

Loaded Handgun Carrying Among US Adults, 2015


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Objectives. To determine the frequency of loaded handgun carrying among US adult handgun owners, characterize those who carry, and examine concealed carrying by state concealed carry laws.

Methods. Using a nationally representative survey of US adults in 2015, we asked handgun owners (n = 1444) about their past-30-day carrying behavior.

Results. Among surveyed handgun owners, 24% (95% confidence interval [CI] = 21%, 26%) carried loaded handguns monthly, of whom 35% (95% CI = 29%, 41%) did so daily; 82% (95% CI = 77%, 86%) carried primarily for protection. The proportion of handgun owners who carried concealed loaded handguns in the past 30 days was 21% (95% CI = 12%, 35%) in unrestricted states, 25% (95% CI = 21%, 29%) in shall issue—no discretion states, 20% (95% CI = 16%, 24%) in shall issue—limited discretion states, and 9% (95% CI = 6%, 15%) in may-issue states.

Conclusions. We estimate that 9 million US adult handgun owners carry loaded handguns monthly, 3 million do so every day, and most report protection as the main carrying reason. Proportionally fewer handgun owners carry concealed loaded handguns in states that allow issuing authorities substantial discretion in granting carrying permits. (*Am J Public Health.* 2017;107:1930–1936. doi:10.2105/AJPH.2017.304072)

 See also Galea and Vaughan, p. 1867.

In the United States, states regulate if, where, and how (i.e., concealed or openly) their residents may carry handguns. State concealed carry laws allow handgun owners, under certain conditions, to carry concealed handguns on their person, in a vehicle, or in certain public settings (e.g., schools, government buildings, and state and national parks).¹ State laws regulating concealed handgun carrying can currently be divided into the following 4 types: (1) unrestricted: no permit is required; (2) shall issue—no discretion: the issuing authority is required to grant a permit to anyone who meets certain minimal statutory requirements (e.g., a person who is not a convicted felon); (3) shall issue—limited discretion: the issuing authority has limited discretion (e.g., a permit may be denied if there is reasonable suspicion to believe that the applicant is a danger to self or others); (4) may issue: the issuing authority has full discretion to approve or deny a concealed carry permit to an applicant (e.g., the denial can occur if the authority believes that

the applicant lacks good character or lacks a good reason for carrying a handgun in public).^{1,2}

State laws regulating handgun carrying have become more permissive in the past 30 years.^{1–5} In 1986, there were 25 may-issue states.² By 2015, the number of may-issue states had declined to 9.² The remaining states were either shall issue—limited discretion (n = 17), shall issue—no discretion (n = 18), or unrestricted (n = 6). The number of concealed carry permit holders grew in parallel, from

2.7 million in 1999 to 4.6 million in 2007, 11 million in 2014, and 14.5 million in 2016.^{1,6}

The extent to which state laws and increases in permit issuance reflect changes in firearm carrying behavior, however, is unknown. In fact, no contemporary nationally representative study has ascertained why, how frequently, or in what manner (i.e., concealed or openly) US adults carry loaded handguns. To our knowledge, only a few nationally representative peer-reviewed surveys have examined firearm carrying by US adults,^{7–9} the most recent of which used data from the 1995 to 1996 National Violence Against Women and Men (NVAW) Survey.⁸ In the NVAW, 8000 women and 8000 men were asked, “Do you ever carry something with you to defend yourself or to alert other people?” Those who responded affirmatively were then asked, “What do you carry?” The NVAW found that 7.8% of the sample, including 3.2% of women and 12.4% of men, had ever carried a firearm to defend themselves or to alert other people. Because no data on firearm ownership were collected, however, the survey did not provide any information on whether individuals who reported not having carried a firearm owned one. Additionally, the survey neither included information on carrying for reasons other than protection nor distinguished between different types of firearms.

We used nationally representative survey data from 2015 to describe the frequency with which US adults who own handguns carry

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loaded handguns, characterize handgun owners who carry loaded handguns, and examine the extent to which the proportion of handgun owners who carry concealed handguns differs by the stringency of state laws regulating concealed carry permits.

