

Can We Talk?

Importance of Random-Digit-Dial Surveys for Injury Prevention Research

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Abstract: Prevention research in public health requires quality data. In injury prevention research, “official” data sources, such as medical or law enforcement data, often do not possess the required depth or completeness. Self-reported data can fill this gap. Such data allow us to understand knowledge, attitudes, exposures, and behaviors associated with injury risk. Self-reported data are also needed to understand outcomes that are often missing from official sources, such as victimization by an intimate partner that is not reported because of concerns about legal consequences and less severe injuries from suicide attempts that go untreated. Data on risk and protective factors and specific types of violence exposures can often only be obtained by directly asking those affected. In addition, “official” data sources are rarely representative. Random-digit-dialing (RDD) surveys are a method of obtaining representative self-reported data. The RDD approach is relatively cost effective, handles non-English-speaking households with relative ease, and possesses a well-developed theory for constructing sample weights. However, there are significant challenges to using RDD surveys. These include declining participation rates; possible self-selection bias, since potential respondents can choose to opt out of the survey; and, with sensitive topics such as intimate partner violence, the need to anticipate potential risks for participants. This theme issue provides suggestions for how we can improve the design and implementation of RDD surveys in a manner that is both practical and ethical.

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Introduction

“I prithee take the cork out of thy mouth, that I may drink thy tidings.”—William Shakespeare, *As You Like It* (Rosalind act III, ii).

Those who say that “talk is cheap” must not appreciate how valuable the information obtained directly from people can be, and they clearly do not realize how costly it can be to collect this information. The RDD telephone survey method is one of the most widely used techniques for collecting self-reported data from large, representative samples. This procedure typically involves systematically selecting random telephone numbers from large data banks or generating them according to a prescribed protocol, and administering a survey over the telephone to eligible individuals who have agreed to cooperate. Although this is an excellent approach for many studies, there are significant challenges to using RDD methods, particularly when collecting data on sensitive

topics and from potentially vulnerable populations. This theme issue of the *American Journal of Preventive Medicine* is dedicated to describing strategies to improve RDD telephone surveys. The authors were asked by staff from the National Center for Injury Prevention and Control within the Centers for Disease Control and Prevention to consider how the latest approaches to conducting telephone surveys, using RDD sample selection, can be applied to the collection of self-reported data on injury-related risks and outcomes in an efficient and ethical manner.

This paper describes the importance of injury prevention, the need for self-reported data, and the promise and challenges of using RDD surveys to collect these data. While injury prevention research is the context for the discussion in this paper and the others in the theme issue, the goal of identifying practical and ethical improvements in the collection of sensitive self-reported data is relevant to most areas of public health research.

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Injury as a Public Health Problem

Injuries are a serious public health problem in the United States. Each year, approximately 150,000 people die from injuries and 50 million people experience

nonfatal injuries.¹ Injuries due to motor vehicle crashes, homicide, and suicide are among the leading causes of death for persons aged 1 through 44 years.² Because of the relatively greater impact on adolescents and young adults, injury ranked as the leading cause of premature mortality in the United States in 2002, accounting for almost 30% of all years of potential life lost before age 65.² About one third of injury-related mortality is linked to motor vehicles, one third is due to other unintentional injuries such as falls and drowning, and one third is due to homicide and suicide. The lifetime economic costs associated with medical treatment and associated productivity losses due to injury in 2000 are estimated to be \$406 billion.³

The public health approach to injury prevention consists of four interconnected steps.⁴ The first step is to understand the prevalence of the outcome of interest and to monitor for changes over time by collecting and analyzing surveillance data. The second step is to examine the etiology of the problem so that modifiable risk and protective factors can be identified. The third step is to develop and evaluate prevention programs designed to reduce risk factors and to enhance protective factors. The final step is to disseminate information about the groups at greatest risk and the most promising prevention strategies, and to monitor the implementation of this information. This entire process depends on the availability of high-quality data that accurately reflect the prevalence of the outcome of interest and the factors associated with it, and that can be used to describe differences in subgroups of the population and to evaluate changes as a result of prevention programs or policies. Self-reported data can provide valuable information at each of these steps.

