Perceptions of the utility of secure firearm storage methods as a suicide prevention tool among firearm owners who currently store their firearms loaded and unlocked

Michael D. Anestis, PhD[1,2], Allison E. Bond, MA[1,3], Jayna Moceri-Brooks, PhD[1], Shelby L. Bandel, MS[1,3], & Daniel Semenza, PhD [1,2,4]

[1] New Jersey Gun Violence Research Center

[2] School of Public Health, Rutgers, the State University of New Jersey

[3] Department of Psychology, Rutgers, the State University of New Jersey

[4] Department of Sociology, Anthropology, and Criminal Justice, Rutgers-Camden

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Correspondence can be sent to Michael D. Anestis, PhD; Executive Director, New Jersey Gun Violence Research Center; Associate Professor, School of Public Health, Rutgers, the State University of New Jersey; 683 Hoes Lane West, Piscataway, NJ 08854; mda141@sph.rutgers.edu

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Abstract

Background: Although secure firearm storage can prevent firearm injury and death, secure storage is relatively rare. This tendency may be driven in part by a perceived lack of utility for secure storage in preventing suicide and other gun violence-related outcomes.

Method: We recruited a large (n = 3,510) representative sample of residents from five US states and assessed the degree to which those who do and do not store their firearms securely perceive different utility in specific firearm storage practices for suicide prevention. To test for specificity, we examined if those differences hold when considering unintentional shooting and firearm theft prevention.

Results: Those who currently store their firearms unsecured reported lower perceived utility in several firearm storage practices, particularly for suicide and theft prevention.

Conclusions: Our findings highlight that a lack of perceived utility in secure firearm storage may partially drive unsecure firearm storage. Efforts to promote secure storage must address this misperception.

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Firearms account for more than half of all suicides in the US annually (Centers for Disease Control and Prevention, 2023). Research has demonstrated that not only does the presence of a firearm in the home increase the risk for suicide death for all household members (Anestis & Houstma, 2018; Simon, 2007), but also that unsecure (e.g. loaded & unlocked) firearm storage further increases that risk (Shanessa, Rogers, Spalding, & Roberts, 2004). Although the precise impact of secure firearm storage on suicide risk is unknown and some have contended that secure storage would prove ineffective (e.g. Langmann, 2021), research to date – particularly within the US – is largely consistent with the notion that securing a firearm in the home would bestow some level of protection against death by suicide (e.g. Kposowa, Hamilton, & Wang, 2016; Monuteaux, Azrael, & Miller, 2019). Despite this, several epidemiological surveys across a variety of diverse firearm owning communities demonstrated that only a minority of firearm owners routinely engage in secure firearm storage (Azrael, Cohen, Sahli, & Miller, 2018; Carter et al., 2022). Prior research also showed that those who currently store firearms unsecured are less willing than other firearm owners to adopt secure firearm storage methods. This resistance is partially explained by beliefs that individuals thwarted in accessing a specific method for suicide will find another method to die (Anestis, Butterworth, & Houtsma, 2018) and a general pattern for firearm owners to see value in secure storage more clearly when children are in the home (e.g. Aitken et al., 2020; Baxley & Miller, 2006; Ye, Thatipamala, & Siegel, 2022).

Recent research examining methods for promoting secure firearm storage has highlighted that lethal means counseling can prompt meaningful and sustained changes in firearm storage behavior (Anestis, Bryan, Capron, & Bryan, 2021). Additionally, a recent randomized trial of visual messages on secure firearm storage for suicide prevention demonstrated that messaging by trusted voices (e.g. law enforcement) can prompt increased willingness to adopt specific secure firearm storage practices among firearm-owning US military service members who currently store their firearms unsecured (Anestis, Bryan, Capron, & Bryan, 2022). Although promising, the generally low rates of secure storage and the imperfect results for interventions promoting secure storage indicate that firearm owners may be skeptical that secure storage is useful for suicide prevention. Thus far, research specifically examining such skepticism has been limited both with respect to the range of storage methods examined and the representativeness of the samples collected (Anestis, Butterworth, & Houstma, 2018).