METHODS

Data for this analysis came from a Web-based nationally representative survey (The National Firearms Survey) designed by the investigators (D. A. and M. M.) to describe firearm ownership, storage, and use in the United States. The survey was conducted by the firm Growth for Knowledge (GfK) in April 2015. Respondents were drawn from GfK's KnowledgePanel, composed of approximately 55 000 US adults sampled on an ongoing basis. Invitations to participate were sent by e-mail; 1 reminder e-mail was sent to nonresponders 3 days later. All panel members, except those serving in the US Armed Forces at the time of the survey, were eligible to participate. To ensure reliable national estimates, firearm owners and veterans were oversampled by GfK from the KnowledgePanel. Participants did not receive any specific incentive to complete this survey, although GfK has a point-based program through which participants accrue points for completing surveys and can redeem them later for cash, merchandise, or participation in sweepstakes. Additional details about the survey design and participants are available elsewhere.¹⁰

Of the 7318 invited panel members who received the survey, 4165 began the survey and 3949 completed it (excluding 48 active-duty military personnel who began the survey but were ineligible to complete it). This yielded a survey completion proportion 55% based on the formula recommended for calculating response proportions for Web panels.¹¹ Respondents were more likely than nonrespondents to be younger, female, unmarried, less educated, and living in metropolitan areas. Respondents were about as likely as nonrespondents to live in a firearm-owning house, but were more likely to personally own a firearm.

For this analysis, we only included respondents who indicated that they were a handgun owner at the time of survey completion. Among all respondents, 1521

reported owning at least 1 handgun. We excluded records of handgun owners who were police officers ($n = 66$) since their profession involves firearm carrying, those who did not answer the question about employment ($n = 3$), and those who refused to disclose if they had carried a loaded handgun in the past 30 days ($n = 8$), resulting in a final sample size of 1444 for this analysis.

Measures

We determined firearm ownership status on the basis of responses to 2 questions. The first question asked, "Do you or does anyone else you live with currently own any type of gun?" Those who answered affirmatively were then asked, "Do you personally own a gun?" Firearm owners were then asked about the type of firearm owned (i.e., handgun, long gun, or both).

For this analysis, outcome measures were handgun-owning survey respondents' answers to 4 questions about carrying loaded handguns on their person and away from home. The initial prompt regarding carrying made it clear that the questions were all about firearm carrying away from the home: "The next questions ask about times in the past 30 days when you may have carried a gun away from home." The survey focused exclusively on respondents' carrying on their person, and not in a vehicle, since the laws in many states effectively treat citizens' vehicles as extensions of their homes.⁹ Respondents were asked, "In the past 30 days, have you carried a loaded handgun on your person?" Those who answered affirmatively were then asked about the number of days that they had carried (range = 0–30), whether they carried openly or concealed, and the primary reason for carrying.

Additional survey domains included respondents' demographic characteristics, presence of children in the home by specific age groups, growing up in a firearm-owning household, political views, veteran status, being threatened with a firearm in the past, fear of violence in the neighborhood, type of firearm owned, and owning a concealed carry permit. Key survey questions related to this analysis are provided in Appendix A (available as a supplement to the online version of this article at <http://www.ajph.org>). For this analysis, we obtained information about

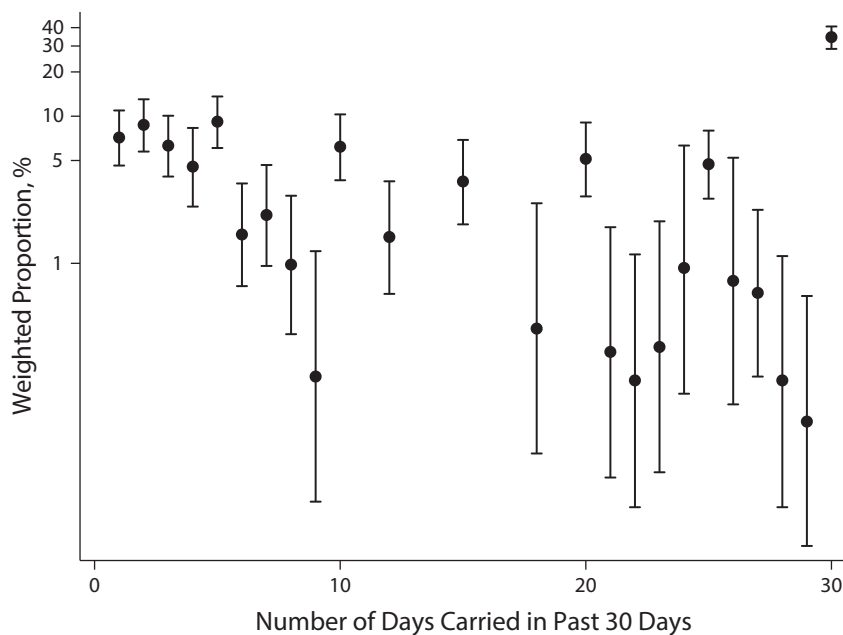
state concealed carry laws as of April 2015 from the Law Center to Prevent Gun Violence.²

