Gun Ownership in the United States: Measurement Issues and Trends

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Introduction

Gun violence is a serious problem in the United States. In 2011, 478,400 violent crimes were committed with a firearm (Planty and Truman, 2013). While down dramatically since the 1990s, the rate of non-fatal firearm victimizations rose from 2008 to 2011. Firearms deaths from all causes (homicides, suicides, accidental, and undetermined) averaged over 31,000 annually in 2005-2011 (CDC WISQARS, 2013; Hoyert and Xu, 2012). Non-fatal gunshot injuries totaled 81,396 in 2012; a rise in the injury rate per 100,000 from 20.5 in 2002 to 25.9 in 2012 (CDC, 2013).

Given the magnitude and seriousness of gun violence, it is important to have accurate and reliable information on the possession and use of firearms in the United States. This report examines one crucial element, the level of and trends in household and personal gun ownership. First, the report considers methodological issues concerning the measurement of gun ownership. Second, it examines trends in gun ownership. Third, it evaluates the nexus of these two factors, the impact of methodological issues on the measurement of trends gun ownership. Finally, it considers what ancillary trend data on crime, hunting, household size, and number of guns available suggest about trends in gun ownership.

Data Sources

Two primary sources were analyzed. First, the General Social Surveys (GSSs) conducted by NORC at the University of Chicago with principal support from the National Science Foundation have asked questions about household gun ownership since 1973 and about personal ownership since 1980. The GSSs are national, probability samples of adults living in households in the United States. Interviews are primarily in-person and are conducted in English and since 2006, also in Spanish. For full details on the GSS see Smith, Marsden, Hout, and Kim, 2013 and the website at http://www3.norc.org/GSS+Website.

Second, drawing mostly on the IPOLL archive of the Roper Center for Public Opinion Research, a database of 415 United States, national polls that asked about gun ownership was compiled. This covers questions from 1959 to early 2013. It includes 364 questions about household gun ownership and 51 questions about personal gun ownership. This contains data from both the afore-mentioned GSSs and over a dozen other data collectors.

In addition, other sources of information from the research literature on gun ownership and from relevant data on crime, hunting, household size, number of guns available, and other related matters have been consulted and utilized.

Measurement Issues

Measuring gun ownership depends on a number of definitional and operational issues including: 1) how guns are defined, 2) whether household or personal ownership is asked about, and 3) how specifically one asks about household and personal ownership. It also depends on the ability and willingness of people to provide accurate and reliable information on gun ownership. This factor is considered by examining 1) studies validating reports of gun ownership, 2) differences in reports between husbands and wives, 3) the ownership of gun by hunters, and 4) item non-response to gun-ownership questions.

Definitional and Operational Issues

First, estimates of the presence of guns in households depend on how guns are defined. The two main sources of variation are whether 1) guns only cover firearms or whether air compression weapons

such as BB and pellet guns should also be included and 2) all firearms should be included or whether only those in working order should be counted. Most questions simply use the term "gun" without further elaboration. A few do instead refer to "firearms" and one explicitly mentions air rifles (van Dijk, van Kesteren, and Smit, 2007 - Do you or anyone else in your household own a handgun, a shotgun, rifle, or air rifle?) In the IPOLL database of 415 data points asking about gun ownership, 89.4% referred to guns and 10.6% to "firearms." Clearly, applying a more restrictive definition should lower ownership levels, but the available evidence on the magnitude of the reduction is very mixed. First, among all households which report having a gun, the GSS then asked, "Is it a pistol, shotgun, rifle, or what? CODE ALL THAT APPLY. Pistol/Shotgun/Rifle/Other (Specify)." In 2006-2012, 0.4% of gun-owning households only mentioned weapons that were not operating firearms (15 BB guns, 6 pellet guns, 4 antiques (e.g. 18th century flintlocks; antique, unusable muzzle loader), and 1 starter pistol). Second, the 1998 and 1999 National Gun Policy Surveys conducted by NORC found that among households with a handgun, 5% had one or more weapons not in working order. Finally, a ABC News/Washington Post survey in April, 2013 asked people reporting guns "What about if we leave out BB guns, starter's pistols, and guns that don't fire, such as antique or ornamental guns? Not counting any of those, do you or anyone in your house own a gun, or not?" It found that only 87% reported that someone in their house still owned a gun after these exclusions. By this stricter definition of guns, the reported share with guns dropped from 43% to 37%. Thus, the reduction resulting from a more limited definition may range from quite small to substantial.

Second, the two basic approaches to measuring gun ownership ask about household ownership, personal ownership, or both. As the IPOLL database indicates, personal gun ownership is of course lower than household gun ownership (28.4% vs. 40.6%) since some respondents do not personally own guns, but live in households with guns. This is also evident by a cross-tabulation of personal and household gun-ownership questions on the 1980-2012 GSS. It shows that 25.8% personally own a gun, 15.7% live in a household with a gun, but don't personally own one, 56.7% have no gun in their household, and 1.9% were missing on one or both questions. In addition, a multivariate analysis using the IPOLL database and controlling for the other features of questions, confirms that personal gun ownership is notably less than household ownership (beta=-.608/.000). Thus, household and personal gun ownership needs to be examined separately as related, but essentially different, measures.[1]

Finally, the wording of questions asking about gun ownership matters. The IPOLL database includes 64 different questions wordings (for the full list see Appendix 1: Question Wordings). Question wordings about gun ownership were coded into a series of variables: 1) personal vs. household, 2) mentioned gun vs. firearm, 3) whether ownership only about "you" or about you and others (e.g. "you or anyone in your home"), 4) whether the gun/firearm was in the home/house or whether other locations were mentioned (e.g. "home, garage or car," "home (if house, 'or garage')," "home…Include those in a garage, outdoor storage area, car, truck or other motor vehicle"), and 5) whether the question only mentioned a gun/firearm or included a list of weapons (e.g. "any guns, revolvers, or pistols," "a handgun or rifle," "guns or revolvers"). It was hypothesized that higher gun ownership would be reported when it was 1) household rather than personal, 2) gun rather than firearm, 3) you plus others rather than just you, 4) home plus other locations rather than just home, and 5) a list of types of

[1]However, the personal ownership figures and the household ownership figures are quite consistent. Using the personal-ownership figures on the 2010 and 2012 GSSs, it was estimated that the portion of adults living in households with guns was between 33.2-34.5% and the average of the two GSSs from the household question was 33.3%.

weapons rather than just gun/firearm. The actual impact of these hypothesized variations in question wordings is examined later.

Assessing Reliability and Accuracy of Reports of Gun Ownership

First, several validation studies indicate a high degree of accuracy in the reports of household gun ownership. A small-scale study comparing handgun-registration records from Seattle and Memphis with survey reports found that among households with a registered handgun, 97% were corroborated by survey results (Kellerman, et al., 1990). Additionally, a comparison of hunting-license and handgun-registration records from a county in Michigan to results from a telephone survey found that 88.6% of the "likely-gun households" reported having a gun, 8.3% refused to answer the gun-ownership question, and 3.1% reported not having a gun in their household. Given that guns and especially hunting weapons might be kept elsewhere and that the survey was done 1-2 years after the date of handgun registration and/or obtaining a hunting license, the level of agreement was very high (Rafferty et al., 1995). Finally, a study in four states of households with a resident with a concealed-carry permit indicated that in a blinded, seeded-sample telephone survey "Of those who screened in as gun carriers, 94% report that they did have a gun-carrying permit, 3.6% that they did not, and 2.4% refused or gave other responses (Smith, 2003)." These studies thus indicate that falsely denying gun ownership is rare (see also Long, 2013b).