To address these gaps, we recruited a large sample of US adults from five diverse states that vary in their demographic composition, firearm ownership rates, and rates of gun violence, and examined whether individuals who do and do not store their firearms securely differ in their perceived utility of specific firearm storage methods as suicide prevention tools. To test the specificity of our findings to suicide prevention, we then examined differences in the perceived utility of these same firearm storage methods for preventing unintentional shootings and firearm theft. Although preliminary, our findings can help clarify an important factor driving the limited use of secure firearm storage and provide guidance for messaging campaigns with respect to which storage methods and storage motivations may prompt the most positive response.

Method

A representative sample (n = 3,510) of residents from five states – Colorado (n = 415), Minnesota (n = 673), Mississippi (n = 178), New Jersey (n = 540), and Texas (n = 1,704) – was recruited for this study via KnowledgePanel (KP), a panel of US adults recruited via probability-based sampling methods and maintained by Ipsos (Table 1). Data were collected between April 29 and May 15, 2022 (58% completion rate). Detailed information regarding weighting procedures for this study is available (Bond et al., 2023).

Our analyses focused specifically on firearm owners (n = 941) and examined the extent to which individuals who do (n = 223) and do not (n = 718) store their firearms securely (unloaded and locked) differ in their perceptions of the utility of specific firearm storage practices as suicide prevention tools. We examined seven different storage practices: (1) unloaded (2) separate from ammunition (3) in a locked location (e.g. gun safe, lock box) (4) with a locking device (e.g. trigger lock, cable locks) (5) away from home (6) in a vehicle and (7) on a high shelf. For each storage method, participants utilized a four-point Likert scale ranging from (0 - Not at all) to (4 - Extremely helpful) to indicate the degree to which they believed the method would be helpful for preventing suicide, unintentional shootings, and theft. To test the specificity of these perceptions with respect to suicide prevention, we also assessed between group differences in the perceived utility of each of these storage practices in the prevention of two other gun violence-related outcomes: (1) unintentional shootings and (2) firearm theft.

To test our models, we ran three multivariate analyses of covariance (MANOVAs), with each form of gun violence-related outcome serving as the dependent variable in one analysis. In each analysis, we covaried for age, gender, racial identity, political beliefs, intolerance of uncertainty, rurality, perceived neighborhood safety, and the presence of kids (age 0-17) in the home. Partial eta squared served as the index of effect size.

Results

Results of our primary analyses are displayed in Table 2. The findings indicated that the two groups significantly differed in their perception of the utility of a range of storage practices with respect to suicide prevention (Wilks $\lambda = .93$; $p < .001$; $_p\eta^2 = .07$). Specifically, those who stored their firearms loaded in a closet/drawer perceived less suicide prevention utility in storing firearms unloaded (1.77 vs 2.47; $F = 49.91$, $p < .001$, $_p\eta^2 = .06$), separate from ammunition (1.84 vs 2.49; $F = 42.23$, $p < .001$, $_p\eta^2 = .05$), in a locked location (2.47 vs 3.01; $F = 35.25$, $p < .001$, $_p\eta^2 = .04$), and with a locking device (2.33 vs 2.81; $F = 26.33$, $p < .001$, $_p\eta^2 = .03$).

In our analyses examining between group differences in the perceived utility of specific firearm storage methods in the prevention of unintentional shootings (Wilks $\lambda = .98$; $p = .011$; $_p\eta^2 = .02$), the groups only differed in their perceived utility of storing firearms in a locked location, with those who currently store their firearms unsecured exhibiting less perceived utility in this method (3.27 vs 3.47; $F = 7.64$, $p = .006$, $_p\eta^2 = .01$).