Statistical Analysis

GfK provided final survey weights that combined presample and study-specific poststratification weights accounting for oversampling and nonresponse. We applied weights such that estimates from the survey are representative of US adults aged 18 years and older. We calculated weighted percentages and their corresponding 95% confidence intervals for each measure. We described sociodemographic characteristics of handgun owners by their past-30-day handgun carrying status (i.e., did carry or did not carry). We described carrying-related characteristics of handgun owners who carried their handgun (concealed or openly) in the past 30 days by tertile of carrying frequency (1–6 days, 7–29 days, or 30 days). We calculated the proportion of handgun owners who carried concealed loaded handguns in the past 30 days for each of the 4 types of state concealed carry laws stratified by individual concealed carry permit ownership. We conducted all analyses in Stata Version 14 (StataCorp LP, College Station, TX) using the SVY suite of commands.

RESULTS

Approximately 1 in 4 handgun owners (23.5%; 95% confidence interval [CI] = 21.0%, 26.2%) reported having carried a loaded handgun in the past 30 days. Of those, about 1 in 3 (34.5%; 95% CI = 28.7, 40.7) reported doing so every day (Figure 1). Compared with handgun owners who did not carry a loaded handgun, a greater proportion of those who carried were aged 18 to 29 years, male, self-identified as conservative, lived in Southern regions of the United States, grew up in a firearm-owning household, owned both handguns and long guns, and had been threatened with a firearm in the past 5 years (Table 1). The distribution of race, educational attainment, annual household income, urbanicity of residence, presence of children in the household, veteran status, and perception of neighborhood violence was not notably different between handgun owners who carried and those who did not.



Note. Error bars indicate 95% confidence intervals. The y-axis is on the logarithmic scale.

FIGURE 1—Distribution of Carrying Days Among Handgun Owners Who Carried a Loaded Handgun in the Past 30 Days (n = 328): National Firearms Survey, United States, 2015

Most handgun owners who carried a loaded handgun did so primarily for protection (82.2%; 95% CI = 77.1%, 86.4%). Of those who carried, about two thirds always carried concealed (65.9%; 95% CI = 59.6%, 71.7%) and 10.6% (95% CI = 7.4%, 14.9%) always carried openly. Compared with handgun owners who carried for less than 7 days, a greater proportion of those who carried for at least 7 days did so for protection and always carried concealed (Appendix B, available as a supplement to the online version of this article at <http://www.ajph.org>).

The proportion of handgun owners who carried a concealed loaded handgun in the past 30 days was 21.1% (95% CI = 11.7%, 35.1%) among those living in unrestricted states, 25.2% (95% CI = 21.5%, 29.3%) in shall issue—no discretion states, 20.1% (95% CI = 16.2%, 24.5%) in shall issue—limited discretion states, and 9.1% (95% CI = 5.6%, 14.6%) in may-issue states (*P* for overall difference < .001). Some handgun owners carried a concealed loaded handgun without a concealed carry permit, even in states in which a permit was required (Table 2). Among handgun owners without a concealed carry permit, proportionally fewer respondents carried a concealed loaded

handgun in states that allowed issuing authorities increasing discretion in granting carrying permits (*P* for trend = .003).

DISCUSSION

Consistent with the increasing number of permit holders, on the basis of our survey results, we estimate that nearly 1 in 4 of the approximately 38 million adult handgun owners in the United States¹² carried a loaded handgun on their person in the past 30 days. Of those who carried, 1 in 3 carried every day, 4 in 5 carried primarily for protection, 4 in 5 had a concealed carry permit, 2 in 3 always carried concealed, and 1 in 10 always carried openly.

