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What Do CDC's Surveys Say About the Prevalence of Defensive Gun Use?

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Abstract

In 1996, 1997, and 1998, the Centers for Disease Control and Prevention (CDC) conducted large-scale surveys asking about defensive gun use (DGU) in four to seven states. Analysis of the raw data allows the estimation of the prevalence of DGU for those areas. Data pertaining to the same sets of states from the 1993 National Self-Defense Survey (Kleck & Gertz, 1995) allow these results to be extrapolated to the U.S. as a whole. Possible sources of error in surveys of DGU are reviewed, and the results of previous surveys compared. CDC's survey data confirm previous high estimates of DGU prevalence, disconfirm very low estimates derived from the National Crime Victimization Survey, and indicate that defensive uses of guns by crime victims are far more common than offensive uses by criminal offenders.

Keywords Defensive gun use · Self-protection · Firearms · Gun control · Surveys

Introduction

The debate over gun control in the U. S. heavily revolves around the issue of the costs and benefits of widespread gun ownership. The principle costs are death, injuries, and property loss due to criminal, suicidal, or accidental uses of firearms. The benefits include recreation-related uses of guns, but the most serious and consequential benefits are arguably deaths, injuries, and property loss prevented by defensive use of guns, or criminal attempts deterred by the potential for such use. The magnitude of these benefits are partly a function of how often guns are used for self-protection. Thus, the frequency of defensive gun use (DGU) is an important part of the American gun control debate.

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At least 21 national surveys have asked large probability samples of the U.S. adult population whether they had used guns defensively, including 17 privately sponsored surveys before 2000, and at least four more since 2000 (Kleck, 2001b; Roper Center, 2018). As will be discussed later, the private surveys have generally yielded annual estimates of the number of DGUs by adults against other persons in the one-to-three million range. The estimates vary considerably because the surveys addressed different subsets of the universe of DGUs or pertained to different time periods with differing crime rates (Kleck, 2001b).

Gun control advocates assert that DGUs are rare, and cite estimates of DGU frequency derived from the National Crime Victimization Survey (NCVS). This survey has yielded annual estimates of just 64,615 DGUs (McDowall & Wiersema, 1994), only about 3% of the typical result of 21 other surveys. The extremely low NCVS estimates are uncritically cited by advocates of stricter gun control, so it is worth considering why the NCVS generates such deviant results. First, the NCVS is a nonanonymous survey - the identities of respondents (Rs) are known to researchers. Second, the survey is conducted by an agency of the federal government, the U. S. Bureau of the Census. Third, respondents (Rs) are told that the information generated by the survey will be provided to the U.S. Department of Justice – the law enforcement branch of the federal government. Fourth, Rs are asked about their self-protective actions only after they have stated where the incident occurred. In most states, for all but the few people who have carry permits, it is illegal to possess a firearm off their own property, and thus most Rs could not report a DGU carried out in a public place without confessing to the crime of unlawful carrying. Under these circumstances, there is a sound basis for doubting whether Rs would be willing to report incidents in which they had pointed a gun, or even shot at, another human being, regardless of the justification. Fifth, the Rs are only asked an open-ended nonspecific question about what they might have done to protect themselves during a crime incident, but no Rs in the NCVS have ever been specifically asked about defensive use of a gun. Victim use of a gun can only be reported in the NCVS if the R chooses to volunteer that specific, controversial detail.

The Centers for Disease Control and Prevention (CDC) has also conducted surveys in which large probability samples of the adult population were asked about DGU, as part of their Behavioral Risk Factor Surveillance System (BRFSS). The DGU questions were asked of representative samples of adults in various sets of four to seven states as part of an optional module of firearms-related questions. To my knowledge, CDC never reported the results of those surveys, and does not currently report on their website any estimates of DGU frequency.

I only discovered that CDC had ever asked about DGU in their BRFSS surveys while searching through the questionnaires used in the surveys for questions on other topics. Once I found the key question in the questionnaire for 1 year's BRFSS, I searched the questionnaires for all the other years, from 1984 through 2016, and found the DGU question had been asked in the 1996, 1997, and 1998 surveys. It was included as part of Optional Module 18 asking a variety of questions about firearms. Individual states could include these questions in their BRFSS surveys if they wanted to do so, in addition to the standard set of questions asked in all states. Seven states chose to do so in the 1996 survey, seven in the 1997 survey, and four in the 1998 survey (see Table 1 for lists of participating states).

Table 1 Groups of states that asked DGU question in BRFSS

Survey		
Group	Year	States Included
A	1996	AK, KY, LA, MD, NH, NY, WV
B	1997	CO, HA, MS, NH, NJ, ND, OH
C	1998	LA, MT, NJ, PA

The timing of CDC's addition of a DGU question to the BRFSS is of some interest. Kleck and Gertz (1995) conducted their National Self-Defense Survey in February through April 1993, and estimated that there were about 2.5 million annual DGUs. They privately circulated their estimates of DGU in 1993 and 1994, formally presented them at the annual meetings of the American Society of Criminology in November of 1994, and published the results in the *Journal of Criminal Law and Criminology* in the Fall of 1995 (Kleck & Gertz, 1995).

CDC added a question about one specific subtype of DGU to their 1994 Injury Control and Risk Survey (ICARIS), a national telephone survey of U.S. adults fielded between April 28 and September 18, 1994, just months after preliminary results of the Spring 1993 Kleck/Gertz survey were circulated. ICARIS interviewers asked Rs in gun-owning households about incidents in which they retrieved a gun because they thought an intruder was in, or trying to get into their home (Ikeda, Dahlberg, Sacks, Mercy, & Powell, 1997), actions which roughly correspond to burglary-related DGUs. CDC then added a DGU question to the BRFSS the first year they could do so after the 1995 publication of the Kleck/Gertz survey, in their 1996 survey.

CDC was not the only federal agency during the Clinton administration to field a survey addressing the prevalence of DGU shortly after the results of the Kleck/Gertz survey became known. The National Institute of Justice (NIJ) financed a national survey devoting even more detailed attention to estimating DGU prevalence. It was fielded in November and December 1994 (Cook & Ludwig, 1996). Then, NIJ and CDC helped co-finance a national survey conducted by David Hemenway and Deborah Azrael, which was fielded in the Spring of 1996 (Hemenway & Azrael, 2000, pp. 259, 272). Finally, CDC funded a second national survey by Hemenway that purported to correct some of the problems in his 1996 survey. This one was fielded in the Spring of 1999 (Hemenway, Azrael, & Miller, 2000, pp. 263, 267). In sum, although neither CDC nor NIJ had ever financed a single survey asking about DGU before 1994, but then they supported at least seven of them in 1994 through 1999, immediately following the Spring 1993 survey by Kleck and Gertz.