In our analyses examining between group differences in the perceived utility of specific firearm storage methods in the prevention of firearm theft, the groups differed on several methods (Wilks $\lambda = .98$; $p = .002$; $_p\eta^2 = .03$). Those who currently store their firearms unsecured indicated less perceived utility in storing firearms unloaded (0.45 vs 0.82; $F = 12.55$, $p < .001$, $_p\eta^2 = .01$), separate from ammunition (0.52 vs 0.85; $F = 10.66$, $p = .001$, $_p\eta^2 = .01$), in a locked location (2.65 vs 2.87; $F = 5.62$, $p = .018$, $_p\eta^2 = .01$), and with a locking device (1.18 vs 1.55; $F = 10.53$, $p = .001$, $_p\eta^2 = .01$).

Discussion

In this study, we sought to examine the extent to which firearm owners who do and do not store their firearms securely differ in their perceptions of the utility of specific firearm storage practices as suicide prevention tools. We then tested the specificity of those effects across various gun-violence related outcomes. Overall, our results indicated several noteworthy points.

First, across storage methods, the perceived utility of secure storage was relatively low. Even among those who currently store their firearms securely, the mean level of perceived utility of secure storage practices rarely exceeded "moderately helpful." This finding highlights a discrepancy between data and public perception and demonstrates the importance of increasing public awareness of the potential utility in secure firearm storage for preventing firearm injury and death.

Second, secure storage methods were generally seen as more helpful for suicide prevention and unintentional shootings than for theft prevention, a finding with implications for messaging campaigns aiming to promote secure firearm storage. If firearm owners with unsecure storage practices view secure storage as having its greatest potential impact for suicide prevention and unintentional shootings, efforts to promote secure firearm storage should not shy away from emphasizing this value in their messages.

Third, among those currently storing firearms unsecured, the perceived utility of storing firearms using locking devices or in a locked location was higher relative to other methods, albeit never quite reaching "very helpful" as a mean score. Efforts promoting these specific methods may thus yield the greatest likelihood of changes in firearm storage practices. These findings also align with prior work on lethal means counseling, which demonstrated that interventions that promote secure firearm storage may yield increased usage of gun safes, cable locks, and trigger locks, but have minimal impact on load status (Anestis, Bryan, Capron, & Bryan, 2022).

Although not central to our hypotheses, individuals who endorsed storing firearms loaded and unlocked differed from those who stored their firearms unloaded and/or locked on several variables that served as covariates in our analyses. For instance, those who stored their firearms less securely were less likely to endorse having children in the home and less likely to have advanced degrees or high annual incomes ($150,000+). These individuals also endorsed less perceived neighborhood safety and less tolerance of uncertainty. Taken together, it appears that having children present in the home – whether due to safety concerns or statewide child access policies – may protect against particularly unsecure firearm storage and that those with greater education may be more disposed to secure their firearms. Additionally, a perception of danger in one's neighborhood – although not necessarily actual danger – as well as less comfort with ambiguity regarding how situations will be resolved may prompt individuals to be more likely to keep a firearm staged so that it is readily accessible and armed for immediate discharge. These latter two findings are consistent with prior literature on the role of these variables in prompting the intent to purchase firearms (Anestis & Bryan, 2021) and actual firearm purchasing behavior (Anestis, Bandel, Bond, & Bryan, 2023) and highlight that the drive for self-protection may heavily influence unsecure firearm storage.

Several limitations are worth noting. First, our findings were self-report and cross-sectional and, as such, were vulnerable to bias and incapable of facilitating causal interpretations. For instance, even within the context of our de-identified data, participants may have responded in a manner they felt

presented them in the most positive manner or which understated responses on sensitive issues. Second, although our sample was representative of the states included in the survey, the generalizability to other states is open to question. As noted earlier, these states were selected due to their heterogeneity across domains relevant to this and related studies. National samples, while informative, fail to provide a thorough assessment of communities more heavily represented in smaller states and thus emphasize results from large states (e.g. California) in a manner that may misrepresent the diversity of some communities. We believe our representation of these states is a strength, but it nonetheless limited generalizability. Third, a precise definition of secure storage has not been settled upon and some firearm owners may view forms of storage (e.g. loaded in a locked container) secure that were not captured in our data. Future work should provide a more nuanced assessment in this regard. Fourth, effect sizes for most significant findings were either small or small-to-medium, with only results related to suicide prevention registering within the medium range. Other variables – including differences in statewide policies regarding how firearms can be stored in the home – undoubtedly explain meaningful degrees of variability in storage practices across states.