We also found that proportionally fewer handgun owners in our survey carried a concealed loaded handgun in the past 30 days if they lived in states with laws that allowed issuing authorities to exercise substantial discretion in granting concealed carry permits. The prevalence of carrying was notably smaller in may-issue states than other states, with no appreciable difference between unrestricted and shall-issue states. The

proportion of handgun owners who reported concealed carrying without a permit varied inversely in a dose–response pattern across states defined by the stringency of their concealed carry laws. These results suggest that when permit-issuing authorities are accorded substantial discretion, concealed carrying by persons not granted permits may be reduced. An alternative explanation is that it is more difficult to pass stringent laws regulating handgun carrying in states where carrying is more common.

Previous studies, as well as the present study, have consistently found political conservatism and Southern area of residence to be associated with permit issuance or carrying behavior. Literature suggests that “gun culture” involves learned behavior that promotes firearms as a normative form of self-defense.¹³ It has been postulated that people who are comfortable with guns and socialize into gun culture will be most likely to obtain concealed carry permits.¹⁴ Consistent with this assumption, we found greater proportions of handgun carrying among handgun owners who lived in Southern regions of the country, grew up in firearm-owning households, identified as politically conservative, and had more than 1 type of firearm than among those who did not have these characteristics.

Findings from our 2015 survey substantially add to, and update, the limited body of knowledge available on firearm carrying among US adults. Two national surveys containing information on firearm carrying among US adults conducted prior to the NVAW include the 1994 National Survey of the Private Ownership of Firearms (NSPOF)⁷ and the 1994 National Self-Defense Survey (NSDS).⁹ The NSPOF asked those respondents who owned a gun about carrying a particular firearm randomly selected from their personal gun stock, using the following question: “Where do you usually keep this gun?” The 2 possible answers were “with you, on you” and “in car, truck.” The survey found that 8.7% of gun owners had usually carried on their person. The NSPOF also found that 7.5% of gun owners had carried a gun for protection at least once in the past 12 months.

In the NSDS, the respondents were asked, “In the last 12 months, have you ever carried a gun away from home, either on your person or in a vehicle, for protection against crime?”

TABLE 1—Characteristics of Handgun Owners by Past-30-Day Loaded Handgun Carrying Status: National Firearms Survey, United States, 2015