Of course, these studies generally document that those with legally registered guns do report having guns on surveys. It is probably likely that those who either are legally prohibited from possessing guns or who obtained their guns illegally would be less likely to report having guns. Nothing is known however about the gun ownership levels or the reporting levels of this group. In 2010, an estimated 2% of adults were ex-convicts (Shannon et al., 2011). Many, but not all, would not be eligible to legally own or purchase firearms. How many actually possess guns and how many would report that in a survey is unknown.

Second, somewhat in contrast to the validation studies, another body of research finds discrepancies between the gun-ownership reports of husbands and wives. Research has consistently shown that men report more household gun ownership than women do. This difference is documented when one compares the household ownership reports of married men to those of married women. Since the spouses are reporting on the same universe of households, they should report the same level of gun ownership. But husbands consistently report more guns than wives do (Coyne-Beasley, Baccaglini, Hepburn, Miller, Azael, and Hemenway, 2007; Coyne-Beasley, Baccaglini, Johnson, Webster, and Wiebe, 2005; Legault, 2011; Ludwig, Cook, and Smith, 1998; Ludwig, Cook, and Smith, 1999; Smith, 1985; Trent, Van Court, and Kim, 1999; Wright, Jasinski, and Lanier, 2012). For example, across all years of the GSS (1973-2012), 54.1% of husbands lived in a household with a gun vs. 49.7% of wives (a spousal difference of +4.4 percentage points). In 2006-2012, the gap was +3.1 points.

This literature concludes that on average the reports of husbands are more accurate than the reports of wives and therefore that reports by wives underreport the level of household gun ownership. Several hypotheses have been offered for this pattern: 1) since most guns are personally owned by men, their reports will be more accurate and specifically that wives either a) may not be aware of some guns owned by their spouses (Coyne-Beasley et al., 2005; Ludwig, Cook, and Smith, 1998 & 1999; Trent, Van Court, and Kim, 1999; Wright, Jasinski, and Lanier, 2012) or b) may have forgotten about the presence of a gun (Smith, 1985), 2) in addition to being less likely to personally own a gun, women have less favorable attitudes towards guns and may underreport guns they know about due to social desirability bias (Legault, 2013; Ludwig, Cook, and Smith, 1998 & 1999; Wright, Jasinski, and Lanier, 2012), 3) since most guns belong to husbands rather than wives, wives may be reluctant to "inform" on their spouses (Legault, 2013), and 4) some gun-ownership questions intended to measure household gun ownership

may be understood instead to refer to the personal ownership of guns and since wives are less likely to personally own guns than husbands are, this leads to lower reports (Ludwig, Cook, and Smith, 1998; Smith and Smith, 1995; Wright, Jasinski, and Lanier, 2012). While these are reasonable hypotheses, there is no definite proof that wives are net underreporters, nor which of these explanations might be operating if they are.

While not entertained in this literature, there is the alternative possibility that men may be overreporting gun ownership. First, husbands may be thinking of guns that they no longer own (e.g. a gun they had when they used to hunt). Second, if the lower approval of guns by wives could have contributed to underreporting guns that they know about, then the more pro-gun husbands might claim guns that they know they do not possess to indicate that they are prepared to protect their home and family and/or because they live in areas when gun ownership is not only very common, but even normative.

Alternatively, the difference could reflect a combination of husbands overreporting and wives underreporting.

Third, while households with hunters overwhelmingly report having guns at home, not all do so. Using the GSS across all years finds that 82.5% of households with a husband and/or wife who hunts have a gun at home. In addition, in 1977-1984 when a follow-up question asked if anyone else in the household hunts, there was a gun in 98.2% of households when both spouses and another person(s) hunted, 94.7% when one spouse and another person(s) hunted, and 80.3% when neither spouse hunted, but another person(s) hunted. There are several reasons why households with hunters would not have guns in their homes. First, a small portion of hunters use only bows rather than guns. Second, hunters may keep their guns outside their residence such as at a vacation home, hunting cabin, or hunting/gun club. Third, some hunters may not personally own a gun, using guns owned by others when they hunt. Finally, since the GSS hunting question does not ascertain if people are current hunters, some may actually be ex-hunters who no longer actively hunt and have disposed of their hunting weapons.[2] Alternatively, gun ownership may be intentionally or unintentionally underreported in households reporting hunting.

Finally, there is item nonresponse on gun-ownership questions. On the GSS household gun-ownership question, there are three types of item nonresponse – refusals to answer, missing data/no answers, and don't knows. For 1973 through 2012, 0.9% of the cases were refusals, 0.3% missing/no answers, and 0.1% don't knows. These missing cases were analyzed to see if gun ownership could be imputed based on their other known characteristics. As Table 1 shows, those refusing have a profile that indicates they are probably disproportionately gun owners. The refusers (0.9% of all cases) are closer to gun owners than non-gun owners in having a hunter, being less supportive of gun control, living in a rural area, and having a male respondent. Missing cases (0.3% of all cases) show a more mixed pattern being closer to gun owners on opposing gun control and living in a rural area, but somewhat closer to non-gun owners on having a hunter and a male respondent. The very small don't know group (0.1% of all cases) is more like non-gun owners except in their lower support for gun control. Based on this profile (and some less differentiating variables also inspected), it was estimated that about 78% of refusers were gun owners. Because of the small numbers and mixed results, the missing and don't know groups were not allocated and make up a residual category of 0.4% of all cases.

In sum, while the validation studies indicate accurate reporting of gun ownership, reports by husbands and wives show inconsistencies. The hunting and gun ownership comparisons show a high degree of cross-corroboration, but not all households with hunters have firearms. Item non-response on gun ownership is small, but it appears to lead to underreports of gun ownership.

[2] The GSS item asks, "Do you (or does your [husband/wife]) go hunting?" This could be understood to refer to active, current hunters or to those who used to hunt (e.g. "ever go hunting" or even "have ever gone hunting").

Trends in Gun Ownership

Three sources on trends in gun ownership are examined: 1) the GSS, 2) Gallup, and 3) the composite trend across all items in the IPOLL database.

GSS Trends

As Table 2 presents, there are two ways to report levels of household ownership using the GSS: 1) the proportion of households with a gun and 2) the proportion of adults living in households with a gun. The first set of columns reports the former and the second set the latter. The former consistently shows a lower figure than the latter essentially because households with guns have more adults than households without guns. Across the five grouped time periods (Table 3), this difference ranges from +1.4 to +3.4 points.

Table 2 indicates that the percent of households with guns declined from 47.5% in the 1970s to 33.3% in 2000-2004 and 32.9% in 2006-2012 for an overall decrease of -14.4 points and that the percent of adults living in households with guns fell from 49.9% in the 1970s to 35.4% in 2000-2004 and 34.3% in 2006-2012, for a net drop of -15.6 points. (See Table 2 for the annual figures.)

Given the differences in reporting by men and women discussed above and at least the possibility that men are more accurate in their reports than women, one wants to see if the reported changes over time are similar for both genders. Looking at the grouped trend data in Table 4 shows similar declines for men (-14.7 points) and women (-16.2 points). Similarly, if one compares the first and last years the decrease is -14.1 points for men and -14.2 points for women. This indicates that the differential reporting propensities for men and women as shown by the comparison of household ownership for married men and women, does not explain the decreasing levels since both men and women show similar trends.

Table 5 shows the trends for personal gun ownership. It fell from an average of 27.4% in the 1980s to 27.0% in the 1990s, 24.6% in 2000-2004, and 21.9% in 2006-2012 for a net decline of 5.5 points.