Surveys by CDC are of special interest because the agency has often been criticized by gun owner organizations like the National Rifle Association (NRA) as being “antigun” and for awarding research grants on firearms and violence only to researchers with strong anti-gun or pro-gun control publication records (see remarks of the NRA's chief lobbyist, Cox 2017). Belief in this anti-gun bias was so strong among pro-gun forces that the NRA got Congress to slash CDC's budget by an amount exactly equal to the budget for its program that studied firearms violence, and to insert a rider in the funding bill that read: “Provided further that none of the funds made available for injury

prevention and control at the Centers for Disease Control and Prevention may be used to advocate or promote gun control” (Jamieson, 2013). Of particular relevance to the present topic, CDC has helped finance surveys on defensive gun use (DGU) by David Hemenway and others that their authors interpreted as indicating that DGU was actually quite rare (Hemenway & Azrael, 2000, p. 272; Hemenway et al., 2000, p. 267).

To the extent that the NRA’s complaints have been widely circulated among gun owners, the CDC’s reputation as “anti-gun” could discourage Rs in surveys sponsored by CDC from reporting firearms-related behaviors, such as the ownership, carrying, or defensive use of guns. There is direct evidence of this concerning estimates of the prevalence of gun ownership. A national poll by Gallup in 1993 found that 49% of households reported gun ownership, and a 1994 Los Angeles Times national poll found the share to be 45% (Roper Center, 2018), but only 34% of households reported gun ownership in CDC’s 1994 Injury Control and Risk Survey (ICARIS)(Ikeda et al., 1997, p. 366). If Rs are as reluctant to report DGUs to CDC interviewers as they appear to be regarding gun ownership, CDC surveys may significantly underestimate the prevalence of DGUs. Their estimates may for this reason be regarded as conservative.

CDC’s 1994 ICARIS included a question on DGU but only in connection with what CDC personnel called “intruder-related firearm retrievals.” Researchers asked those who reported any guns in their household: “During the past 12 months, how many times did you or any other household member get a firearm because there might be an intruder in or trying to get into your home?” The researchers then established whether those retrieving a gun actually saw an intruder and believed “the intruder was frightened away because of the gun,” which presumably implies that the intruder saw the gun and was threatened with it. Of the 34% of Rs reporting household gun ownership, 6% contained at least one person who, in the previous 12 months, retrieved a gun, saw an intruder, and believed the intruder had been scared away because of the gun (Ikeda et al., 1997). The researchers estimated that there were 497,646 incidents in that year in which an intruder was reportedly scared away by a gun. Kleck and Gertz (1995) had found that 33.8% of DGUs were linked with burglaries, implying that the total number of DGUs is 2.96 times the number of burglary-linked DGUs ($1/0.338 = 2.96$). If CDC’s “intruder-related firearm retrievals” are interpreted as burglary-linked DGUs, these survey results indicated that there were about 1.5 million total DGUs in 1994 among persons reporting a gun in their household ($2.96 \times 497,646 = 1.5$ million).

It is, however, unclear how many of these experiences constitute DGUs, since it was not explicitly established that the gun user attacked or threatened the intruder. Consequently, it is debatable whether CDC generated any DGU estimates with this survey. In contrast, they clearly did ask about DGU in their 1996, 1997, and 1998 BRFSS surveys.

CDC’s Behavioral Risk Factor Surveillance System Surveys

The BRFSS surveys are high-quality telephone surveys of very large probability samples of U.S. adults, asking about a wide range of health-related topics. Even just the subset of four to seven state surveys that asked about DGU in 1996–1998 interviewed 3197–4500 adults, depending on the year. This is more people than were asked about this topic in any other surveys, other than the National Self-Defense Survey conducted in 1993 by Kleck and Gertz (1995), who asked DGU questions of

4977 people. Sample sizes were much smaller in all the rest of surveys on the topic (Kleck, 2001b).

The wording of the DGU question in the BRFSS surveys was also excellent, avoiding many problems with the wording that afflicted the DGU questions used in other surveys. The exact wording was:

“During the last 12 months, have you confronted another person with a firearm, even if you did not fire it, to protect yourself, your property, or someone else?”

Respondents (Rs) in these surveys had previously been instructed not to report firearm uses associated with an occupation that “requires and authorizes you to use a firearm.” Thus, the question excluded uses by military, police, security guards, and others with firearm-related jobs. Further, the question appropriately excluded uses against animals (“...another person...”), asked about a specific, recent recall period (“...during the last 12 months...”), covered uses by any type of firearm (not just handguns), covered uses regardless of where they occurred (not just uses in the home), and explicitly told respondents that they should report uses even if they did not fire a gun. In sum, the surveys used an excellent, carefully worded DGU question, in contrast to the wordings used in so many other surveys (reviewed in Kleck, 2001b).

The most important shortcomings of the BRFSS surveys regarding DGUs were that (1) the DGU question was asked only in four to seven states, and (2) the DGU question was asked only of Rs who had reported guns in their household at the time of the survey. In the present analysis, procedures have been developed to adjust for these limitations.

Results - What Did CDC's Surveys Indicate About the Prevalence of Defensive Gun Use?

I downloaded the BRFSS datasets for 1996, 1997, and 1998 from the BRFSS website (CDC, 2018a) and obtained frequencies on the DGU question. Three different combinations of states asked the DGU question in the BRFSS surveys in the 3 years it was asked. Table 1 displays which states asked the DGU question in each of the 3 years. Alaska asked the DGU question in 1996 and Hawaii asked it in 1997, but these results could not be used because the NSDS did not cover those states, and findings from the NSDS were needed to adjust the BRFSS results.

