satisfied	Ref.	Ref.	Ref.	Ref.
Satisfied	1.033	1.032	0.952	0.904
	(0.821 to 1.301)	(0.795 to 1.339)	(0.757 to 1.197)	(0.684 to 1.194)
Dissatisfied	0.912	2.023*	0.907	1.816*
	(0.552 to 1.508)	(1.124 to 3.644)	(0.517 to 1.594)	(1.018 to 3.238)

Estimates were obtained using complex survey weights. 95% confidence intervals are in parenthesis. Not loaded is the base outcome. Adjustments were made for age, sex, race and ethnicity, marital status, urban/rural residence, educational attainment, employment status, presence of children in the household, veteran status, state of residence fixed effects and interview month fixed effects.
***p<0.001, **p<0.01, *p<0.05.

respondent's risk perceptions regarding guns and household safety, which could directly influence storage practices.[19] Future studies with appropriate data may explore these intricate and multifaceted relationships in the context of life satisfaction, feeling of social isolation and receipt of social support.

Nevertheless, our findings advanced the knowledge base by offering an important link between psychosocial well-being and safe storage practices. Given the societal costs of firearm injuries in the USA which entail direct medical care costs, law enforcement costs and costs of prosecution and incarceration, as well as indirect costs through lost productivity of the shooting victims,[20] concerted and multifaceted policy efforts are needed to improve compliance of safe storage practices. The influence of psychosocial factors on safe storage practice can be an integral piece of such comprehensive effort.

CONCLUSION

In conclusion, policy interventions to uplift psychosocial well-being at the individual, institutional and community level can play a role in improving adherence to safe storage practices at home. Since non-adherence to safe storage practice is associated with the risk of suicide, non-fatal injury and homicide, improving psychosocial well-being may help reduce firearm-related suicide, and unintentional deaths and injuries.

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ORCID iD

Biplab Kumar Datta http://orcid.org/0000-0002-2559-850X

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