Gallup[3]

The three Gallup trends in Tables 6 and 7 all show moderate declines in gun ownership over time. Overall, household gun-ownership levels dropped from 49% for the 1959 data point to 47.5% in the 1960s, 45.6% in the 1970s, 44.7% in the 1980s, 43.5% in the 1990s, and to 40.4% in 2000-2005. Gun ownership then rose in 2006-2013 to 42.0%. The decrease from the 1970s to 2006-2013 was – 3.6 points. From the 1990s to 2006-2013, the decline for general, household gun ownership was -1.5 points, for the augmented household gun ownership adding a follow-up question about guns "elsewhere on your property…such as in your garage, barn, shed, or in your car or truck" ownership declined by -3.8 points, and for personal gun ownership it fell by – 5.4 points.

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[3] Gallup is focused on since it has the longest time series (1959-2013), is tied with Greenberg for having the most data points (80), and has been the main data collector compared to the GSS (Dimock, Doherty, Christian, 2013; Frum, 2013; Henning, 2013; Lemieux, 2013; Long, 2013b).

As Tables 8 indicates, the IPOLL database shows that household gun ownership declined from 48.4% before 1980 to 38.4% in 2000-2005 and 39.4% in 2006-2013 for a net decrease of -9.0 points. The association between date of interview and household gun ownership has a bivariate beta of -.461/.000. Of course this trend combines many different question wordings from various data collectors, modes, target populations, etc. The impact of these factors is taken into consideration in the discussion of methodological issues regarding time series below. For personal gun ownership the IPOLL database adds little since the GSS and Gallup make up 44 of the 51 data points.

In summary, the GSS shows grouped declines in household gun ownership from the 1970s to 2006-2012 of between -14.4 and -16.2 points, the raw IPOLL figures have a decline of -9.0 points, and Gallup has a drop of -3.6 points. For personal gun ownership, the GSS had a decline from the 1990s to 2006-2012 of -5.5 points and Gallup showed a decrease over a similar period of -5.4 points.

Besides showing different trends, the GSS and Gallup also differ on the level of gun ownership. GSS and Gallup surveys asked questions on household gun ownership in the same years 15 times and the GSS produced higher estimates in 4 years and Gallup in 11 years. The average difference (GSS – Gallup was -2.7 points). For personal gun ownership, the GSS was lower than Gallup in all 8 years and the average difference was -8.1 points.

Methodological Issues Regarding Trends in Gun Ownership

To evaluate the trends in gun ownership presented above, a number of methodological assessments were conducted. First, measurement issues affecting the GSS time series were considered. Second, the Gallup trends were examined. Third, the composite trend from the IPOLL database was subjected to multivariate controls. Fourth, the possible role of unit non-response was considered. Finally, ancillary trends related to gun ownership were examined.

GSS

A review of GSS measurement procedures from sampling through question wording and survey context to coding was carried out to see if any methodological factors might have inflated or suppressed reports of gun ownership in general and affected the time series in particular.

Most GSS measurement procedures have remained fixed over the series. First, the GSS has used a consistent measure of household gun ownership since 1973 (Do you happen to have in your home (if house: or garage) any guns or revolvers?) and an unchanging measure of personal gun ownership (Do any of these guns personally belong to you?) since it was added in 1980. Since the latter follows the former, the adding of personal gun ownership did not impact the household trend. Second, other fixed procedures includes using a Kish table to select a random respondent within households, recruitment and training of interviewers, supervision of interviewers, data entry, editing, and cleaning, etc.

Some GSS methods have varied over time, but have no discernable impact on gun ownership. First, there appears to be no likely contextual cause for the GSS getting lower levels of gun ownership reported. The immediately-previous question on hunting probably increases reports of gun ownership as discussed below. The next group of preceding questions deal mostly with crime (fear of walking alone at night, need for tougher courts, and support for capital punishment) and touch on protection - the other main reason for having a gun. With the notable exception of the addition of the hunting questions in 1977), there is no indication of context effects. Since 1988 when the GSS introduced its split-ballot, rotation design, the gun-ownership question has been asked on two different ballots in somewhat different contexts. For 1988-2008 these different contexts produced essentially identical and statistically non-significant results (39.2% of adults in a household with a gun vs. 39.1%). Similarly, split ballots in 1994 which either included or excluded questions on having been robbed or burgled

immediately preceding the hunting question produced comparable results (excluding = 43.5% vs. including = 43.9%; prob.=.15).

Second, the periodic updating of the sample frame after each decennial Census has not affected the measurement of gun ownership. A split-sample frame experiment in 1993 found no statistically significant difference in levels of gun ownership between the 1980 frame and the 1990 frame and inspection of sample-frame transitions from Censuses in 1970 to 1980, 1990 to 2000, and 2000 to 2010 showed no evidence of changes in gun ownership (Smith, Shin, and Tong, 1996).

Third, the switch from paper-and-paper interviews in 1972-2000 to computer-assisted-personal interviews in 2002+ had no apparent effect of the measurement of gun ownership.

Finally, a close inspection was made of the three largest survey-to-survey changes in the GSS, a decline of - 4.8 points in 1987-88, a rise of +5.0 points in 1988-89, and a decline of -7.0 points in 1996-1998. There were no changes in wording, context, sample design, or any other survey component that readily explained these shifts.

But several probable impacts on the measurement of gun ownership were detected. There are two reasons to suspect that the earliest readings in 1973-1976 might underestimate the proportion of adults living in households with guns. First, the 1972 and 1973 GSS used a block-quota, probability design while the GSSs since 1977 have used a full-probability design. In 1975 and 1976, random halves utilized block-quota and full probability designs. This experiment indicated that the full probability design yielded slightly higher estimates of gun owners (50.1 - 48.8=+1.3; prob.=.04). Since full-probability samples are more statistically rigorous than block-quota designs, the higher figure is the better estimate.[4] Second, in 1977, the GSS added an item on hunting immediately before the gun-ownership question and has continued this grouping ever since. If one compares the three surveys prior to the introduction of hunting (1973-1976) to the three surveys after its instruction, one finds gun ownership averaged 48.6% vs. 51.8% (+3.2 points). If one first adjusts the earlier years for the possible lower reporting due to the use of block-quota sampling, the change is still +2.6 points from adding hunting. While there is no experimental test of this possible context effect and it could result from changes across years or other uncontrolled for factors, such an effect is plausible. Mentioning hunting should both activate recall of guns and among households with hunters provide a clear rationale for having a gun in the household.[5]

Likewise, there are two reasons for suspecting that the most recent years may be producing lower time-series estimates. First, starting in 2006 the GSS added Spanish interviews to expand the target population to Spanish- as well as English-speaking adults living in households in the United States. This improved the GSS's coverage of the household population, but also created a disjuncture in the time series since only those able to do the survey in English were covered before 2006. To be able to adjust for this, the GSS recorded both in what language Interviews were conducted in and whether a respondent interviewed in Spanish could have done the interview in English (and thus would have been covered in the pre-2006 samples). The results below indicate that the adding of Spanish interviews lowered the estimated percent of adults living in a household with a gun by about 1.3 points:

[4] On the switch in sample designs, see Stephenson, 1979.

[5] On context effects in general, see Smith 1991a & 1991b.

% with gun the household

	All Respondents	English-Capable Respondents	English - All
2006	34.5%	36.3%	+ 1.8
2008	35.9%	37.2%	+ 1.3
2010	32.1%	33.3%	+ 1.2
2012	34.4%	35.4%	+ 1.0

While the first column represents the better overall estimate, the second column produces the better time-series estimate and as the third column indicates, the level of gun ownership is higher in 2006-2012 when using the target population for earlier years.[6]

Second, as Tables 2 and 3 document, the percent giving the combination of refused + no answer has risen over time. The pooled refused+no answer figures across 1973-2012 are 1.2% and rose from 0.9-1.2% before 2000 to 1.4% in 2000-2004 and 2.0% in 2006-2012. The 2010 figure was especially high at 3.6% and the 2012 reading was the second highest at 2.0%. As the above discussion of item non-response indicated, the variability in refusal rates over time will affect estimates of household gun ownership.