The weighted and unweighted frequencies used to compute the prevalence of DGU in the three BRFSS surveys and in the NSDS are shown in Table 2. Readers should note that figures derived from the BRFSS surveys cannot be compared across years since they were based on three different subsets of states. Thus, they reflect the prevalence of gun use in differing subsets of the nation. Some of the states are places where gun ownership is higher than average and one would therefore expect more DGUs, while other states are lower in gun ownership and thus presumably lower in DGU. These year-to-year differences should not be interpreted as either inconsistencies or as reflecting real changes over time in the prevalence of DGU.

It is the weighted frequencies in Table 2 that are meaningful because they adjust for differences in the probability of a given person being selected into the sample. Weighted

Table 2 Numbers used to compute relative prevalence of DGU in U.S. as a whole vs. groups of states

BRFSS	1996	1997	1998
Unweighted past-year DGU cases	55	29	33
Unweighted total cases	5484	4189	3197
Weighted (by FINALWT) DGU cases	69,387	51,976	61,360
Weighted total cases	5,336,378	5,835,973	5,869,842
Weighted % with DGU	1.300	0.891	1.045
NSDS			
Weighted (by fw t) past-year DGU cases, U. S.	66	66	66
Weighted total sample cases, U. S.	4969	4969	4969
Weighted % with DGU, U. S.	1.326	1.326	1.326
Weighted past-year DGU cases, BRFSS states	10	8	4
Weighted total cases, BRFSS states	337	535	513
Weighted % with DGU, BRFSS states	2.967	1.495	0.780
Ratio, U. S. % DGU over BRFSS states % DGU	0.447	0.887	1.700

Abbreviations: BRFSS = Behavioral Risk Factor Surveillance System (CDC surveys); DGU = Defensive gun use; NSDS = National Self-Defense Survey (fielded in 1993 by Kleck and Gertz)

frequencies from the BRFSS are based on data weighted by the FINALWT weight (see CDC, 2018a for a thorough explanation of the weighting). Weighted frequencies from the NSDS are based weights documented in an unpublished 1995 research memorandum by Kleck (“Weights used in the National Self-Defense Survey datasets.” College of Criminology and Criminal Justice, Florida State University.) Nevertheless, unweighted frequencies are shown because some readers may be skeptical of weighting procedures and worry that they could somehow distort DGU estimates.

The unweighted frequencies are, however, relevant to the question of how much the BRFSS results are subject to sampling error. As previously noted, the sample sizes used in the BRFSS surveys, even just for the subsets of states that asked the DGU question, are enormous, ranging from 3197 to 4500. Such large sample sizes minimize the degree to which DGU estimates could be influenced by random sampling error. For illustrative purposes, if we use the unweighted frequencies from the 1996 survey (46 DGUs among 4500 total Rs) and assume random sampling, the 95% confidence interval estimate of the fraction of adults who had a past-year DGU for the 1996 survey would be 1.022% \pm 0.294%, or 0.73–1.32%. Note that the more meaningful weighted DGU prevalence was 1.329% in the 1996 survey, but readers are again cautioned that this pertains only to the six states that asked the DGU question and therefore cannot, without further adjustment, be directly compared with estimates for the U. S. as a whole.

Table 2 also includes weighted and unweighted frequencies from the NSDS conducted in the Spring of 1993, for both the continental U. S. as a whole, and for each of the three subsets of states used in the three BRFSS surveys. These figures allow us to estimate how much more common or less common DGU was in the nation as a whole compared to how common it was in each of these subsets of states. Knowing these relative levels in turn allows us to extrapolate the BRFSS estimates of DGU prevalence, based on the subsets of states, up to the nation as a whole.

The NSDS-based estimated ratio of nationwide DGU prevalence over DGU prevalence in the subset of states that asked the DGU question in a given BRFSS survey is shown in the last row of Table 2.

The numbers needed to estimate the number of U.S. adults who used a gun defensively in each of the years from 1996 to 1998 are shown in Table 3. The estimated prevalence of DGU for these subsets of states, based on the BRFSS, is reported in line (4) of this table. To produce national estimates of the prevalence of DGU from the BRFSS surveys, however, requires adjusting these prevalence estimates for the effects of two limitations of those surveys. First, they only cover the populations of four to six states (excluding Alaska and Hawaii), not the entire nation. Second, the DGU questions were only asked of people reporting current household gun ownership. Thus, our strategy was to project BRFSS results pertaining only to some states up to the nation as a whole, and to then adjust for the omission of DGU uses by persons who did not report household gun ownership at the time they were interviewed.

The process of adjusting BRFSS-based DGU estimates is summarized in Table 3. We began by estimating how many adults live in gun-owning households, because this is the population that was asked a DGU question in the BRFSS surveys. Row (1) displays Census Bureau estimates of the size of the U.S. adult (age 18+) residential population for years from 1996 through 1998 (U. S. Bureau of the Census, 1998), while Row (2) shows the percent of U. S. households reporting gun ownership in national surveys. Multiplying row (1) (divided by 100) times row (2) yields the estimated number of U. S. adults living in gun-owning households,

Table 3 Estimating the frequency of defensive gun use based on CDC’s BRFSS surveys^a

	1996	1997	1998
(1) U.S. resident population age 18+ (in 1000 s)	196.044	198.156	200.296
(2) % U. S. households reporting guns (Gallup Poll)	42	42	42 ^b
(3) Number of adults in gun-owning households [(1) × (2)/100]	82,338,480	83,225,520	84,124,320
(4) BRFSS: % of adults in gun-owning households with DGU in group of states asking DGU question (Table 2)	1.300	0.891	1.045
(5) NSDS: Ratio of U. S. DGU rate over rate in BRFSS states (from last row of Table 2)	0.447	0.887	1.700
(6) BRFSS: Estimated % of all U. S. adults in gun-owning households with DGU [row (4) times row (5)]	0.581	0.790	1.776
(7) BRFSS: Estimated number of all U. S. adults in gun-owning households with DGU [row (6) times row (3)]	478,387	657,482	1,494,048
(8) BRFSS: Total U. S. DGUs, all adults [1.266 times row (7)]	605,638	832,372	1,891,465
Annual average of estimates in row (8) = 1,109,825			

Notes:

a. DGU prevalence rate is defined as the estimated percent of U.S. adults (age 18+) who used a gun for self-protection against a person, not including uses in connection with military, police, or security guard duties, in the 12 months before the date of the survey interview. BRFSS = Behavioral Risk Factor Surveillance System, NSDS = National Self-Defense Survey (Kleck & Gertz, 1995)

b. Gallup estimate of household gun ownership prevalence was 42% in both 1996 and 1997. Gallup did not ask the question in 1998, so their 1997 figure was used

shown in row (3). (It was assumed that average household size is the same in households with or without guns).