Characteristic	Did Not Carry (n = 1116), % (95% CI)	Carried (n = 328), % (95% CI)	Total (n = 1444), % (95% CI)
All respondents	76.5 (73.8, 79.0)	23.5 (21.0, 26.2)	100
Age, y			
18–29	8.4 (6.4, 10.9)	15.0 (10.6, 20.8)	9.9 (8.0, 12.2)
30–44	21.9 (19.0, 25.1)	27.3 (21.6, 33.8)	23.2 (20.6, 26.0)
45–59	30.8 (27.8, 33.9)	32.6 (27.1, 38.7)	31.2 (28.5, 34.0)
≥ 60	39.0 (35.8, 42.3)	25.1 (20.7, 30.2)	35.7 (33.0, 38.5)
Gender			
Male	65.5 (62.2, 68.8)	78.8 (72.9, 83.8)	68.7 (65.7, 71.4)
Female	34.5 (31.2, 37.9)	21.2 (16.2, 27.1)	31.3 (28.6, 34.3)
Race/ethnicity			
Non-Hispanic White	78.6 (75.2, 81.7)	77.2 (70.6, 82.8)	78.3 (75.3, 81.1)
Non-Hispanic Black	8.8 (6.7, 11.3)	6.6 (3.9, 11.0)	8.3 (6.5, 10.4)
Non-Hispanic Other	4.1 (2.9, 5.9)	4.9 (2.5, 9.4)	4.3 (3.2, 5.9)
Hispanic	8.5 (6.4, 11.3)	11.2 (7.1, 17.2)	9.2 (7.2, 11.6)
Education			
< high school	5.7 (4.3, 7.5)	5.2 (3.0, 8.8)	5.6 (4.3, 7.1)
High school	31.4 (28.2, 34.8)	31.4 (25.7, 37.7)	31.4 (28.6, 34.4)
Some college	34.1 (30.9, 37.4)	38.3 (32.4, 44.6)	35.1 (32.3, 38.0)
College degree	28.8 (26.0, 31.8)	25.1 (20.2, 30.7)	27.9 (25.5, 30.6)
Annual household income, \$			
< 25 000	10.9 (8.9, 13.3)	10.5 (7.2, 15.2)	10.8 (9.1, 12.9)
25 000–74 999	41.1 (37.8, 44.6)	35.4 (29.6, 41.6)	39.8 (36.9, 42.8)
75 000–124 999	31.4 (28.3, 34.6)	36.7 (30.8, 43.0)	32.6 (29.8, 35.5)
≥ 125 000	16.6 (14.3, 19.1)	17.4 (13.2, 22.6)	16.8 (14.7, 19.0)
Community			
Urban	17.0 (14.4, 19.9)	15.5 (11.3, 20.9)	16.6 (14.4, 19.1)
Suburban	46.2 (42.8, 49.6)	46.4 (40.2, 52.7)	46.3 (43.3, 49.3)
Rural	36.9 (33.6, 40.2)	38.1 (32.2, 44.4)	37.1 (34.3, 40.1)
Children (< 18 y) in household			
None	75.8 (72.6, 78.6)	73.2 (67.0, 78.5)	75.1 (72.4, 77.7)
≥ 1 child in household	24.3 (21.4, 27.4)	26.9 (21.5, 33.0)	24.9 (22.3, 27.6)
≥ 1 child aged birth–5 y	10.2 (8.2, 12.6)	10.3 (6.9, 15.0)	10.2 (8.5, 12.3)
≥ 1 child aged 6–12 y	11.0 (9.0, 13.4)	12.5 (8.6, 17.9)	11.4 (9.5, 13.5)
≥ 1 child aged 13–17 y	10.5 (8.6, 12.9)	13.6 (9.6, 18.9)	11.3 (9.4, 13.4)
Veteran			
Yes	18.8 (16.4, 21.3)	19.2 (15.2, 23.9)	18.9 (16.8, 21.1)
No	81.2 (78.7, 83.6)	80.8 (76.1, 84.8)	81.1 (78.9, 83.2)
Identifies as—			
Liberal	16.0 (13.6, 18.8)	7.2 (4.4, 11.7)	14.0 (12.0, 16.3)
Moderate	42.5 (39.1, 46.0)	40.9 (34.7, 47.4)	42.1 (39.1, 45.2)
Conservative	41.5 (38.2, 44.9)	51.9 (45.5, 58.3)	43.9 (40.9, 46.9)
Region ^a			
New England	2.7 (1.8, 3.9)	1.6 (0.7, 3.7)	2.4 (1.7, 3.4)
Mid-Atlantic	8.2 (6.6, 10.2)	8.5 (5.5, 12.9)	8.3 (6.8, 10.1)
East-North Central	14.4 (12.1, 16.9)	14.0 (10.5, 18.4)	14.3 (12.3, 16.4)
West-North Central	7.5 (6.0, 9.3)	6.6 (3.9, 10.7)	7.3 (6.0, 8.9)
South Atlantic	21.1 (18.5, 24.0)	24.0 (19.1, 29.7)	21.8 (19.5, 24.3)

Continued

TABLE 1—Continued

Characteristic	Did Not Carry (n = 1116), % (95% CI)	Carried (n = 328), % (95% CI)	Total (n = 1444), % (95% CI)
East-South Central	8.5 (6.8, 10.7)	11.3 (7.9, 16.0)	9.2 (7.6, 11.1)
West-South Central	14.7 (12.3, 17.5)	18.1 (13.4, 24.1)	15.5 (13.3, 18.0)
Mountain	9.1 (7.3, 11.4)	8.4 (5.6, 12.4)	8.9 (7.4, 10.9)
Pacific	13.8 (11.6, 16.3)	7.7 (5.0, 11.6)	12.3 (10.5, 14.5)
Firearms in the household while growing up			
Yes	76.6 (73.4, 79.5)	87.7 (83.3, 91.1)	79.2 (76.6, 81.6)
No	23.5 (20.6, 26.6)	12.3 (8.9, 16.7)	20.8 (18.4, 23.4)
Firearm type owned			
Handgun only	36.8 (33.5, 40.2)	20.0 (15.1, 26.0)	32.8 (30.0, 35.8)
Handgun and long gun	63.2 (59.8, 66.6)	80.0 (74.0, 84.9)	67.2 (64.2, 70.0)
Threatened with a firearm in the past 5 y			
Yes	1.9 (1.1, 3.2)	5.8 (3.3, 10.0)	2.8 (1.9, 4.1)
No	98.2 (96.8, 98.9)	94.2 (90.0, 96.7)	97.2 (95.9, 98.1)
Afraid of being hurt by violence in own neighborhood			
Always afraid	0.6 (0.2, 1.5)	0.4 (0.1, 1.5)	0.5 (0.2, 1.2)
Often afraid	1.8 (1.0, 3.5)	1.8 (0.6, 5.2)	1.8 (1.0, 3.2)
Sometimes afraid	11.0 (8.9, 13.5)	15.0 (10.6, 20.8)	11.9 (10.0, 14.3)
Rarely afraid	49.6 (46.2, 53.1)	48.3 (42.0, 54.6)	49.3 (46.3, 52.3)
Never afraid	37.0 (33.7, 40.3)	34.5 (28.9, 40.5)	36.4 (33.6, 39.3)
Has a concealed carry permit			
Yes	22.5 (19.8, 25.6)	79.0 (73.1, 83.9)	35.9 (33.0, 38.8)
No	77.5 (74.4, 80.2)	21.0 (16.1, 26.9)	64.2 (61.2, 67.0)