The impact of these factors are shown in the section below on Adjusted GSS Time Series.

Gallup

There was little available information for accessing the Gallup trends. Documentation is very limited and sometimes in error. For example, Saad (2012) and Gallup (2013b) indicate that a single consistent wording was used for the 1959-2013 time series on household gun ownership, but IPOLL documents that actually six different wordings were used. Moreover, an inspection of the Gallup general, household time series shows numerous large shifts up and down in household ownership that are statistically significant, but realistically impossible given the nature of gun ownership. There were increases between adjoining surveys of +9 points in 1986-88, +8 points in 2003-2004 and +6 points in 2010-2011. Conversely, there were declines of –11 points in 1993-96, and -6 points in 1997-1999. It is likely that much of these shifts, as well as other shifts, were probably due to changes in measurement properties such as question wording, survey context, sampling method, and other aspects.

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Drawing mostly on the IPOLL archive of the Roper Center for Public Opinion Research, a database of 415 United States, national polls that asked about gun ownership was compiled. It included 364 questions about household gun ownership and 51 questions about personal gun ownership. A number of elements were coded for each of the data points: 1) percent reporting a gun, no gun, and missing (Don't Know, refused, etc.),[7] 2) organization conducting the survey, 2) sample size, 3) question wording, 4) mode of data collection (e.g. face-to-face, telephone), 5) target population (e.g. all adults, likely votes, registered voters), and 6) date of survey. Question wordings about gun ownership were

[6] On the transition of the GSS from English-only to English and Spanish, see Smith, 2013.

[7] Available evidence indicates that the figures report in IPOLL represent the % of adults living in households with guns and are thus the GSS figures in right side of Table have been used. However, in many cases the exact definition of the IPOLL survey figures is not made explicit.

coded into a series of variables: 1) personal vs. household, 2) mentioned gun vs. firearm, 3) whether ownership only about "you" or about you and others (e.g. "you or anyone in your home"), 4) whether the gun/firearm was in the home/house or whether other locations were mentioned (e.g. "home, garage or car," "home (if house, 'or garage')," "home…Include those in a garage, outdoor storage area, car, truck or other motor vehicle"), and 5) whether the question only mentioned a gun/firearm or included a list of weapons (e.g. "any guns, revolvers, or pistols," "a handgun or rifle," "guns or revolvers"). The 64 different questions wordings in the database are listed in Appendix 1: Question Wordings. It was hypothesized that higher gun ownership would be reported when it was 1) household rather than personal, 2) gun rather than firearm, 3) you plus others rather just you, 4) home plus other locations rather than just home, and 5) a list of types of weapons rather than just gun/firearm.

Given that household and personal gun ownership are essentially different questions, the subsequent analysis eliminates the 51 personal gun-ownership questions and focuses on the 364 household gun ownership items. Table 8 presents the bivariate relationships between household gun ownership and time, the study-design variables, and question wording. As indicated above, gun ownership declines with time. It is lower for telephone vs. in-person surveys, among some data collectors (e.g. Pew and Greenberg) than others (e.g. CBS and ABC), among likely and registered voters than all adults, and among results that included missing data as a category vs. those that excluded missing data from the reported results. It is also lower for question wordings that 1) included a list of types of weapons vs. mentioning only guns/firearms in general, 2) asked about only "you" rather than whether you + others had guns/firearms, 3) made no reference to where the gun/firearm was located vs. either mentioning house/home or house/home + other residential-related locations (e.g. garage, cars, sheds), but with no differences between home-only and home+ wordings, and 4) used the term "gun" rather than "firearm."

Table 9 then examines household gun ownership in multivariate models with these variables. Model 1 and Model 3 treat time as a continuous variable and Model 2 and Model 4 group time into five periods. Models 1 and 2 compared CBS to other data collectors and Models 3 and 4 compare GSS to other data collectors. All models show that household gun ownership declines over time. Models 2 and 4 however indicate that gun ownership levels after the 1990s are essentially unchanged from 2000-2005 to 2006-2013.

For survey design and other variables, including/excluding missing data is only marginally statistically significant, but does consistently indicate that gun ownership is higher when missing data are included in the base. This is not mathematically possible when dealing with the same data (i.e. excluding missing data from the base must increase both the percent owning and not owning guns) and suggests that cases with missing data excluded are otherwise marginally associated with surveys with higher gun ownership. Mode (in-person vs. telephone) shows no consistent relationship with household gun ownership. Target population (all adults vs. likely/registered voters) is never statistically significant. Gun ownership is higher when CBS is compared to all other data collectors. For the GSS, only Model 4 shows a statistically significant relationship, but the non-significant relationship shown in Model 3 is in the same direction. They would indicate that non-GSS studies have lower gun ownership than the GSS finds.

For question wording variables, those data points which did not list types of weapons had higher gun ownership than those that include a list. While it was initially thought that giving a list would lead to more reports by simulating recall of specific types of listed weapons, the opposite was the case. A close inspection of the 20 different versions of the listing questions suggested a plausible explanation. Only two listed all major types of weapons (e.g. "handguns, rifles, shotguns, or any other type of firearm"). The other 18 failed to mention shotguns, eight also did not list rifles, and two did not mention handguns/pistols/revolvers. Respondents may have focused on only the explicitly-listed types of weapons and underreported other weapons. Mentioning the home only rather than also mentioning

other associated locations produces lower estimates in Models 1 and 2. For Models 3 and 4, there are no statistically significant relationships, but they also show lower levels when only the home is mentioned. Using the term "firearm" produces statistically significant higher levels in Models 3 and 4. In Models 1 and 2 the same direction is indicated, but they are not statistically significant. This direction is counter to the expected direction and indicates that the term "guns" is not generally understood to encompass a broader range of weapons than the term "firearms" covers. Mentioning other household members rather than just the respondent (i.e. "you") consistently yields higher gun ownership reports across all models.

To further test the impact of explicitly mentioning other household members when asking about household gun ownership, an experiment was carried out on the 2010 panel reinterview on the 2014 GSS. A random half received the standard GSS wording "Do you happen to have in your home (If house, 'or garage') any guns or revolvers?" and half got the variant "Do you or anyone in your household happen to have in your home (IF HOUSE: or garage) any guns or revolvers?" Besides testing the results from the gun ownership databank analysis, this experiment also tests the explanation that wives report fewer guns than husbands do because some are answering it as a personal rather than household gun-ownership question and since women personally own fewer guns than men do (Smith and Smith, 1995), this leads to lower reports. The experiment showed no statistically significant differences between wordings. The standard wording found that 37.1% reported having a firearm while the variant wording found that 32.7% had firearms (prob. = 0.41). Thus, counter to the meta-analysis results, the revised wording did not yield higher reports. Also, counter to some speculation that the standard GSS wording might yield lower reports due to some respondents not thinking of household ownership (Wright, Jansinski, and Lanier, 2012), this was not the case.

Adjusted Time Series

GSS

The four factors identified as affecting measurement in general and the time series in particular (context change and sample change in the 1970s, adding Spanish interviews in 2006+ and refusals across all years) were used to adjust the original figures for adults living in a household with guns in Tables 2 and 3 and are presented in Tables 10 and 11. From 1973 to 2012, adjusted household gun ownership declined by 15.9 points and from 1973-1979 to 2006-2012 the decrease was 15.7 points.

The adjusted and unadjusted GSS trends on household gun ownership were also similar by period:

Change across Periods (Percentage Points)

Period	Unadjusted	Adjusted
1970s to 1980s	-1.5	- 4.4
1980s to 1990s	-5.9	- 5.1
1990s to 2000-04	-7.1	- 6.6
2000-04 to 2006-12	-1.1	+0.4

Both showed similar declines from the 1970s to the 1980s and from the 1980s to the 1990s and little or no decline from 2000-2004 to 2006-2012. They disagree somewhat in that the unadjusted figures

showing only a small decease from 1970s to the 1980s (-1.5 points), while the adjusted figures show a moderate decline (-4.4 points).