Row (4) reports the weighted percent of adults in gun-owning households who reported a DGU in the various sets of states that asked a DGU question in the 1996, 1997, and 1998 BRFSS surveys (listed in Table 1). The raw frequencies used to compute these percentages were reported in Table 2. We cannot directly apply these estimates to the U.S. because the population of these sets of states do not constitute a probability sample of the U. S. population. The prevalence of DGU could be far higher in some states than in the nation as a whole if the states have higher-than-average rates of gun ownership or crime, or could be far lower if the set of states had lower gun ownership or crime rates. The substantial differences in the figures in row (4) are certainly consistent with this view. The NSDS, however, provided information that allows us to extrapolate the BRFSS figures applying to the various subsets of states to the U.S. as a whole, since the NSDS provides both an estimate of DGU prevalence in the nation as a whole and its prevalence in any given subset of states.

This NSDS-based ratio of the DGU prevalence for the U. S. as a whole over the prevalence in the subset of surveyed states (seen in the last row of Table 2) is again reported, for convenience, in row (5) of Table 3. This adjustment ratio (row 5) is multiplied times the figures in row (4) to yield BRFSS-based estimates of the percent of adults in gun-owning households with a DGU *in the U. S. as a whole*, shown in row (6) of Table 3.

The BRFSS asked the DGU question only of people living in households that reported guns at the time of the interview. This excludes (1) DGUs by people who used a household gun that was no longer in the household by the time they were interviewed in the BRFSS, (2) DGUs by people who used a gun belonging to a person who was not a member of their household, and (3) DGUs by people who falsely denied having a gun in their household. This is not a trivial matter, since Kleck and Gertz (1995, p. 187) found that 21% of persons who reported a DGU had denied having a gun in their household at the time of the interview. To adjust for this difference, the DGU prevalence estimates based on BRFSS surveys were multiplied by 1.266 ($1/0.79 = 1.266$). The figures shown in row (7) were therefore multiplied by 1.266, yielding the final BRFSS-based DGU estimates shown in row (8).

These three CDC-based estimates average 1,109,825 DGUs per year for the period 1996–1998. This puts the CDC results squarely within the range of DGU estimates typically produced by the many private surveys (Kleck, 2001b). This CDC-based estimate, however, is 18 times larger than the number of DGUs supposedly implied by the NCVS (McDowall & Wiersema, 1994). Thus, even other federal government surveys, and not just private surveys, suggest that the NCVS-based estimate of DGU prevalence is far too low.

What little difference there is between the BRFSS estimates for 1996–1998 and those of earlier surveys could be due to declining rates of violent crime, the crime type that accounts for most DGUs. For example, the U.S. murder rate was 9.3 per 100,000 population in 1992, but just 6.3 in 1998 (Federal Bureau of Investigation, 1999, p. 64). Thus, the murder rate declined by 32% from 1992, the period covered by the Kleck and Gertz past-year DGU estimates, to 1998, the year when the last of the three BRFSS surveys with a DGU question was fielded. With fewer occasions for self-defense in the form of violent victimizations, one would expect fewer DGUs. Other things being

equal, one would expect that a 32% decline in violence rates would result in a roughly similar proportional decline in DGUs. Thus, if there were 2.5 million DGUs in 1992, we would expect about 1.7 million in 1998. The CDC-based estimate for 1998 of 1.9 million is therefore quite consistent with the NSDS estimate for 1992.

A Review of Errors in Surveys of Defensive Gun Use

There is currently no feasible way to measure the prevalence of DGU other than with surveys. Certainly police data cannot provide meaningful estimates given the unwillingness of most crime victims to even report their victimizations to the police (Hart & Rennison, 2003), never mind the controversial fact that they had threatened or attacked another person with a firearm during the crime event. Counts of news accounts of DGUs would be even more incomplete because news outlets would normally know only about the subset of DGUs known to the police.

All surveys are flawed, some more than others. The BRFSS surveys, however, are among the better ones, using large probability samples, carefully crafted question wordings, and skilled interviewers. Is it nevertheless possible that even the BRFSS yields DGU estimates that are too high? This could happen either because BRFSS samples include too many people who had a DGU experience (sample bias) or because too many people reported DGUs who did not actually have such experiences (response errors). CDC's assessment of sample biases, however, indicate that they contribute to an *under*representation of persons likely to have a DGU. Their samples underrepresent males, nonwhites, and low-income people – that is, people who are more likely to become crime victims and thus have occasions to use firearms for self-protection (CDC, 1998). These sample biases would all tend to make BRFSS-based estimates of DGU prevalence too low.

Surveys can also be subject to coverage bias, that is the use of sampling procedures that preclude the inclusion of some parts of the target population. For example, both the CDC surveys and almost all other surveys asking a DGU question are telephone surveys, so their sample frame is the set of all possible telephone numbers with known area codes and prefixes. People without telephone service therefore have zero chance of inclusion in the sample. Likewise, all these surveys interview only adults age 18 or over, so no adolescents are interviewed. Surveys that ask about DGUs involving any member of the household might indirectly capture some adolescent DGUs known to adult household members, but reports by proxies are never as complete as reports directly provided by the target individuals. Finally, national surveys almost always exclude the homeless, and usually exclude persons in institutions at the time of the survey (Dillman, Smith, & Christian, 2009). All of these excluded subpopulations are of lower average income, and at greater risk of being a victim of the types of crime which guns are used to defend against.

Thus, both sample bias and coverage bias tend to make estimates of DGU prevalence too low. Any upward bias in the estimate would therefore have to come from response errors – respondents giving, intentionally or unintentionally, inaccurate answers to the DGU question. Critics of higher DGU estimates like David Hemenway (1997) have speculated about reasons why respondents in these surveys might give inaccurate answers, but these discussions are misleading because they focus solely on

“false positive” responses – inaccurate claims of DGU experiences by persons who had no such experiences. Thus, they address only response errors that tend to make DGU estimates too high, while ignoring well-established sources of response errors that would tend to make estimates of controversial behaviors too low. No one disputes that false positive responses occur, but false positive responses cannot lead to an overestimate of DGU prevalence unless they outnumber false negative responses – people saying “no” to the DGU question when the accurate answer would have been “yes.” Hemenway and the other critics of higher DGU estimates (e.g. McDowall, Loftin, & Presser, 2000) have had nothing to say about the frequency of false negative responses, and thus can have nothing to say about the relative balance of these two kinds of response error.