Note. CI = confidence interval. Percentages are weighted sample proportions.

^aNew England includes Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont. Mid-Atlantic includes New Jersey, New York, and Pennsylvania. East-North Central includes Illinois, Indiana, Michigan, Ohio, and Wisconsin. West-North Central includes Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, and South Dakota. South Atlantic includes Delaware, Florida, Georgia, Maryland, North Carolina, South Carolina, Virginia, and West Virginia. East-South Central includes Alabama, Kentucky, Missouri, and Tennessee. West-South Central includes Arkansas, Louisiana, Oklahoma, and Texas. Mountain includes Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Utah, and Wyoming. Pacific includes Alaska, California, Hawaii, Oregon, and Washington.

Those who responded affirmatively were then asked, “Was this carrying done on your person—for example, in a pocket, holster, or bag—or was it only in a motor vehicle?” The survey found that 3.8% of all respondents (i.e., gun owners and nonowners), and 12.5%

of gun owners, reported having carried a gun on their person for protection against crime in the past 12 months.

One reason that our estimate of firearm carrying is greater than those obtained in previous national surveys, in addition to

whatever effect more permissive laws and greater permit issuance may have had, is that we focused on handgun carrying for any reason among handgun owners. A contribution of our study is that it provides direct information on reasons for carrying. Much

TABLE 2—Prevalence of Past-30-Day Concealed Loaded Handgun Carrying by State Concealed Carry Laws and Concealed Carry Permit Status Among Handgun Owners: National Firearms Survey, United States, 2015

State Concealed Carry Law	Concealed Carry Permit Holders (n = 507), % (95% CI)	Concealed Carry Permit Nonholders (n = 933), % (95% CI)	Total (n = 1440), % (95% CI) ^a
All states	49.8 (44.8, 54.9)	5.0 (3.5, 7.2)	21.1 (18.7, 23.7)
Unrestricted states	40.9 (19.5, 66.5)	15.1 (6.0, 33.2)	21.1 (11.7, 35.1)
Shall issue—no discretion states	55.4 (48.2, 62.3)	6.4 (3.9, 10.5)	25.2 (21.5, 29.3)
Shall issue—limited discretion states	46.3 (38.1, 54.7)	3.4 (1.7, 6.7)	20.1 (16.2, 24.5)
May-issue states	35.5 (21.7, 52.2)	1.2 (0.4, 3.8)	9.1 (5.6, 14.6)

Note. CI = confidence interval. Percentages are weighted sample proportions.

^aTotal excludes 4 respondents who refused to disclose whether they had a concealed carry permit.

previous literature has focused on reasons for gun ownership, and not carrying, among adults in the United States. Gallup polls have inquired about gun use and estimated that about 67% of gun owners cite protection against crime as a reason for using their gun.¹⁵

Felson and Pare used data from the NVAW to examine the associations of certain characteristics with firearm carrying for protection.⁸ There are several important differences between that survey and our study that preclude meaningful comparisons. The NVAW did not include information on firearm ownership or type, asked respondents about carrying a firearm at any time in the past (i.e., ever), exclusively focused on protection, and did not collect information on firearm ownership. Multivariable models in that study indicated that adults who were younger, male, African American, or higher income; lived in Southern regions and rural areas of the United States; had a history of prior victimization; or were concerned about safety were more likely to report ever having carried a firearm. Some of the results from our survey are consistent with those of the NVAW, including associations of age, gender, region of residence, and history of victimization with loaded handgun carrying. On the other hand, we did not find notable differences in loaded handgun carrying by race, income, urbanicity, or concern about neighborhood violence among handgun owners. Neither the NVAW nor our study found firearm carrying to vary by level of educational attainment.