All of the different permutations of GSS trends in household gun ownership show highly similar patterns. For example, the unadjusted decline in gun ownership for 1973-1979 to 2006-2012 was -14.6 points for households and -15.6 points for adults, the adjusted average decline for adults from 1973-1979 to 2006-2012 was -15.7 points, and the unadjusted declines for adult males and adult females for 1973-1979 to 2006-2012 were respectively –14.7 points and -16.2 points.

Gallup

While some methodological effects are suspected for the Gallup data, there is insufficient information to create an adjusted time series.[8]

IPOLL

The raw correlation of time with household gun ownership was -.461 and in the multivariate analysis Model 1 the correlation was -.467, thus indicating no meaningful difference in the trends with question wording and other aspects of surveys controlled for.

When the adjusted GSS grouped data are compared to the grouped Gallup data, the notable results is the GSS starts off with higher estimates than Gallup has and ends up with lower estimates: GSS – Gallup: 1970s 52.9% - 45.6%= +7.3 points; 1980s 48.5% - 44.7%= +3.8 points; 1990s 43.4% - 43.5%= -0.1 points; 2000-2005 36.8% - 40.4%= -3.6 points; 2006+ 37.2% - 42.0%= -4.8 points. Thus, with the exception of the 1990s, GSS and Gallup have shown moderate to large and changeable differences in their measurements of household gun ownership. Likewise, while the GSS shows a substantial decline over time in household gun ownership, Gallup finds a much smaller decline and one that depends more on the specific question and exact years being analyzed.

Ancillary Trends Related to Gun Ownership

To check the plausibility of the reported decline in household gun ownership, ancillary trends on four factors were examined: 1) crime, 2) hunting, 3) household size, and, 4) gun supply.

Studies consistently show that hunting and self-defense are by far the two major reasons for having a gun (Hepburn, Miller, D, Azrael, and Hemenway, 2007; Dimock, Doherty, and Christian, 2013; Jelen, 2002; Krouse, 2012). For example, the Pew Research Center in a February, 2013 poll found that 60% named protection as the “main reason” for having a gun, 39% mentioned hunting, and 28% gave all other reasons (totals exceed 100% due to multiple mentions). The relative balance of these two reasons may well have changed over time as a similar survey by US News and World Report in 1994 reported 60% mentioning hunting, 22% protection, and 14% all other reasons, but they have remained the top two reasons for having a gun in the household.

Time series on crime and hunting both indicate declines during the 1970-2012 period. As Table 12 shows, the FBI’s Uniform Crime Reports find that the violent crime index rose from 401 in 1972 to a peak of 758 in 1992 and then fell to a period low of 387 in 2012. Likewise, the homicide rate climbed

[8] On the relatively poor performance of Gallup in the 2012 pre-election polls see NCCP, 2013; Real Clear Politics, 2012; Silver, 2012. On Gallup changes to their pre-election survey methodology to reduce their error rate see Gallup, 2013a.

from 9.0 in 1972 to a high of 10.2 in 1982 and then declined to a low of 4.7 in 2011 and 2012. Similarly, the GSS item on being afraid to walk alone at night near one's home increased from 40% in 1973 to 45% in 1994 and then dropped to 30% in 2004 and ended up at 34% in 2012. All three series indicate a substantial decline in crime or fear of crime and thus less reason to have a gun for protection.

Table 12 also shows that the percent of households with a husband or wife who hunts decreased from a high of 21% in 1977 to a low of 11% in 2006 and finished at 12% in 2012. Similarly, figures from the National Surveys of Fishing, Hunting, and Wildlife-Associated Recreation of the U.S. Fish and Wildlife Service report that the share of those 12+ who participated in hunting dropped from 9.9% in 1975 to 8.4% in 1985 and that among those 16+, hunters declined from 7.4% in 1991 to 5.7% in 2011. Similarly, the number of purchasers of hunting licenses fell from 7.4 per capita in 1962 to 7.3 in 1973, 7.0 in 1983, 6.0 in 1993, 5.1 in 2003 to 4.6 in 2013 (US Fish and Wildlife, 2004 & 2013). Thus, both the proportion of households with a hunter and the share of the population hunting decreased from the 1970s to the present and as a result hunting has also declined as a reason for having a gun in the household.

The proportion of households with one or both spouses who hunted and that had a gun has declined over time from 85.9% in the 1970s to 85.1% in the 1980, 82.7% in the 1990s, 76.1% in 2000-2004, and 78.3% in 2006-2012. It is possible that the lower reporting level may reflect less willingness of hunters to report having a gun in their home and thus to increased underestimates of household gun ownership. Alternative explanations are that fewer hunters keep their guns at home, more hunters are exclusively bow hunters, or that the decline in hunting has led to an increased portion who are inactive hunters who no longer possess a gun among those reporting that they go hunting.

The changing size and composition of households is another reason for expecting a decline in the portion of adults living in households with guns (Jones, 2013; Wright, Jansinski, and Lanier, 2012). The number of adults in households has declined over the last 40 years. In the 1970s, 8.6% of adults lived in households without other adults and in 2006-2012 this rose to 18.4%. Those with three adults fell from 20.4% to 15.7% and those with 4+ adults dropped from 12.9% to 9.5%. Households with two adults remained fairly stable between 56.5-58.5% during this span. Household gun ownership increases appreciably from single-adult households to larger households. In the 1970s, it was 25.5% for single-adult households, 52.7% for 2 adults, 50.5% for three adults, and 52.4% for 4+ adults. If the 1970s distribution of guns by number of adults is applied to the 2006-2012 composition of households, it indicates an expected -2.6 point drop in adults living in households with guns.

There are various estimates of the total number of guns available to the civilian population (non-military) that use estimates from surveys, gun production figures, and import/export figures for guns. Table 13 shows various recent estimates of the total number of guns available to adults in the United States. The first three columns (A-C) are based on survey reports. Column D combines the survey estimates with later government figures on domestic manufacturing, exports, and imports and estimates E and F probably do the same, but they are not explicit about their methods. There is considerable variation in the annual estimates with the high estimate exceeding the low estimate by from 4% (2010) to 30% (2004) and averaging 17%. Of particular note is the difference in 2004 between the two survey estimates. They both come from the National Firearms Survey conducted by Fact Finders for the Harvard School of Public Health (Hepburn et al., 2007). The lower figure is based on their estimate that 38% of households have a firearm and with high outliers removed that there were 5.2 firearms per household. The higher figure is based on their estimate that 26% of adults living in households personally owning firearms and that with high outliers removed that here were 5.0 guns per gun-owning household. They do not present enough information to fully understand the basis for the difference in total number of guns, but it does highlight the issue that household and personal estimates of gun ownership may not always produce comparable results. The three time series (D-F) all indicate increases in the number of guns available per household: 1) D - from 2.05 in 1996 to 2.37 in 2010, 2) E -

from 2.43 in 1996 to 2.65 in 2009, and 3) F - from 2.41 in 2004 to 2.47 in 2010.[9] Assuming that these estimates of an increased supply of guns are correct, this might indicate 1) little or no increase in the number of guns in households if there was a decline in the proportion of the gun supply that was held in households as opposed to by gun dealers, pawnshops, and other non-household venues, 2) an increase in the number of guns in households, but no rise in the proportion of households with guns and an increase in number of guns per gun-owning household, 3) a rise in the proportion of households with guns and little or no change in the number of guns per gun-owning household, or 4) some combination of changes in household vs. non-household location, the proportion of households with guns, and/or the number of guns per gun-owning household. Unfortunately, there is little basis for choosing between these scenarios.