The Value of Self-Reported Data for Injury Prevention Research

Official data, such as the information collected from coroners and medical examiners used in the National Vital Statistics System, the records from emergency departments (EDs) abstracted by the National Electronic Injury Surveillance System, or the statistics from law enforcement agencies compiled in the Uniform Crime Reporting System are enormously valuable for understanding the prevalence of violence and unintentional injuries and deaths.⁵⁻⁷ However, the field of injury prevention, like many other areas of public health, requires more-detailed information than what is available in official data systems.

Self-reported data collected directly from the population of interest can provide information that complements and extends what is available from official data sources in several important ways. First, self-reported data are critically important when studying outcomes, like injury, that are often missing from official data

sources. There are many reasons why injuries and injury-related behaviors could be missing from official data sources. For example, injuries, such as bruising from assaults, the consequences of nonfatal suicide attempts, or minor burns received while putting out a kitchen fire, may not be severe enough for the victim to seek medical care or medical care may not be immediately accessible because of availability or cost. Alternatively, some injured persons who seek care, particularly victims of assaults or suicide attempts, may be reluctant to disclose the cause of their injuries to healthcare providers because of concerns that they will be judged negatively or that the medical staff will report the incident to law enforcement. Similarly, many victims of assault never report the incident to police.

The most common reasons that victims of violent crime (i.e., rape/sexual assault, robbery, and simple or aggravated assault) give for not reporting the incident to police are because they considered the incident to be a "private or personal matter" (20%) or because they considered it "not important enough." Another 5% of victims of violent crime responded that they did not report the incident because they "feared reprisal," and 3% wanted to "protect the offender."⁸ The number of missed cases is particularly problematic for the use of law enforcement and medical record data to estimate the "true" prevalence of violent victimization. For example, self-reported data from the National Crime Victimization Survey indicate that 41% of those who reported having been physically injured in an assault did not seek care from a hospital or ED and did not report the assault to the police. Among victims of rape or sexual assault, 91% reported that they were not treated in an ED or hospital, and 69% indicated that they did not report the incident to the police.⁹

A second particularly important benefit of collecting self-reported data is the ability to obtain far more information about the attitudes, behaviors, and exposures associated with the outcomes of interest than what is available in official data sources. For example, data from the Injury Control and Risk Survey conducted with a nationally representative sample of U.S. adults using RDD methods have been used to describe a wide variety of injury-related topics, including the following: prevalence of attitudes supportive of intimate partner violence; behaviors such as alcohol impaired driving, firearm storage practices, and bicycle helmet use; and exposures such as parents' reports that their child's pediatrician provided counseling on injury prevention.¹⁰⁻¹⁵ These types of data help researchers to understand the importance of risk and protective factors and how they vary across subgroups. This understanding allows for the development of empirically grounded prevention efforts and promotes a more efficient use of limited prevention resources by helping planners and policymakers determine the most appropriate audiences for prevention programs.¹⁶

Clearly, injury prevention research requires data on topics that are difficult to study without gathering that data directly from respondents. Yet, many relevant topics, such as the frequency of alcohol and other substance use, driving while impaired, parental monitoring of a child's behavior, violent victimization by intimate partners, exposure to sexual violence, suicidal behavior, and perpetration of violence against others can be stressful or emotionally difficult for respondents to discuss. Also, some respondents may face additional risks from disclosing information if they are not adequately protected. For example, respondents may be concerned that the socially sanctioned or illegal behaviors that they could disclose might be shared with others or obtained by police. Similarly, it may be unsafe for those who have been victimized by a household member to disclose this experience if the abuser is home at the time of the interview. The nature of the topics examined can make it challenging to recruit representative samples for injury-related research, and make it important to provide participants with the information and protection they need to provide accurate reports. Overall, both official records data and self-reported data have strengths and limitations, ideally they will be used together to inform and evaluate prevention practice.

