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An Assessment of State Level Sexual Assault Prevalence Estimates

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Abstract The purpose of our research is to compare sexual violence prevalence rates from three sources of state level data. Public health officials, legislators and other policymakers often require state-level sexual assault prevalence estimates to justify funding and rationalize both new and ongoing sexual violence prevention programs, as well as programs for victims. We compared survey design and resulting prevalence rates of the three surveys frequently used at the state level: the Behavioral Risk Factor Surveillance System (BRFSS), the National Violence Against Women Survey (NVAWS) extrapolations, and replications of the NVAWS. Although the specificity of the questions used in the NVAWS provides a clearer picture of the prevalence of sexual assault than the BRFSS questions, the sexual violence module on the BRFSS survey has the advantage that it is used regularly by some states. Currently available female sexual assault prevalence estimates differ widely at the state level but can be used when interpreted with informed caution. The new National Intimate Partner and Sexual Violence Surveillance System holds promise for providing better estimates in the future.

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Introduction

Three sources of data often used to describe the problem of sexual violence against women at the state level are the Behavioral Risk Factor Surveillance System (BRFSS), the National Violence Against Women Survey (NVAWS) extrapolations, and state replications of the NVAWS. We compare prevalence estimates and provide a critical review of these three sources. We conclude by discussing the potential policy implications that may result from these differences.

Previous research indicates only a fraction of sexual assaults (SA) are reported to the police. These estimates range from 3 to 26% [1–3]. Yet research has documented the lifelong effects of SA consequences for the victim that manifest in social, health and economic problems [4]. Determining prevalence accurately is crucial for understanding the magnitude of the problem and seeking ways to engage in prevention and victim services as public health officials, legislators and other policymakers often require state-level prevalence estimates to justify funding or even the existence of sexual violence prevention programs and programs for victims. For our purposes, we will use the term "prevalence" to mean lifetime (ever) prevalence.

A number of sources of SA data are currently available (see Table 1). Despite the plethora of sources, there continues to be controversy in estimating lifetime SA prevalence. There was also concern that two of the most commonly used sources for sexual violence data, the Uniform Crime Reports (UCR) and National Crime Victimization Survey (NCVS), did not adequately portray

Table 1 Sources of sexual assault data at the national and state levels

Data source	Lifetime prevalence	Short description
Behavioral Risk Factor Surveillance System (BRFSS) [45]	Yes	Health phone survey that is state administered and sponsored by CDC since 1984. States determine administration frequency (e.g., monthly, and annually). Participants are randomly selected
National Violence Against Women Survey (NVAWS)	Yes	Phone survey administered to a national representative sample of men and women in 1995–1996 sponsored by the US Department of Justice. The first time a behaviorally specific survey (focusing on sexual violence) was administered nationwide [8]
State NVAWS extrapolation	Yes	In 2003, CDC funded Kilpatrick and Ruggiero to estimate state sexual violence prevalence rates using extrapolated data from the 1996 NVAWS and the 1989 National Women's Study [19–23]
State NVAWS replication	Yes	Since 2005 individual states have replicated the NVAWS at the state level [4–7]. Funding for these studies have come from a combination of state and local partnerships
Youth Risk Behavior Survey (YRBS) [46]	Yes	Since 1991 CDC has sponsored the annual data collection on health risk behaviors among high school students from a United States sample of public high schools. Students are asked if they have ever been physically forced to have sexual intercourse
Uniform Crime Reports (UCR) [47]	No	Annually since the 1930s the Federal Bureau of Investigation has collected and compiled data on reported crimes on a voluntary basis from law enforcement agencies
National College Health Risk Behavior Survey [48]	Yes	The CDC funded survey was administered to college students in 1995. They were asked if they have been forced to have sexual intercourse against their will in their lifetime
National Crime Victimization Survey (NCVS) [49]	No	The survey has been administered by the Bureau of Justice Statistics since 1973 to a random national sample of 76,000 house holds. Participants are asked about the occurrence of crime victimization
Sexual Assault Nurse Examination (SANE) [50] data	No	Forensic data gathered from assault victims by a sexual assault nurse examiner (SANE) in hospital emergency rooms within 72 h of an incident. Data are aggregated and analyzed at the state level. The first program was started in Tennessee in 1976 [51]
State Coalition Numbers	No	State annually aggregated number of victims who seek services from local rape crisis centers to determine the number of people in state who accessed victim support services
National Intimate Partner and Sexual Violence Surveillance System (NISVSS) [44]	Yes	English and Spanish U.S. telephone survey of people 18 years and older with oversampling of American Indian and Alaska Native women and female married spouses and female active duty members of the U.S. armed forces. Data collection expected to begin 2010

either the problem of sexual violence or the lifetime prevalence rate [5–8]. This is because the UCR measure is calculated using only crimes reported to the police [8], and the NCVS measure includes only those incidents that occurred within the past 6 months. Further, both of these data sources exclude SA perpetrated by intimate partners and acquaintances as many victims do not acknowledge a SA perpetrated by an intimate partner or acquaintance is a crime [5–8]. Sexual assault prevalence rates were calculated using survey responses regardless of whether or not the incident had been reported to the authorities in the three data sources examined in our analysis. These surveys, therefore, result in higher (and probably more accurate) rates of SA than estimates from the UCR and the NCVS [7–10].

Methods

We examined how survey design such as item (question) construction, survey and section introduction wording, assurance of a safe interviewing environment, and interviewer gender differed across three surveys designed to measure sexual violence against women at the national level but used at the state level. The three sources of SA prevalence estimates we examined are the BRFSS (sexual violence module), state extrapolations of the NVAWS, and state replications of the NVAWS [11–15]. All three sources of data rely on random digit-dialed phone surveys administered to women ages 18 and over. The three data sources differ in terms of the question construction, sample size, sampling plan, questions about the safety of the participant's

environment, gender of survey interviewers, and frequency of survey administration.