In sum, the declines in crime, hunting, and household size are all consistent with a decrease in the portion of households having guns. But the rising, estimated number of guns available to civilians might indicate more households with guns (at least under one of four scenarios).

Survey Nonresponse and Gun Ownership

Either item or unit non-response could lead to an underreporting of gun ownership. Moreover, if these factors increased over time, it would lead to an increasing underreporting of gun ownership. The analysis of gun-ownership refusals on the GSS above points to this occurring and has been adjusted for. However, a similar problem could be occurring if unit nonresponse was increasing and if it was greater among gun owners (and especially if such a relationship was getting larger over time). By its very nature, the characteristics of nonrespondents and the size of any nonresponse bias are difficult to judge. But it is possible to consider whether there is evidence that 1) nonresponse is increasing, 2) nonresponse is greater among gun owners than non-owners, and 3) any possible underreporting from nonresponse bias may have grown over time.

It is well-established that there has been a general rise in the unit, nonresponse rate in recent decades (Curtin, Presser, and Singer, 2005; Keeter, Kennedy, Dimock, Best, and Craighill, 2006; Rookey, Le, Littlejohn, and Dillman, 2012). Nonresponse on telephone surveys now typically reaches around 90%. Even the GSS, which has one of the lowest nonresponse rates among surveys, saw it rise from an average of 24.8% in the 1970s to 29.5% in the 2000s. Most of the rise was from 1990s to the 2000s, and nonresponse has been essentially stable since 2000. Thus, nonresponse levels in general and especially the extremely-high, nonresponse rate in telephone surveys show that there is ample and growing opportunity for gun owners to hid their ownership by just not doing surveys.

However, there is no evidence that gun owners are more likely to be nonrespondents than non-owners. In fact, gun owners generally have socio-demographic profiles that make them more likely to be respondents than non-gun owners (e.g. being more likely to be homeowners and married) (Dimock, Doherty, and Christian, 2013; Jelen, 2002; Jones, 2013; Smith, 2010). In particular, since rural residents are both much more likely do surveys and to own guns, it is non-owners rather than gun owners who are likely to be underrepresented in surveys.

But perhaps gun owners have become increasingly likely to be nonrespondents over time because of a general reluctance to do surveys or a specific desire to avoid disclosing on a survey that they are gun owners. The latter is not likely since the vast majority of surveys that have asked about gun ownership have not focused on this topic and respondents doing the survey do not know that some questions will ask about guns.

[9] For related figures on annual additions to the gun supply, especially rates per 100,000 population and estimates of the size of the used gun market see Brauer, 2013a & 2013b.

But perhaps the rise in refusals in recent years could reflect heightened concern by gun owners about challenges to gun ownership (perhaps in light of the election in 2008 of President Obama who was perceived by some to be pro-gun control (Editorial 2012; "NRA Targets," 2008; Todd, 2008) and that the general rise in unit nonresponse has been disproportionately high among gun owners. To examine this, evidence was looked for that would support the possibility of nonresponse being increasingly associated with gun ownership.

First, the association between refusing to report income and gun ownership was examined. The GSS found that refusals to provide household income levels rose from 3.1% in the 1970s to 4.4% in the 1980s, 6.8% in the 1990s, 7.6% in 2000-2004, and 8.8% in 2006-2012. Refusals on these two different types of information are positively correlated. Of people who reported their household income, 0.8% failed to report gun ownership and of those refusing income, 7.7% failed to provide gun ownership. If there was a special problem with reporting gun ownership, then one might expect that the ratio of income refusals to gun refusals would fall (indicating that guns were catching up with income as a topic people did not want to disclose). There was however no overall trend with the ratio lowest in the 1970s (2.8:1), highest in the 1990s (7.6:1), and declining thereafter to 4.4:1 in 2006-2012. By extension, this does not suggest gun ownership is likely to be increasingly associated with unit nonresponse.

Second, while nonresponse has risen over time, there is no long-term decline in interviewer's rating of respondent cooperation. The portion rating respondents in the top cooperation category "friendly and interested" vs. the lower ratings ("cooperative, but not particularly interested," "restless and impatient," or "hostile") declined from 82.3% in the 1970s to a low of 74.0% in the 1990s, but came back up to 79.7% in 2006-2012 (second highest to the 1970s). Refusal to answer the gun-ownership question was inversely related to interviewer assessment of cooperation increasing from 0.7% to 4.0% across the four interviewer ratings. Thus, the lack of a clear long-term trend in cooperation ratings does not indicate a likely increase in failure to report on gun ownership, nor does it suggest that gun owners have become more likely to be nonrespondents.

In sum, there is little evidence to indicate that gun owners are underrepresented on surveys or that such possible nonresponse bias has grown over time.

Summary

There has been considerable controversy about what the trend in gun ownership has been (Dimock, Doherty, Christian, 2013; Frum, 2013; Henning, 2013; Lemieux, 2013; Long, 2013a). Some argue that gun ownership is high and either holding steady or rising. Others find that both household and personal gun ownership have appreciably declined in recent decades. This review indicated that based on the GSS there has been a substantial decline in household gun ownership from the 1970s to the present of about 15 points, a decline of about 9 points based on the IPOLL database, and a much smaller decline about 3-4 points based on Gallup. There was more agreement about decreases of about 5-6 points in personal gun ownership from either the 1980s (GSS) or the 1990s (Gallup) to the present.

Table 1

A Profile of Gun Owners/Non-Owners to Those Not Indicating Gun Ownership Status

Category	Owners	Non-owners	Refused	Missing	DK
% without Hunter	56.1	93.6	67.2	76.5	86.8
% for Gun Control	64.5	84.7	41.8	50.8	64.4
% Male	52.2	41.0	51.8	40.4	20.1
% in Rural Area	66.2	40.7	58.2	55.0	49.1

Source: GSS

Table 2: Trends in Household Gun Ownership

	% of Households with Guns					% of Adults in Households with Guns					
	Gun	No Gun	Re-fused	DK	Missing	Gun	No Gun	Re-fused	DK	Missing	N
1973	47.0	51.4	1.0	0.0	0.6	48.8	49.5	1.0	0.0	0.7	1504
1974	46.1	52.9	0.7	0.1	0.3	47.6	51.3	0.6	0.1	0.4	1484
1976	46.5	52.0	1.1	0.0	0.4	49.4	48.9	1.2	0.0	0.4	1499
1977	50.4	48.9	0.1	0.1	0.5	53.7	45.6	0.2	0.2	0.4	1530
1980	47.3	51.8	0.1	0.1	0.7	51.1	47.8	0.1	0.2	0.8	1468
1982	45.3	52.9	1.3	0.2	0.3	50.5	47.6	1.3	0.1	0.4	1506
1984	44.9	54.0	0.6	0.1	0.4	47.1	51.7	0.6	0.1	0.5	1473
1985	44.2	54.9	0.7	0.0	0.3	48.0	51.2	0.5	0.0	0.3	1534
1987	46.0	53.3	0.5	0.0	0.1	48.0	51.2	0.6	0.0	0.2	1466
1988	39.8	58.4	1.0	0.0	0.7	43.0	55.3	0.9	0.0	0.8	977
1989	46.0	53.7	0.0	0.0	0.3	48.7	50.9	0.0	0.0	0.4	1033
1990	42.2	56.7	0.0	0.1	1.0	45.4	53.7	0.0	0.1	0.8	917
1991	39.6	58.7	1.0	0.0	0.7	43.4	54.7	1.2	0.0	0.7	993
1993	42.0	57.1	0.7	0.0	0.2	45.4	53.7	0.6	0.0	0.2	1075
1994	40.6	58.1	1.0	0.2	0.2	43.8	54.9	0.9	0.2	0.2	1996
1996	40.1	59.4	0.4	0.1	0.0	43.4	56.2	0.4	0.1	0.0	1923
1998	34.8	64.6	0.3	0.1	0.3	36.5	62.7	0.3	0.1	0.3	1882
2000	32.4	66.1	1.2	0.1	0.2	34.2	64.3	1.3	0.1	0.1	1861
2002	33.5	65.5	1.0	0.0	0.0	36.4	62.7	0.9	0.0	0.0	924
2004	34.7	62.9	1.6	0.2	0.6	37.0	60.8	1.4	0.3	0.5	898
2006	33.1	65.2	1.6	0.1	0.0	34.5	63.8	1.7	0.1	0.0	1984
2008	34.0	64.6	1.1	0.3	0.0	35.9	62.7	1.1	0.4	0.0	1356
2010	31.1	65.0	3.5	0.5	0.0	32.1	63.7	3.6	0.6	0.0	1291
2012	33.1	64.7	2.0	0.2	0.0	34.4	63.4	2.0	0.2	0.0	1314