Collecting Representative Data

A common strategy for collecting self-reported data from large populations is to use RDD sampling procedures paired with telephone survey administration. The RDD telephone interview approach provides considerable advantages over other approaches. For example, telephone surveys are less expensive than in-person interviews and they typically provide substantially more control over who participates than surveys conducted through the mail.¹⁷ Telephone surveys can also accommodate non-English-speaking households relatively easily by having an interviewer who is fluent in the household member's language call the household back.¹⁸ Also, the RDD sampling method provides the ability to construct sampling weights using well-established procedures.¹⁸ These procedures can make it possible to over-sample from populations in specific geographic regions or from communities with particular sociodemographic characteristics.

Of course, RDD surveys are not a panacea. They are often inefficient for research on rare populations or events. For example, some events, such as near-drowning incidents, are difficult to study using RDD sampling because they are so rare (e.g., approximately two people of 100,000 are treated in EDs for nonfatal drowning-related injuries each year).¹ Also, the RDD approach is less appropriate for use with transient populations and populations with low telephone coverage, or in areas, such as U.S. territories, where landlines

are often shared by multiple households. Finally, some strategies that can be used with in-person interviews to reduce the potential for intentional or unintentional misreporting, such as ensuring that the respondent is in a private location and showing the respondent a list of potential response options, are not possible with telephone surveys.

The strengths of RDD telephone surveys are also being increasingly undermined by significant challenges that threaten the utility of the RDD approach.¹⁹ Ongoing RDD surveys have seen considerable declines in participation rates, and there is some evidence that this decline has become worse in recent years.²⁰ Factors such as heightened privacy concerns and greater use of screening devices have contributed to these declines, resulting in many RDD surveys with response rates below 40%. Also, a growing number of people, particularly young adults, are using cell phones as their only telephone.¹⁹ Cell phones are typically excluded from RDD surveys because participants frequently incur a cost from these calls and survey researchers have yet to develop an effective strategy for incorporating cell phone numbers into telephone samples.²¹ The movement toward increased cell phone use is raising concerns about the representativeness of RDD samples. Also, given that many health-risk behaviors and outcomes—particularly injury-related behaviors and outcomes such as binge drinking, alcohol-impaired driving, and assault victimization—are more common among young people, if the samples are not adequately adjusted for response bias they could result in erroneous prevalence estimates.^{22–24}

It can be particularly difficult to recruit participants for studies on sensitive topics such as injury-related behaviors and experiences. Not only do the interviewers have to overcome the increasing reluctance to participate in phone surveys that studies on other research topics face, but they also have to prepare participants to answer specific questions about behaviors that may be socially unacceptable and experiences that may be painful to recall. Also, the researchers have an ethical obligation to provide potential participants with an understanding of the content of the survey so that they can make an informed decision about whether they are in a safe place to discuss their experiences and whether they are prepared to share potentially upsetting information. The responsibility to provide this information and to allow participants to make a thoughtful decision has implications for how interviewers are trained to avoid respondent refusals, and it may have implications for how incentives for participation are viewed by participants and internal review boards.

What Can Be Done?

Two papers in this theme issue describe strategies for improving the response rates of telephone surveys

when collecting data on sensitive topics and from potentially vulnerable populations. In the first paper, Singer and Bossarte²⁵ examine the impact of the amount and timing of incentives on response rates. These authors present a broader context for considering respondents' motives for participation and they provide a thoughtful discussion of whether incentives are ever coercive. The authors conclude that incentives are not coercive if the study procedures provide adequate protection for participants and adequately inform participants about the purpose and nature of the study. In the second paper, O'Brien et al.²⁶ describe the reasons why respondents are reluctant to participate in telephone surveys and how interviewers can recognize these reasons and tailor their responses to maximize the likelihood of participation. These authors discuss the potential for questions on sensitive topics to put vulnerable populations at risk for harm and how the latest approaches to interviewer training may need to be modified to ensure the safety of respondents and to reduce the stress and risk for burnout among the interviewers. (Another factor that can affect the results in self-reported injury prevention data is question wording. The wording of survey items is a complex topic that is beyond the scope of these papers.)