A few studies have indirectly examined the correlates of concealed carrying using aggregate-level data on the proportion of permits issued at the neighborhood, parish, township, or county level in different regions of the United States.^{14,16–19} Those studies did not examine reports of actual carrying behavior, and their findings have been mixed, highlighting the heterogeneity of methodologies, study populations, and study settings that preclude definitive conclusions about correlates of concealed carrying. Some of those studies suggest that concealed carrying, as proxied by permit issuance, is heavily influenced by fear of crime victimization and actual crime rates. Others, on the other hand, suggest that carrying may primarily be a function of sociodemographic characteristics and politics. For instance, these studies found crime rates to be positively,¹⁸

negatively,²⁰ or not associated^{14,16,19} with permit issuance. Gau found fear of crime to be strongly associated with permit issuance.¹⁷ As another example of inconsistent results, those studies found median household income to be positively,^{16,18,20} negatively,¹⁴ or not associated¹⁹ with permit issuance.

Limitations

Our study is subject to some limitations. First, recall and social desirability bias may exist in findings of any self-reported survey. In our study, questions on handgun carrying referred to the 30-day period preceding the survey, mitigating concerns about recall bias. Additionally, previous evidence indicates that online panel surveys such as ours can generate findings that are less tainted by social desirability bias compared with telephone surveys.²¹ Second, panel members who chose not to participate in our survey may have differed from those who chose to participate regarding handgun carrying likelihood and frequency. An advantage of online panels is high completion proportions for individuals who begin the survey and the availability of information about panelists who do not elect to take the survey.¹¹ In our study, fewer than 1% of respondents declined to answer the stem question about household gun ownership, no one declined to answer the subsequent question regarding whether they personally owned a handgun, and fewer than 1% declined to answer the handgun carrying question. Our survey completion proportion of 55% is substantially greater than the range of percentages observed in typical nonprobability, opt-in, online surveys (2%–16%).¹¹

Third, we did not ask survey respondents in which state they had carried their handgun; they may have carried their handgun in a state different from the one in which they resided at the time of the survey, resulting in some degrees of misclassification in our findings. States decide which other states' permits to honor. Typically, states enter reciprocity agreements that establish which out-of-state permit holders can carry concealed handguns within each state. The number of states that recognize other states' permits has grown over the past decades, and states can issue permits to either residents of the state only or to both residents and nonresidents, depending on that

state's law.¹ Fourth, only a small number of survey respondents reported always carrying their handgun openly, precluding us from examining the relation between this behavior and state open carry laws, which are regulated separately from concealed carry laws.

Public Health Implications

This nationally representative study adds to the small body of empirical research on the epidemiology of loaded handgun carrying among US adults. Specifically, our findings suggest that nearly 9 million US adult handgun owners carry loaded handguns monthly, approximately 3 million of whom do so every day, and that most report protection as the primary reason for carrying regardless of carrying frequency. In addition, handgun owners who live in states with less stringent concealed carry laws appear more likely to carry concealed than do handgun owners in states that grant substantial discretion to issuing authorities.

Although information about US public opinion on firearm carrying exists,²² efforts to comprehensively evaluate the impact of increasingly permissive firearm carry laws are currently hindered by the absence of state-level data on firearm-carrying behavior among US adults. Future studies should focus on whether, and to what extent, discretion afforded to permit-issuing authorities results in less frequent carrying (and by whom) and the extent to which carrying behavior continues illegally among those denied permits. The totality of these efforts will provide a basis for examining the impact of handgun carrying on crime and injury, and in turn informing firearm carrying policy, in the United States. Specifically, there is a need to identify characteristics of concealed carry permit holders who perpetrate firearm-related crimes; this knowledge would allow policymakers to modify licensure rules to potentially prohibit individuals with such characteristics from obtaining a permit in the future.²³ These policies could be particularly important in light of the ongoing steady increase in the number of concealed carry permit holders in the United States. **AJPH**

CONTRIBUTORS

A. Rowhani-Rahbar, D. Azrael, and M. Miller contributed to the study conceptualization and design and the study supervision. A. Rowhani-Rahbar drafted the

article. D. Azrael and M. Miller contributed to the acquisition of data and obtained funding. V. H. Lyons led the statistical analyses. All authors contributed to the interpretation of data, critical revision of the article for important intellectual content, and administrative, technical, or material support.