Source: GSS

Table 3

Trends in Gun Ownership by Grouped Years

	% of Households with Guns					% of Adults in a Household with Guns					
	Gun	No Gun	Re-fused	DK	Missing	Gun	No Gun	Re-fused	DK	Missing	N
1973-1979	47.5	51.3	0.7	0.0	0.4	49.9	48.8	0.7	0.1	0.5	6017
1980-1989	45.0	53.9	0.6	0.1	0.4	48.4	50.5	0.6	0.1	0.5	9457
1990-1999	39.5	59.6	0.6	0.1	0.3	42.5	56.6	0.6	0.1	0.3	8786
2000-2004	33.3	65.2	1.2	0.1	0.2	35.4	63.0	1.2	0.1	0.2	3683
2006-2012	32.9	64.9	2.0	0.2	0.0	34.3	63.4	2.0	0.3	0.0	5943

Source: GSS

Table 4: Trends in Adults Living in Households with Guns
By Gender

	Men						Women					
	Gun	No Gun	Re-fused	DK	Missing	N	Gun	No Gun	Re fused	DK	Missing	N
1973-1979	53.7	44.9	0.9	0.0	0.5	2844	46.5	52.3	0.6	0.1	0.5	3166
1980-1989	55.2	43.8	0.7	0.0	0.3	4535	42.9	55.8	0.5	0.1	0.6	5644
1990-1999	49.2	49.9	0.6	0.0	0.3	4005	36.8	62.1	0.5	0.2	0.3	4791
2000-2004	42.9	55.3	1.3	0.2	0.2	1793	28.4	70.4	1.1	0.0	0.2	1886
2006-2016	39.0	58.7	2.2	0.2	0.0	2723	30.3	67.5	1.9	0.4	0.0	3216

Source: GSS

Table 5

Trends in Personal Ownership of Guns

	Owns	Gun in Household Unknown Owner	Gun in Household Owned by Other	No Gun in Household	Missing	N
1980	28.1%	2.5	19.7	48.5	1.1	1469
1982	28.2%	2.6	17.8	49.5	1.9	1507
1984	25.3%	0.2	22.7	50.5	1.4	1473
1985	30.5%	0.3	17.2	51.3	0.8	1535
1987	28.0%	0.7	19.8	50.8	0.8	1466
1988	24.9%	0.5	17.7	55.3	1.6	980
1989	27.1%	0.6	21.0	50.9	0.4	1037
1990	28.5%	0.2	16.7	53.8	0.8	909
1991	27.0%	0.5	15.9	54.7	1.9	997
1993	29.3%	0.4	15.9	53.7	0.8	1066
1994	28.2%	0.1	15.4	54.9	1.3	2027
1996	27.1%	0.3	16.0	56.2	0.5	1917
1998	22.4%	0.3	13.9	62.7	0.8	1891
2000	22.3%	0.1	11.9	64.2	1.6	1865
2002	26.3%	0.0	10.1	62.7	0.9	936
2004	25.2%	0.2	11.5	60.8	2.2	876
2006	21.6%	0.0	12.8	63.8	1.8	1996
2008	23.5%	0.0	12.4	62.7	1.4	1358
2010	20.6%	0.1	11.3	63.7	4.2	1279
2012	21.8%	0.2	12.4	63.4	2.2	1307

Source: GSS

Table 6

Gallup Household Gun Ownership Trends

	% Owning Gun	% Owning Gun + Around Home
7/1959	49	
1/1965	48	
8/1966	47	
5/1972	43	
3/1975	45	
3/1975	45	
10/1975	48	
11/1979	47	
1/1980	44	
1983	40	
5/1985	44	
4/1986	42	
9/1988	51	
3/1989	47	
9/1990	47	
3/1991	46	
5/1991	46	
5/1991	----	50
3/1993	48	----
10/1993	51	----
12/1993	49	54
7/1996	38	40
11/1996	42	45
8/1997	42	----
2/1999	36	42
4/1999	34	----
4/2000	42	----
9/2000	39	41
10/2001	40	----
10/2002	41	44
10/2003	43	45
10/2004	38	40
10/2005	40	42
10/2006	43	----
10/2007	42	44
10/2008	42	43
10/2009	40	42
10/2010	39	41
10/2011	45	47
10/2012	43	44
1/2013	----	36

Source: IPOLL Database; Gallup, 2013b; Saad, 2011

Note: This omits one data point from Gallup (2013b). This 1968 point had gun ownership at 50%. This point was not in IPOLL and its question wording, sample size, and other features are unknown. Also, it is the only the only point in Gallup (2013b) with only year and no other date indicated.

Table 7

Gallup Personal Gun Ownership Trends

	% with Gun
10/1993	35
5/1995	35
5/2000	34
9/2000	27
10-11/2000*	31
10/2004	32
11/2004	31
10/2005	30
5/2007	30
5/2007	32
10/2007	28
2/2008	34
10/2008	30
11/2008	29
10/2009	29
10/2010	28
10/2011	34
10/2012	29
1/2013	23

*Questions on personal gun ownership were asked on daily tracking polls and six three-day rolling averages were reported. This is the average of those overlapping reports.

Source: IPOLL database; Gallup, 2013b; Saad, 2011

Table 8

% Owning Gun by Characteristics of Surveys
Percentages, (Sample Sizes), Probabilities

Questions Wordings

All

Personal	28.4 (51)
Household	40.6 (364) prob.=.000

Household Only

Gun/Firearm only	42.7 (168)
"Any type"	43.4 (14)
List of Weapons	38.4 (182) prob.=.000
Mentions House/Home	42.8 (207)
No reference to Place	34.8 (98)
Home/House & Other Location	42.6 (59) prob.=.000
Gun	40.3 (321)
Firearm	42.6 (43) prob.=.010
You	38.9 (217)
You + Others	43.2 (142)
In in Home (no ref. to whose)	42.2 (5) prob.=.000

Survey Design

Household Only

Mode:	
Telephone	40.1 (319)
In-person	44.4 (39)
Exit Poll/Other	42.0 (6) prob.=.000

Table 8 (continued)

	% Owning Gun
Data Collector:	
ABC	43.8 (21)
CBS	46.2 (25)
Gallup	43.5 (56)
Greenberg	34.2 (80)
GSS	43.3 (24)
George Washington Un.	42.9 (40)
LA Times	39.1 (20)
Pew	36.4 (17)
Other	41.6 (81) prob.=.000
Target Population:	
All Adults	42.3 (215)
Likely Voters	37.4 (121)
Registered Voters	40.0 (22)
Exit Poll Voters/Other	43.3 (6) prob.=.000
Other	
Data Presentation:	
Missing Cases Excluded	43.4 (27)
Missing Cases in Base	40.3 (337) prob.=.005
Years (Collapsed)	
Before 1980	48.4 (16)
1980s	46.2 (24)
1990s	43.4 (67)
2000-2005	38.4 (129)
2006-2013	39.4 (128) prob.=.000