Overall, our findings emphasize that firearm owners generally do not see the utility in secure storage practices for reducing firearm injury and death, and as a result there is a lack of engagement in these practices. Large scale shifts in firearm storage will likely require multifaceted efforts aimed at shifting societal norms on the perceived utility of secure storage across forms of gun violence. Such efforts might include broad public health messaging efforts that leverage credible messengers (e.g. law enforcement, military veterans) in an effort to increase awareness of the actual costs and benefits of various firearm storage options. Additionally, recent research has examined firearm owners' preferences for specific locking devices and it may be that addressing the troubling components of our findings may require ensuring that programs involving the distribution of locking devices emphasize the options preferred by firearm owners. Ready and affordable access to specific firearm storage devices may increase their use and more widespread use of the devices may influence the perceived utility of secure storage more broadly.

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Table 1. Sample characteristics.

	All Firearm Owners	Loaded and Unlocked	Unloaded and/or Locked	
Sample Size	941	223	718	
	%	%	%	
Gender				$X^2 = 0.04$; $p = .852$
Male	65.9	66.4	65.7	
Female	34.1	33.6	34.3	
Race				$X^2 = 0.51$; p - .773
American Indian/Alaskan Native	0.3	1.0	0.0	
Asian	2.8	0.7	3.4	
Black/African American	8.6	9.7	8.3	
Caribbean Black	0.0	0.0	0.0	
Indo Caribbean	0.5	0.0	0.7	
Native Hawaiian/Pacific Islander	0.0	0.0	0.0	
White	80.7	80.5	81.4	
Other	6.6	8.1	6.2	
Rurality				$X^2 = 4.31$; $p = .116$
Non-Metropolitan Rural	53.1	57.8	51.6	
Metropolitan Rural	24.0	24.3	23.9	
Urban	22.8	17.9	24.4	
Political Beliefs				$X^2 = 7.25$; $p = .123$
Highly Conservative	19.1	22.3	18.3	
Somewhat Conservative	28.0	31.9	27.0	
Moderate	36.5	34.5	37.6	
Somewhat Liberal	11.6	8.1	12.9	
Highly Liberal	4.0	3.2	4.2	
Children in Home (Age 0-17)				$X^2 = 16.83$; $p < .001$
Yes	35.6	24.0	39.1	
No	64.4	76.0	60.9	
Household Income				$X^2 = 22.49$; $p < .001$
Less than $10,000	1.5	0.5	1.8	
$10,000-$24,999	3.8	3.0	4.1	

$25,000-$49,999	13.5	13.5	13.5	
$50,000-$74,999	17.6	24.2	15.5	
$75,000-$99,999	17.9	23.2	16.2	
$100,000-$149,999	23.6	21.0	24.4	
$150,000 or more	22.2	14.7	24.5	
Education				$X^2 = 14.38$; $p = .002$
No High School Diploma or GED	8.0	4.7	9.0	
High School Diploma or GED	24.9	26.7	24.4	
Some College or Associate's Degree	33.8	42.3	31.1	
Bachelor's Degree or Higher	33.3	26.2	35.5	
Age				$X^2 = 12.17$; $p = .007$
18-29	10.6	14.0	9.5	
30-44	27.3	19.7	29.7	
45-59	30.3	29.3	30.7	
60+	31.8	37.1	30.1	
Sexual Identity				$X^2 = 10.87$; $p = .093$
Heterosexual	92.6	90.4	93.6	
Gay or Lesbian	1.2	0.7	1.3	
Bisexual	2.6	4.7	2.0	
Pansexual	0.6	0.1	0.7	
Asexual	0.5	1.1	0.3	
Other	0.8	0.7	0.8	
Do Not Wish to Disclose	1.5	2.3	1.3	
	M (SD)	M (SD)	M (SD)	
Perceived Neighborhood Safety	6.89 (2.69)	6.92 (2.82)	6.22 (2.58)	$F = 12.05$; $p < .001$
Intolerance of Uncertainty	19.07 (5.62)	20.66 (5.53)	18.35 (5.38)	$F = 30.98$; $p < .001$
State	N	N (% of state)	N (% of State)	$X^2 = 48.93$; $p < .001$
Colorado	119	17 (14.3)	102 (85.7)	
Minnesota	109	13 (11.9)	96 (88.1)	
Mississippi	75	27 (36.0)	48 (64.0)	
New Jersey	77	2 (2.6)	75 (97.4)	
Texas	561	164 (29.2)	397 (70.8)	