Unfortunately, there is little hard evidence bearing directly on response errors in reporting DGUs in particular since it is ordinarily impossible to know for certain whether a DGU really happened. In two national surveys, interviewers were asked for their impressions as to whether each R they questioned was either concealing a DGU (false negative) or inventing one (false positive), based on R’s tone of voice, hesitation in responding, extraneous remarks, and so on. Both surveys found that interviewer-suspected false negatives greatly outnumbered suspected false positives (Kleck, 2001b, pp. 253–254, based on the NSDS; secondary analysis of NSPOF data, Police Foundation, 1994). These judgements, however, could be dismissed because they are necessarily subjective and indirect.

There is, on the other hand, considerable hard evidence bearing indirectly on the issue of response errors because it concerns *elements* of a DGU. We can begin with the fact that most DGUs occur away from the victim’s home (Kleck & Gertz, 1995, p. 185) and that, in the 1990s, it was unlawful for anyone to carry a gun off their own property unless they were among the few (under 1% back then – Kleck 1997, Chapter 6) who had a carry permit. Therefore, a survey respondent had to be willing to confess to a crime (unlawful possession of a firearm) if they wanted to report a DGU that occurred in a public place. In the NSDS, it was found that 63% of DGUs occurred in places other than the defender’s home (Kleck & Gertz, 1995, p. 185). Likewise, people forbidden to possess guns regardless of location, such as convicted criminals, would have to confess to a crime to report DGUs that occurred anywhere, even those in their own home. Thus, even if the gun use itself involved lawful self-defense, most DGUs probably involve the crime of unlawful possession of a weapon.

The technical literature on self-report surveys of offending consistently indicates that few people report crimes that they did not commit, and many deny committing crimes that they did commit. That is, false negatives greatly outnumber false positives, and consequently response errors in surveys, on net, contribute to the *underestimation* of the prevalence of criminal offending (reviewed in Kleck, 2001b).

Regardless of the location of the DGU, in order to report using a gun for protection, one must also be willing to admit to possessing a gun. Research on survey reporting of gun ownership has found that large shares of even law-abiding gun owners falsely deny having guns, or refuse to answer a question about their gun ownership (Rafferty Thrush, Smith, & McGee 1995; Kellermann, Rivara, Banton, Reay, & Fligner, 1990). For example, Rafferty and her colleagues found that 9% of registered handgun owners refused to answer the gun ownership question when interviewed in a telephone survey, and of those answering it, 13% denied having a gun in their household. On the

other hand, I am not aware of any evidence of any significant numbers of false positive responses regarding gun possession.

Finally, in order for survey respondents to be willing to report using a gun to protect themselves against crime, they must be willing to report the victimization attempt itself. Without a crime victimization experience, there can be no defense against crime. Research on the reporting of crime victimization has long indicated that most crime victims fail to report the victimization to police. The National Crime Victimization Survey indicates that no more than a third of crimes are reported to the police (Hart & Rennison, 2003). Further, reverse-record checks conducted by the Census Bureau found that even among assaults that were reported to the police, only half were reported to survey interviewers (Turner, 1972, p. 26).

To summarize, for a person who had experienced a typical DGU to be willing to report it to a surveyor, she or he would have to be willing to report (1) a crime they committed (unlawful carrying), (2) possession of a gun, and (3) a crime victimization experience. Research consistently indicates that false negative responses are common in surveys asking about these topics, while false positives are rare. Therefore, as best we can tell from empirical evidence currently available, the net effect of response errors in surveys asking about DGU is likely to be an underestimation of DGU prevalence.

CDC Survey-Based Estimates Compared to those of Other National Surveys

One way to judge the validity of DGU prevalence estimates derived from CDC's surveys is to compare them with estimates derived from national surveys. Table 4 summarizes the results of 21 national surveys that asked a DGU question (recall that the NCVS did not ask a DGU question). All were based on probability samples of the national adult (age 18+) population and were conducted by professional survey organizations. All were telephone surveys except the Pew 2017 survey, which was an Internet (Web-based) survey.

The surveys differed in the subsets of DGUs asked about, the subsets of the survey sample asked the DGU questions, and in other respects, so their estimates had to be adjusted if they were to be even moderately comparable with each other. They were adjusted so as to produce standardized estimates of the share of U.S. adults who used *any kind of gun* defensively against a *human* (rather than an animal) in *the preceding 12 months*, not including uses in connection with *military, police, or security guard duties*.

The adjustments are described in detail in the [Appendix](#). Readers who are skeptical about these adjustments may focus just on the surveys that did not require any adjustments - the NSDS fielded in 1993 (Kleck & Gertz, 1995) and the NSPOF fielded in 1994. Both yielded unadjusted DGU estimates that fall in the middle of the range of adjusted estimates - 2.5 million and 2.7 million respectively.

Original (unadjusted) DGU prevalence percentages from surveys that required multiple adjustments were multiplied by as many adjustment factors as necessary. For example, the 2000 Washington Post survey summarized in Table 4 required adjustments 2, 3, and 4 (see [Appendix](#)). Its initial unadjusted DGU prevalence percentage was 8%, which was multiplied by adjustment factors $0.1628 \times 0.90984 \times 0.806$, yielding an adjusted DGU prevalence of 0.96%. We did not adjust for the