Source: IPOLL database

Table 9

Multivariate Analysis (OLS) of Question/Survey Characteristics
Affecting Reports of Gun Ownership

		Beta/prob.		
Variables	Model 1	Model 2	Model 3	Model 4
Years (uncollapsed)	-.467/.000	----	- .499/.000	----
Years (Base=-Pre-1980)				
1980s	----	-.138/.012	----	- .203/.001
1990s	----	-.481/.000	----	-. 624/.000
2000-2005	----	-.947/.000	----	- 1.13/.000
2006-2013	----	-.946/.000	----	- 1.12/.000
Missing Data (Base=-Missing Excluded)	+.075/.044	+.077/.033	+.059/.162	+.050/.209
Mode (Base=In-person)	+.101/.024	+.031/.531	- .005/.947	- .170/.049
Target Population (Base=-Adults)	- .029/.508	+.025/.557	- .080/.068	- .015/.737
Data Collector (Base=CBS)	- .286/.000	- .251/.000	----	----
Data Collector (Base=GSS)	----	----	-.124/.109	- .205/.010
List of Weapons/Gun-Firearm Only	+.428/.000	+.415/.000	+.369/.000	+.382/.000
In or Around Home/ Home Only	- .142/.001	- .152/.000	- .093/.063	- .090/.056
Gun/Firearm	+.026/.608	+.060/.227	+.180/.000	+.205/.000
You+Others/Only You	- .239/.000	- .235/.000	- .327/.000	- .294/.000
Adjusted R^2	.604	.634	.576	.618
N	357	357	357	357

Source: IPOLL database

Table 10: Adjusted GSS Trends in Household Gun Ownership

% of Adults in Households with Guns

	Gun	No Gun	Re-fused[a]	DK	Missing	N
1973	52.8	46.5	--	0.0	0.7	1504
1974	51.3	48.2	--	0.1	0.4	1484
1976	53.4	46.1	--	0.0	0.4	1499
1977	53.9	45.6	--	0.2	0.4	1530
1980	51.2	47.8	--	0.2	0.8	1468
1982	51.5	47.9	--	0.1	0.4	1506
1984	47.6	51.8	--	0.1	0.5	1473
1985	48.4	51.3	--	0.0	0.3	1534
1987	48.5	51.3	--	0.0	0.2	1466
1988	43.7	55.5	--	0.0	0.8	977
1989	48.7	50.9	--	0.0	0.4	1033
1990	45.4	53.7	--	0.1	0.8	917
1991	44.3	55.0	--	0.0	0.7	993
1993	45.9	53.8	--	0.0	0.2	1075
1994	44.5	55.1	--	0.2	0.2	1996
1996	43.7	56.3	--	0.1	0.0	1923
1998	36.7	62.8	--	0.1	0.3	1882
2000	35.2	64.6	--	0.1	0.1	1861
2002	37.1	62.9	--	0.0	0.0	924
2004	38.1	61.1	--	0.3	0.5	898
2006	37.7	62.2	--	0.1	0.0	1984
2008	38.1	61.5	--	0.4	0.0	1356
2010	36.0	63.3	--	0.6	0.0	1291
2012	36.9	62.9	--	0.2	0.0	1314

Source: GSS

[a]Refused have been removed and reallocated to Gun and No Gun.

Table 11

% of Adults in a Household with Guns by Grouped Years, Adjusted Averages

	Gun	No Gun	Re-fused[a]	DK	Missing	N
1973-1979	52.9%	46.6	--	0.1	0.5	6017
1980-1989	48.5%	50.9	--	0.1	0.5	5457
1990-1999	43.4%	56.1	--	0.1	0.4	8786
2000-2004	36.8%	62.9	--	0.1	0.2	3683
2006-2012	37.2%	62.5	--	0.3	0.0	5943

Source: GSS

[a]Refused have been removed and reallocated to Gun and No Gun.

Table 12

Ancillary Trends: Crime and Hunting

	Violent Crime Rate	Homicide Rate	% Afraid to Walk at Night	% with Hunter in Household	% Hunters 12+	% Hunters 16+
1972	401.0	9.0				
1973	417.4	9.4	39.9			
1974	461.1	9.8	43.6			
1975	467.8	9.6			9.9	
1976	467.8	8.7	42.3			
1977	475.9	8.8	43.0	21.4		
1978	497.8	9.0				
1979	548.9	9.8				
1980	596.6	10.2	42.4	16.3	9.1	
1981	593.5	9.8				
1982	570.8	9.1	44.6	17.8		
1983	538.1	8.3				
1984	539.9	7.9	40.8	16.2		
1985	558.1	8.0	38.7	18.2	8.4	
1986	620.1	8.6				
1987	612.5	8.3	37.3	15.1		
1988	640.6	8.5	37.9	14.4		
1989	666.9	8.7	38.5	14.4		
1990	729.6	9.4	39.0	16.3		
1991	758.2	9.8	42.9	15.7		7.4
1992	757.7	9.3				
1993	747.1	9.5	41.0	14.4		
1994	713.6	9.0	45.4	14.9		
1995	684.5	8.2				
1996	636.6	7.4	40.8	16.1		6.9
1997	611.0	6.8				
1998	567.6	6.3	39.2	12.4		
1999	523.0	5.7				
2000	506.5	5.5	37.7	12.8		
2001	504.5	5.6				6.1
2002	494.4	5.6	31.0	15.5		
2003	475.8	5.7				
2004	463.2	5.5	30.2	12.7		
2005	468.0	5.6				

Table 12 (continued)

	Violent Crime Rate[a]	Homicide Rate[b]	% Afraid to Walk at Night	% with Hunter in Household	% Hunters 12+	% Hunters 16+
2006	479.3	5.8	35.1	10.8		5.5
2007	471.8	5.7				
2008	458.6	5.4	32.7	12.0		
2009	431.9	5.0				
2010	404.5	4.8	32.7	13.4		
2011	387.1	4.7				5.7
2012	386.9	4.7	33.7	11.9		

Sources:

Violent Crime Rate: Uniform Crime Reporting Statistics of the Federal Bureau of Investigation
Homicide Rate: Uniform Crime Reporting Statistics of the Federal Bureau of Investigation
Afraid: GSS –"Is there any area right around here--that is, within a mile--where you would be afraid to walk alone at night?"
Hunter in Household: GSS – "Do you (or does your [husband/wife]) go hunting?"
Hunters 12+ and 16+ - National Surveys of Fishing, Hunting, and Wildlife-Associated Recreation in U.S. Fish and Wildlife Service, 2012. Their definition of hunters includes those using bows as well as firearms.

[a] The Violent Crime Rate is the number of murders and non-negligent manslaughters, forcible rapes, robberies, and aggravated assaults reported to the police per 1000,000 inhabitants.

[b] Homicides per 100,000 inhabitants

Table 13

Estimates of the Number of Civilian Guns in the United States

	A	B	C	D	E	F
1994	192,000,000					
1996				204,000,000	242,000,000	
2000				221,500,000	259,000,000	
2004		218,000,000	283,000,000	240,000,000		270,000,000
2007				256,000,000	294,000,000	
2009				269,000,000	310,000,000	
2010				278,000,000		290,000,000

Source:
A=Cook and Ludwig, 1997
B=households-based, Hepburn et al., 2007
C=respondent-based, Hepburn et al., 2007
D=Hill, 2013
E=Krouse, 2012
F=Karp, 2007

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