Note: Higher scores indicated less perceived neighborhood safety.

Table 2. Results of analyses of covariance from each multivariate analysis of covariance comparing those who do and do not store their firearms securely on their perception of the utility of specific firearm storage practices for preventing specific gun-violence related outcomes.

	Loaded, in Closet or Drawer				
	Yes	No			
Sample Size	205	675			
Firearm Theft Prevention	EMM (SE)	EMM (SE)	F	p	η_p^2
Unloaded	0.45 (0.09)	0.82 (0.05)	12.55	<.001	.01
Separate from Ammunition	0.52 (0.09)	0.85 (0.05)	10.66	.001	.01
Locked Location (e.g. gun safe, lock box)	2.65 (0.08)	2.87 (0.04)	5.62	.018	.01
Locking Device (e.g. cable lock, trigger lock)	1.18 (0.10)	1.55 (0.05)	10.53	.001	.01
Away from Home	1.81 (0.10)	1.87 (0.05)	0.21	.649	.00
In Vehicle	0.63 (0.08)	0.73 (0.04)	1.28	.258	.00
On a High Shelf	0.60 (0.07)	0.65 (0.04)	0.38	.540	.00

	Loaded, in Closet or Drawer				
	Yes	No			
Sample Size	206	661			
Suicide Prevention	EMM (SE)	EMM (SE)	F	p	η_p^2
Unloaded	1.77 (0.09)	2.47 (0.05)	49.91	<.001	.06
Separate from Ammunition	1.84 (0.09)	2.49 (0.05)	42.23	<.001	.05
Locked Location (e.g. gun safe, lock box)	2.47 (0.08)	3.01 (0.04)	35.25	<.001	.04
Locking Device (e.g. cable lock, trigger lock)	2.33 (0.08)	2.81 (0.04)	26.33	<.001	.03
Away from Home	2.70 (0.09)	2.78 (0.05)	0.53	.468	.00
In Vehicle	1.09 (0.08)	0.99 (0.04)	1.39	.238	.00
On a High Shelf	0.85 (0.08)	0.94 (0.04)	1.07	.301	.00

	Loaded, in Closet or Drawer				
	Yes	No			
Sample Size	205	671			
Unintentional Shooting Prevention	EMM (SE)	EMM (SE)	F	p	η_p^2
Unloaded	2.99 (0.07)	3.07 (0.04)	0.76	.385	.00
Separate from Ammunition	2.89 (0.08)	3.03 (0.04)	2.46	.117	.00
Locked Location (e.g. gun safe, lock box)	3.27 (0.06)	3.47 (0.03)	7.64	.006	.01
Locking Device (e.g. cable lock, trigger lock)	3.22 (0.07)	3.28 (0.04)	0.52	.472	.00
Away from Home	2.94 (0.10)	2.82 (0.05)	1.16	.282	.00
In Vehicle	1.23 (0.09)	1.07 (0.05)	2.71	.100	.00
On a High Shelf	1.26 (0.09)	1.15 (0.05)	1.23	.268	.00

Note: Perceived utility of storage methods scored as follows: (0) Not at all (1) Not particularly helpful (2) Moderately helpful (3) Very helpful (4) Extremely helpful.