Table 4 National surveys of defensive gun use in the U. S.^a

Survey:	Cambridge Reports	DMla	DMlb	Hart	Time/CNN	Mauser	Gallup
Time of Interviews:	April–May 1978	May–June 1978	December 1978	October 1981	December 1989	March–April 1990	May 1991
Sample Size:	1500	1500	1010	1228	605	344	1,002
Population covered:	Adults	Registered voters	Registered voters	Registered voters	“Firearm owners”	Adults	Adults
Gun Type Covered:	Handguns	All guns	All guns	Handguns	All guns	All guns	All guns
Recall Period:	Ever	Ever	Ever	5 years	Ever	5 years	Ever
Excluded Uses Against Animals?	No	No	Yes	Yes	No	Yes	No
Excluded Military, Police Uses?	No	Yes	Yes	Yes	Yes	Yes	No
DGU question asked of:	Protection hgun owners	All	All	All	Gun owners	All	Rs in handgun households
DGU question refers to:	R	Household	Household	Household	R	Household	R
Unadjusted % adults with DGU ^b	3	15	7	4	9	3.79	8
Adjustments applied:	2–5,11	2,3	2	1,5	2,3,8	1	2–4,12
Adj. % with DGU	1.62	2.22	1.14	2.01	4.50	1.52	2.36
Population 18 or over	146.5	[76,030 m]	[76,030 m]	[82,368 m]	((59.5 m))	[93,347 m]	185.0 m
Implied number of DGUs ^d	2.4 m	1.7 m	0.9 m	1.5 m	2.7 m	1.4 m	4.4 m
Survey:	Kleck & Gertz	Gallup	L.A Times	U.S NEWS	CDC ICARIS	NSPOF	Time/CNN
Time of Interviews:	Feb.–April 1993	December 1993	April 1994	May 1994	April–Sept. 1994	Nov.–Dec. 1994	May 1995
Sample Size:	4997	1014	1682	1000	5238	2568	600
Population covered:	Adults	Adults	Adults	Adults	Adults	Adults	Gun Owners
Gun Type Covered:	All guns	All guns	All guns	All guns	All guns	All guns	All guns
Recall Period:	1 year	Ever	Ever	5 years	1 year	1 year	Ever
Excluded Uses Against Animals?	Yes	No	No	Yes	Yes	Yes	No

Table 4 (continued)

Survey:	Cambridge Reports	DM1a	DM1b	Hart	Time/CNN	Mausser	Gallup
Excluded Military Police Uses?	Yes	Yes	Yes	Yes	Yes	Yes	No
DGU question asked of:	All	Gun Owners	All	All	Rs in handgun households	All	Gun Owners
DGU question refers to:	R	R	R	R	R	R	R
Unadjusted % adults with DGUs ^b	1.326	11	8 ^c	1	0.63	1.44	10
Adjustments applied:	None	2.3,8	2.3,6	1	7,9	None	2–4,8,10
Adj. % with DGU	1.326	2.74	3.18	0.40	2.36	1.44	8.39
Population 18 or over	188.0 m	188.0 m	190.3 m	190.3 m	190.3 m	190.3 m	((62.4 m))
Implied number of DGUs ^d	2.5 m	5.1 m	6.1 m	0.8 m	4.5 m ^d	2.7 m	5.2
Survey:	Hemenway & Azrael	Hearst	Hemenway	Gallup	Washington Post	CNN	Pew (Internet)
Time of Interviews:	May–June 1996	August 1997	Spring 1999	May 2000	June 2000	Sept. 2014	March 2017
Sample Size:	1906	2016	2474	1031	1068	1014	3844
Population covered:	Adults	Adults	Adults	Adults	Adults	Adults	Adults
Gun Type Covered:	All guns	All guns	All guns	All guns	All guns	All guns	All guns
Recall Period:	5 years	Ever	5 years	Ever	Ever	Ever	Ever
Excluded Uses Against Animals?	Yes	Yes	Yes	No	No	No	No
Excluded Military Police Uses?	Yes	No	Yes	No	No	No	Yes
DGU question asked of:	All	All	All	All	All	Gun owners	All
DGU question refers to:	R	R	R	R	R	R	R
Unadjusted % adults with DGUs ^b	0.73	5	1.15	7	8	20	7
Adjustments applied:	1	2.4	1	2–4	2–4	2–4,8	2,3
Adj. % with DGU	0.29	0.66	0.46	0.84	0.96	1.33	1.04
Population 18 or over	193.7 m	196.0 m	200.4 m	202.6 m	202.6 m	239.9 m	250.1 m

Table 4 (continued)

Survey:	Cambridge Reports	DM1a	DM1b	Hart	Time/CNN	Mauser	Gallup
Implied number of DGUs ^d	0.6 m	1.3 m	0.9 m	1.7 m	1.9 m	3.2 m	2.6 m

Abbreviations: DMI = Decision Making Information; R = respondent; Hgun = handgun; m = million; DGU = defensive gun use; CDC = Centers for Disease Control and Prevention; NSPOF = National Survey of the Private Ownership of Firearms

Notes: a. Table 4 covers surveys of probability samples of the general U.S. population that directly asked Rs about DGU. It excludes the survey reported in McDowall et al. (2000), which was instead based on samples of “commercial lists of likely gun owners” (p. 8), and the NCVS, which never asks Rs specifically about DGU

b. This percentage is the share of persons or households who reported a DGU for whatever recall period was used, for whatever subset of gun types or circumstances that happened to be specified in the survey’s original question. Thus, these figures are generally not even minimally comparable across surveys without adjustment. Household-based prevalence figures assume just one member of the household had a DGU

c. This survey inquired only about DGUs outside the home

d. Implied DGUs is for DGUs in connection with all types of crimes, projected from the survey’s estimate for burglary-linked DGUs only

Population Bases to Which Adjusted DGU prevalence percentages were applied: Figures in the penultimate row for most surveys display the number of U.S. residents age 18 or over, but those in brackets refer to number of households, and those in double parentheses refer to the estimated number of adults who personally own guns

Sources: Cook and Ludwig (1996); Hemenway, Azrael, and Miller (2000); Kleck (2001b); Mauser (1996, p. 397); Roper Center (2018); iPoll Databank online database of surveys

different time periods in which surveys were fielded because we wanted the figures to reflect changes over time. We could not adjust for any possible difference in DGU involvement between registered voters and the adult population as a whole, because there are no data on which an adjustment factor could be based.