Of course, efforts to improve the participation rate do not necessarily lead to improvements in the representativeness of the sample. The third paper in this theme issue by Johnson et al.²⁷ points out that response rates are not an adequate measure of nonresponse error (e.g., surveys with low response rates do not necessarily yield biased results). The authors describe the strengths and weaknesses of several strategies for assessing nonresponse error. They provide an empirical example using the records-match approach to evaluate nonresponse in an RDD survey of injury-related risk behaviors. The authors conclude that the records-matching approach provides an efficient tool for evaluating some types of nonresponse error in telephone surveys.

After considering the challenges to RDD telephone surveys, it is tempting to look for alternative strategies for collecting data on sensitive topics. A thorough description of the relative advantages and disadvantages of personal visit, mail, Web, and interactive voice response surveys is provided in the paper by Galesic et al.¹⁹ The authors provide a summary of the literature on these alternative survey strategies as well as recent attempts to combine them in mixed-mode designs. The authors conclude that each strategy has pros and cons and that none is clearly superior to the RDD telephone survey approach. The authors indicate that additional methodologic research is needed to maintain coverage and response rates.

The final paper in this issue describes potential next steps for developing strategies to collect sensitive, self-reported data in a way that is valid and cost effective. In

this paper, Link and Kresnow²⁸ discuss how the four preceding papers inform future research on strategies to improve RDD telephone surveys and test alternative approaches to sampling and data collection. Such research is necessary to address the general limitations of the RDD telephone survey approach and the specific challenges associated with using telephone surveys to collect data on sensitive topics. The authors conclude that the RDD approach will remain an important tool for collecting self-reported data for the foreseeable future, and they encourage researchers to address the challenges on multiple fronts.

In summary, the need for valid data to better understand the magnitude of the problem of injuries, the groups at greatest risk, and the effectiveness of prevention strategies and policies requires the use of official statistics from law enforcement and medical records as well as self-reported data. The RDD telephone survey approach is particularly useful for collecting self-reported data from a large sample in a way that is relatively cost effective. However, the ability to recruit a representative sample and to encourage them to participate in a survey about topics that they might prefer not to discuss depends on finding creative solutions. The papers in this theme issue provide practical suggestions for how researchers can avoid nonresponse bias in an ethical manner and assess the implications of the nonresponse that does occur. The papers also provide specific suggestions for methodologic research that will improve future efforts to collect self-reported data on sensitive topics from representative samples.

The findings and conclusions in this report are those of the authors and do not necessarily represent the views of the Centers for Disease Control and Prevention.

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References

1. Vyrostek SB, Annett JL, Ryan GW. Surveillance for fatal and nonfatal injuries—United States, 2001. *MMWR Morb Mortal Wkly Rev* 2001;50:1–32.
2. Centers for Disease Control and Prevention (CDC) Web-based Injury Statistics Query and Reporting System (WISQARS). National Center for Injury Prevention and Control, Centers for Disease Control and Prevention, 2005. Available at: www.cdc.gov/ncipc/wisqars.
3. Finkelstein E, Corso P, Miller T. The incidence and economic burden of injuries in the United States. New York: Oxford University Press; 2006.
4. Rosenberg ML, O'Carroll PW, Powell KE. Let's be clear: violence is a public health problem. *JAMA* 1992;267:3071–2.
5. Anderson RN, Minino AM, Hoyert DL. Deaths: injuries 2001. *Natl Vital Stat Rep* 2004;52:1–86.
6. Centers for Disease Control and Prevention. National estimates of nonfatal injuries treated in hospital emergency departments—United States, 2000. *MMWR Morb Mortal Wkly Rev* 2001;50:340–6.
7. U.S. Department of Justice. Crime in the United States 2004: uniform crime reports. Washington DC: Federal Bureau of Investigation, 2004. Available at: www.fbi.gov/ucr/cius04/documents/CIUS2.
8. Hart TC, Rennison C. Reporting crime to the police, 1992–2000. Washington DC: Bureau of Justice Statistics, March 2003 (NCJ 195710).