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HUMAN PARTICIPANT PROTECTION

This study was approved by the Northeastern University institutional review board, Boston, MA.

REFERENCES

- Government Accountability Office. States' laws and requirements for concealed carry permits vary across the nation. US Report to Congressional Requesters, 2012. Available at: <http://www.gao.gov/assets/600/592552.pdf>. Accessed May 22, 2017.
- The Law Center to Prevent Gun Violence. Concealed weapons permitting. Available at: <http://smartgunlaws.org/gun-laws/policy-areas/firearms-in-public-places/concealed-weapons-permitting>. Accessed May 22, 2017.
- National Rifle Association, Institute for Legislative Action. Right-to-carry summary. Available at: <https://www.nra.org/articles/20110516/right-to-carry-summary>. Accessed May 22, 2017.
- Siegel M, Pahn M, Xuan Z, et al. Firearm-related laws in all 50 US states, 1991–2016. *Am J Public Health*. 2017; 107(7):1122–1129.
- Hemenway D, Hicks JG. “May issue” gun carrying laws and police discretion: some evidence from Massachusetts. *J Public Health Policy*. 2015;36(3):324–334.
- Lott JR, Whitley JE, Riley R. Concealed carry permit holders across the United States. SSRN Electronic Journal. Available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2814691. Accessed May 22, 2017.
- Cook PJ, Ludwig J. Guns in America: results of a comprehensive national survey on firearms ownership and use. Available at: <https://www.policefoundation.org/wp-content/uploads/2015/06/Cook-et-al.-1996-Guns-in-America.pdf>. Accessed May 22, 2017.
- Felson RB, Pare P-P. Gun cultures or honor cultures? Explaining regional and race differences in weapon carrying. *Soc Forces*. 2010;88(3):1357–1378.
- Kleck G, Gertz M. Carrying guns for protection: results from the National Self-Defense Survey. *J Res Crime Delinq*. 1998;35(2):193–224.
- Miller M, Hepburn L, Azrael D. Firearm acquisition without background checks: results of a national survey. *Ann Intern Med*. 2017;166(4):233–239.
- Callegaro M, Disogra C. Computing response metrics for online panels. *Public Opin Q*. 2008;72(5):1008–1032.
- Azrael D, Hepburn L, Hemenway D, Miller M. The stock and flow of US firearms: results from the 2015 National Firearms Survey. *Russell Sage Found J Soc Sci*. In press.
- Lizotte AJ, Bordua DJ. Firearm ownership for sport and protection: two divergent models. *Am Sociol Rev*. 1980;45(2):229–244.
- Costanza SE, Kilburn JC, Miles B. The spatial dynamics of legal handgun concealment. *Crime Mapping*. 2013;5(1):39–62.
- Gallup Poll. Gun ownership and use in America. Available at: <http://www.gallup.com/poll/20098/gun-ownership-use-america.aspx>. Accessed July 23, 2017.
- Costanza SE, Kilburn JC Jr. Circling the welcome wagons: area, income, race, and legal handgun concealment. *Crim Justice Rev*. 2004;29(2):289–303.
- Gau JM. A neighborhood-level analysis of concealed hand-gun permits. *Policing: An International Journal of Police Strategies & Management*. 2008;31(4):674–693.
- Carter JG, Binder M. Firearm violence and effects on concealed gun carrying: large debate and small effects. *J Interpers Violence*. 2016; Epub ahead of print.
- Thompson J, Stidham R. Packing heat in the Tar Heel State: a county-level assessment of concealed carry permits. *Crim Justice Rev*. 2010;35(1):52–66.
- Hood M, Neeley G. Packin' in the hood? Examining assumptions of concealed-handgun research. *Soc Sci Q*. 2000;81(2):523–537.
- Chang L, Krosnick JA. National surveys via RDD telephone interviewing versus the internet: comparing sample representativeness and response quality. *Public Opin Q*. 2009;73(4):641–678.
- Wolfson JA, Teret SP, Azrael D, Miller M. US public opinion on carrying firearms in public places. *Am J Public Health*. 2017;107(6):929–937.
- Phillips CD, Nwaiwu O, McMaughan Moudouni DK, Edwards R, Lin SH. When concealed handgun licenses break bad: criminal convictions of concealed handgun licensees in Texas, 2001–2009. *Am J Public Health*. 2013;103(1):86–91.