Once the DGU prevalence percentage was adjusted, it was – in most cases – multiplied times the size of the U.S. adult population (age 18+) at the time of the survey. For example, this population numbered 202.6 million in 2000 when the Washington Post fielded their survey. Applying this survey’s adjusted DGU percentage of 0.96% times 202.6 million yields an estimated number of adult DGUs in 2000 of about 1.9 million. For surveys of the population of registered voters, it was assumed that DGU prevalence was the same in the entire adult population, including those not registered to vote, as among adults registered to vote. For the two surveys whose samples were confined to persons who personally owned guns at the time of the interview (the Time/CNN surveys of 1989 and 1995), it would be implausible to assume that DGU prevalence was the same among people who do not own guns as it was among those who do. For these surveys, the adjusted DGU percentage was multiplied times an estimate of the number of people who personally own guns. This procedure yielded estimates of DGUs only among persons who reported gun ownership at the time of the interview, estimates which are therefore incomplete and not comparable with the other surveys. All final estimates of numbers of DGUs are conservative in three respects: (1) they assume only one DGU-involved adult per household reporting a DGU, (2) they assume only one DGU incident per DGU-involved person in the recall period, and (3) they do not include any DGUs by adolescents, persons institutionalized at the time of the survey, or persons without telephone service.

The annual number of DGUs implied by the 21 national surveys summarized in Table 4 ranges from 0.6 million to 6.1 million, averaging 2.2 million. Figure 1 visually illustrates the distribution of estimates, displaying the number of surveys that yielded estimates in each range.

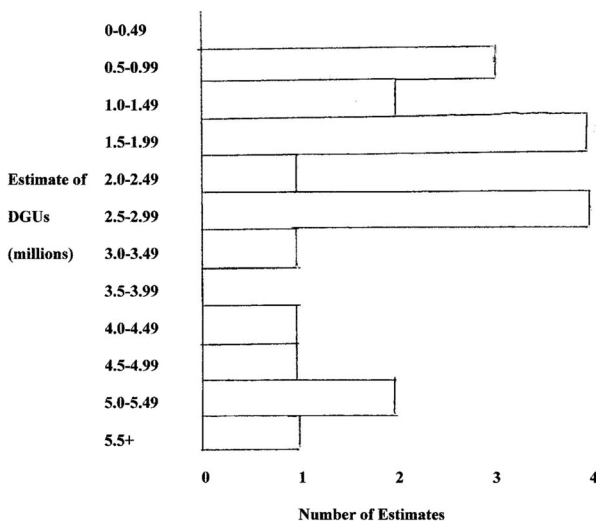


Fig. 1 Distribution of Survey Estimates of Annual Defensive Gun Uses (DGUs)

The estimates we derived from the three CDC surveys of 0.6, 0.9, and 1.9 million (Table 3) all fall within the range of estimates generated by previous surveys, though the agency's "anti-gun" reputation among some gun owners may have biased its DGU estimates to the low side. The CDC surveys confirm what private surveys have found – defensive use of firearms by crime victims is common in the U.S.

The sources for these survey results (such as the Roper iPoll database) generally do not report standard errors or confidence intervals. Further, most of them use complex sampling designs that depart from simple random sampling, so introductory textbook formulae for computing standard errors are not strictly applicable. Nevertheless, for the sake of giving readers a rough idea of the magnitude of sampling error, estimates were computed, using the textbook formula, for the two most recent national surveys. The 95% confidence interval estimate of the percent of the adult population with a DGU was 0.625–2.035% for the 2014 CNN poll and 0.876–1.204% for the 2017 Pew survey. These estimates imply 1.5–4.4 million annual DGUs based on the CNN poll and 2.2–3.0 million for the Pew survey. The intervals are wide, but even the lower limits imply numbers of DGUs much larger than the number of crimes committed with guns. In any case, the sampling error in any one survey becomes less important if you have 21 surveys, with a collective sample in the tens of thousands, all yielding large DGU estimates.

These estimates indicate that defensive use of firearms by crime victims is far more common than the highest estimates of offensive uses by criminals based on victim surveys. The National Crime Victimization Survey estimated that there were 416,350 violent crime incidents committed by offenders with firearms in 2016, including crimes not reported to the police (U.S. Bureau of Justice Statistics, 2017). By comparison, the average of the estimates of annual DGUs based on the 2014 CNN poll and the 2017 Pew survey was 2.9 million (Table 4)– seven times larger than the number of crimes committed by gun-armed offenders in 2016.

Discussion

Some cautions are in order about the CDC estimates of DGU prevalence. First, there is no way to adjust for any reluctance of gun owners to report defensive gun uses to CDC interviews or to even participate in a CDC-conducted survey, since there is no way to calculate how much NRA efforts to characterize CDC as "anti-gun" have influenced the population of gun owners.

Second, the factors we used to extrapolate from results based on four to six states up to the nation as a whole depend on small numbers of persons reporting DGUs in those subsets of states in the NSDS. The number of persons residing in those states who were *asked* the DGU questions was substantial (between 337 and 535), which minimized sampling error, but the number reporting a DGU in those subsets of the NSDS was small, which makes DGU prevalence estimates in those subsamples sensitive to response error. As previously noted, the dominant response error is likely to be false negatives, which would tend to make these DGU prevalence estimates too low. This is, however, true for Rs in both the national NSDS sample as a whole, and for Rs in the BRFSS residing in states that asked the DGU question.

Third, there are limitations to the BRFSS surveys that parallel those of the NSDS. Although the numbers of persons asked the DGU question was very large in the

BRFSS states (between 3197 and 5484) and this minimized sampling error, the raw numbers of Rs reporting a DGU in the BRFSS surveys was just 29–55 in each of the three surveys, which makes the estimates of DGU prevalence more vulnerable to response error of the sort discussed in the previous paragraph. Again, in light of prior evidence suggesting that false negative responses are more common than false positive responses, the effect of response errors is likely to be predominantly one that makes the BRFSS-based estimates of DGU prevalence too low.

Conclusions

In sum, even when CDC, an organization perceived by some to be strongly “anti-gun,” devised and conducted the surveys, their survey results implied huge estimates of defensive gun uses – over a million per year, far more than the number of violent crimes in which offenders used guns. Although the CDC routinely reports results of the BRFSS regarding a wide variety of topics on their website, including results pertaining to subareas of the nation (CDC, 2018b) and even results pertaining to individual states (CDC, 2018c), the CDC has not reported their DGU results.

These estimates are relevant for the scholarly purpose of describing the full set of consequences of widespread gun ownership in America, but do they imply anything about public policy on the regulation of firearms? If one were considering only moderate controls that would not disarm significant numbers of noncriminal Americans, such as background checks, DGU estimates would be of little relevance since such policies would presumably not substantially reduce defensive use of firearms by noncriminals. The number of DGUs is, however, highly relevant to the relative costs and benefits of prohibitionist controls aimed at disarming *everyone*, including the noncriminal majority.