9. Simon TR, Mercy J, Perkins C. Injuries from violent crime, 1992–98. Washington DC: Bureau of Justice Statistics and Centers for Disease Control and Prevention, June 2001 (NCJ 168633).
10. Simon TR, Anderson M, Thompson MP, Sacks JJ, Crosby AE, Shelley G. Attitudinal acceptance of intimate-partner violence among U.S. adults. *Viol Vict* 2001;16:115–26.
11. Bolen JR, Kresnow M, Sacks JJ. Reported bicycle helmet use among adults in the United States, 1994. *Arch Fam Med* 1998;7:72–7.
12. Logan P, Sacks JJ, Branche CM, Ryan GW, Bender P. Alcohol influenced recreational boat operation in the United States, 1994. *Am J Prev Med* 1999;16:278–82.
13. Dellinger AM, Bolen JR, Sacks JJ. A comparison of driver- and passenger-based estimates of alcohol-impaired driving. *Am J Prev Med* 1999;16:283–8.
14. Stennies G, Ikeda R, Houston B, Leadbetter S, Sacks JJ. Firearm storage practices and children in the home, U.S., 1994. *Arch Pediatr Adolesc Med* 1999;153:586–90.
15. Quinlan KP, Sacks JJ, Kresnow M. Exposure to and compliance with pediatric injury prevention counseling, U.S., 1994. *Pediatrics* 1998;102.
16. National Center for Injury Prevention and Control. CDC injury research agenda. Atlanta GA: Centers for Disease Control and Prevention, 2002.
17. McAuliffe WE, Geller S, LaBrie R, Paletz S, Fournier E. Are telephone surveys suitable for studying substance abuse? Cost, administration, coverage and response rate issues. *J Drug Issues* 1998;28:455–81.
18. Smith PJ, Hoaglin DC, Battaglia MP, Barker LE, Khare M. Statistical methodology of the National Immunization Survey: 1994–2002. *Natl Vital Stat Rep* 2005;138:1–55.
19. Galesic M, Tourangeau R, Couper MP. Complementing random-digit-dial telephone surveys with other approaches to collecting sensitive data. *Am J Prev Med* 2006;31:437–43.
20. Curtin R, Presser S, Singer E. Changes in telephone survey nonresponse over the past quarter century. *Public Opinion Q* 2005;69:87–98.
21. Tourangeau R. Survey research and societal change. *Annu Rev Psychol* 2004;55:775–801.
22. Centers for Disease Control and Prevention. Behavioral Risk Factor Surveillance System Survey Data. Atlanta GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, 2004.
23. Quinlan KP, Brewer RD, Siegel P, et al. Alcohol-impaired driving among U.S. adults, 1993–2002. *Am J Prev Med* 2005;28:345–50.
24. Potter LB, Sacks JJ, Kresnow M, Mercy J. Nonfatal physical violence, United States, 1994. *Public Health Rep* 1999;114:343–52.
25. Singer E, Bossarte RM. Incentives for survey participation: when are they “coercive”? *Am J Prev Med* 2006;31:411–18.
26. O’Brien EM, Black MC, Carley-Baxter LR, Simon TR. Sensitive topics, survey nonresponse and considerations for interviewer training? *Am J Prev Med* 2006;31:419–26.
27. Johnson TP, Holbrook AL, Cho YI, Bossarte RM. Nonresponse error in injury risk surveys? *Am J Prev Med* 2006;31:427–36.
28. Link MW, Kresnow M-J. Future of random-digit dialed surveys for injury prevention and violence research? *Am J Prev Med* 2006;31:444–50.