Organizations like the Brady Campaign to Prevent Gun Violence, the Violence Policy Center, and Everytown for Gun Safety insist that they do not favor prohibition but their denials are always carefully phrased so as to pertain only to the policies that they are currently actively advocating – policies that indeed do not include prohibition (Kleck, 2001a). Given current political realities, and public opinion polls indicating that most Americans presently oppose banning guns, or even just handguns, it would be futile to lobby for gun prohibition. The October 2017 Gallup poll found that only 28% of U. S. adults favor banning the possession of handguns (Roper Center, 2018). Further, any admission of future prohibitionist ambitions would play into the NRA’s “slippery slope” argument that proposals for moderate controls must be opposed because they would incrementally lead to banning guns altogether (Kleck, 2001a).

None of the major gun control advocacy organizations, however, have publicly committed themselves to never favoring prohibition *in the future*. There is considerable evidence that the leaders and activist members of the major advocacy groups do think that banning gun possession in the general civilian population would be a good idea, and that they would favor it if its achievement ever became politically feasible (Kleck, 2001a). To the extent that the fight over guns eventually becomes a fight over gun prohibition, the incidence of victims using firearms to defend themselves will become increasingly relevant to policy.

Authors' Contributions No applicable.

Availability of Data and Material NSDS Data are available from author; CDC data are public.

Compliance with Ethical Standards

Conflicts of Interest/Competing Interests None.

Code Availability Not applicable.

Appendix

The following adjustments were applied to the Table 4 DGU prevalence percentages in order to make them more comparable with each other.

- *Adjustment 1* was applied to surveys inquiring about a five-year recall period, in order to produce an estimate pertaining to a one-year recall period. The NSDS obtained a DGU prevalence of 1.326 when using a one-year recall period, and 3.315 when using a five-year recall period (Kleck & Gertz, 1995, p. 184). Therefore, adjustment 3 consisted of multiplying a prevalence figure based on a five-year recall period by 0.40000 ($1.326/3.315 = 0.40$).
- *Adjustment 2* was applied to surveys using a lifetime recall period (“have you ever..”), in order to produce an estimate pertaining to a one-year recall period. A California poll was unique in asking a DGU question for both a one-year recall period and a lifetime recall period, and indicated that the same survey yielded a 1.4 percent prevalence figure for a one-year recall period and an 8.6 percent figure for lifetime period (Field Institute, 1976), so the adjustment consists of multiplying an “ever used” estimate by 0.16279 ($1.4\%/8.6\%=0.16279$).
- *Adjustment 3* was applied to surveys that failed to exclude uses of guns against animals, in order to produce an estimate pertaining only to uses against humans. The NSDS (Kleck & Gertz, 1995) indicated that of 244 Rs initially reporting DGUs, 22 had used guns only against animals, so the adjustment consists of multiplying a humans-plus-animals estimate by 0.90984 ($222/244$).
- *Adjustment 4* was applied to surveys that failed to exclude incidents linked with military, police, or security guard duty. An experiment by McDowall et al. (2000) showed that when Rs were not instructed to exclude such incidents, 30 of the 155 Rs who initially reported a DGU were found to be reporting these kinds of duty-related experiences. The adjustment consisted of multiplying the DGU prevalence percentage by 0.806 ($125/155 = 0.806$).
- *Adjustment 5* was applied to surveys that asked only about DGUs committed with handguns. Kleck and Gertz (1995, p. 185) found that 79.7% of DGUs were committed with handguns, so the adjustment consisted of multiplying a handgun-only DG prevalence percentage by 1.255 ($100/79.7 = 1.255$).
- *Adjustment 6* was applied to a survey that inquired only about DGUs occurring outside the R’s home. Kleck and Gertz (1995) that only 62.7% of DGUs occurred outside the user’s home, so the adjustment consisted of multiplying the DGU prevalence percentage by 1.595 ($100/62.7 = 1.595$).

- *Adjustment 7* was applied to a survey that asked only about burglary-linked DGUs. Kleck and Gertz (1995) found that 33.8% of DGUs were linked with burglaries, so the adjustment consisted of multiplying the DGU prevalence percentage by 2.959 ($100/33.8 = 2.959$).
- *Adjustment 8* was applied to surveys that asked the DGU question only of Rs who reported personally owning a gun or handgun, in order to produce an estimate pertaining to the entire population and thus reflecting uses among those who do not report current ownership of a gun. The NSDS indicated that only 59.5% of Rs reporting DGUs reported current personal ownership of a gun (Kleck & Gertz, 1995, p. 187), so the adjustment consists of multiplying a gun-owners-only estimate by 1.681 ($1/0.595 = 1.681$).
- *Adjustment 9* was applied to surveys that asked the DGU question only of Rs who lived in households reporting current gun ownership, in order to produce an estimate pertaining the entire population and thus reflecting uses among those who do not live in a household reporting current ownership of a gun. The NSDS indicated that only 79.0% of Rs reporting DGUs reported current household ownership of a gun (Kleck & Gertz, 1995, p. 187), so the adjustment consists of multiplying a gun-owning household-only estimate by 1.26582 ($1/0.790$).
- *Adjustment 10* was applied to the 1989 Time/CNN survey that only asked about DGUs in which the gun was fired. Kleck and Gertz (1995, p. 185) found that only 23.9% of DGUs involve the gun being fired, even as a warning shot, so the adjustment consisted of multiplying the guns-fired DGU prevalence by 4.184 ($100/23.9 = 4.184$).
- *Adjustment 11* was applied to the 1978 Cambridge Reports survey, which only asked the DGU question of Rs who reported personally owning a handgun for purposes of “protection.” Analysis of the NSPOF dataset shows that only 27.69% of DGUs were by Rs who personally owned a handgun primarily for self-protection, so the adjustment consisted of multiplying the unadjusted DGU prevalence by 3.6111 ($100/27.69 = 3.6111$).
- *Adjustment 12* was applied to the 1991 Gallup poll, which only asked the DGU question of Rs who reported household handgun ownership at the time of the survey. Analysis of the NSPOF dataset shows that only 40.46% of DGUs were by Rs who lived in a household with handguns, so the adjustment consisted by multiplying the unadjusted DGU prevalence by 2.4717 ($100/40.46 = 2.4717$).

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