Data Sources

National Violence Against Women Survey

The NVAWS was administered from November 1995 to May 1996 to a randomly selected sample of 8,000 women (and 8,000 men) in the United States [16]. It was the largest study to examine prevalence of sexual violence among adults in the U.S. Since the survey was not designed to capture state prevalence rates, state identifiers are not provided in the database. The specificity of the questions in the administered survey provided a detailed look at violence against women in the United States. It was the first time participants were asked behaviorally specific questions about violence in their lives on such a large scale [17]. The NVAWS has not been replicated at the national level, and because of the comprehensiveness of the study it continues to be cited regularly. The Second Injury Control and Risk Survey (ICARIS-2) was intended to serve as a follow-up to the NVAWS. Data were collected on the prevalence and incidence of sexual violence as part of a national survey from 4,877 women from July 2001 through February 2003 [18]. This study was not replicated at the state level and is therefore not included in our analysis.

State Level NVAWS Extrapolation

Since the 1996 NVAWS and the 1989 National Women's Study did not provide state-level prevalence estimates, a series of state reports were published that used extrapolated results from these two studies and census data [19–23]. Analyzing the national data from the 11,000 NWS and NVAWS participants, Kilpatrick and Ruggiero identified demographic and geographic factors that increased the likelihood of sexual assault. They then combined the NWS and NVAWS data and census data to account for state level factors such as age, race, ethnicity, and geographic (e.g., rural, urban) characteristics to provide prevalence estimates at the state level. Despite these rigorous manipulations, the study authors stress the importance for data to be collected at the state level [19–23].

State NVAWS Replications

Although the NVAWS extrapolations [19–23] provided a picture of violence against women at the state level, they were extrapolated from a national data set that was not designed to measure state VAW prevalence rates. Therefore, several states have replicated parts of the 1996 NVAWS study to collect sexual violence prevalence data from their residents. Furthermore, some states have adjusted the survey instrument to represent state context. For example, the survey replicated in Texas has a question asking if the participant is an American citizen and an additional question asking if the participant is in the country legally, both providing some insight into experience of legal and illegal immigrants [12]. Because of the differences in state surveys, the estimates for all SA are not shown here. For instance, the Washington and Virginia state surveys included questions on whether a participant was unable to give consent when the assault occurred because she was under the influence of alcohol and drugs [11, 13]. When the NVAWS was administered in NH in October 2006, additional questions were added to the survey to examine participants' familiarity with the availability of services for victims of sexual violence [14].

The NVAWS researchers decided against weighting the survey after their analysis of weighted and unweighted lifetime prevalence estimates showed that they were not substantially different [23]. Researchers in NH and VA followed this lead with their respective replication surveys and elected not to weight the data after investigating differences in weighted and unweighted lifetime prevalence estimates [11, 14]. Texas researchers weighted their state replication survey data in order to account for oversampling of African Americans and Hispanics [12].

Behavioral Risk Factor Surveillance System

The Centers for Disease Control and Prevention sponsors the administration of BRFSS, an annual random digit-dial telephone survey conducted by states (using Disproportionate Stratified Sampling). Detailed methods have been described elsewhere [24]. BRFSS has been in use since the early 1980s and has been used by all 50 states since 1994. Sample size varies by state. In recent years some states have relied on BRFSS data to justify funding for public health programs [25]. Like many large telephone surveys, BRFSS does not always provide local level (e.g., city, county) and special population data [25]. Furthermore, because of the use of random digit-dialed home telephone surveys, the BRFSS survey has been reported to underrepresent Asian Americans and Pacific Islanders who are foreign born [26]. The use of home telephone numbers causes the underrepresentation of low income persons and younger people who are more likely to have a mobile phone rather than a home phone [27–29]. The inclusion of mobile phones in the 2009 and subsequent BRFSS may improve representation of younger persons.

Researchers cite several advantages to BRFSS, including a relatively quick turnaround time, making it a timely tool for policy decisions [30]. Additionally, when states use the same module, it makes comparisons across states as

well as aggregation at the national level straightforward [30]. Since many researchers utilize these data, they examine and note sensitivity in respondent answers following changes in question structure. For instance, a decrease in participants' reporting of mammograms was noted following a question wording change. The consistency in the BRFSS administration enables researchers to investigate whether changes in rates of mammograms, illness, etc. result from changes in question structure [31]. In other efforts to define state SA prevalence rates, public health officials in some states began to include the BRFSS sexual violence module in 2005. The CDC developed two modules with the stated purpose of enabling state health officials and policy planners to better understand incidence and prevalence of intimate partner and sexual violence [32, 33]. The survey items cover incidence (last 12 months) and prevalence (ever). Our review of the published literature suggests research has not been conducted to assess the sensitivity and specificity of the BRFSS sexual violence module in ascertaining sexual violence prevalence rates.

Analytic Strategy

A general internet search was used to determine states that had replicated the NVAWS; it was followed by a targeted electronic search of state coalitions against domestic and sexual violence websites, state public health departments and the State Attorney General Office websites. It is difficult to locate the replicated NVAWS since the study results have generally not been published in peer-reviewed journals and there is currently no central repository for data from these replications. We identified and retrieved the NVAWS extrapolation reports for the five states that had replicated the survey (NH, TX, WA and VA, UT). All states known to have replicated at least a portion of the NVAWS were included in our analysis ($n = 5$) [11–15].

After identifying the states with NVAWS replications, we searched the Centers for Disease Control and Prevention (CDC) website for a list of states that had used the sexual violence module in the BRFSS for the years 2005–2007. We contacted the public health departments of states not listed as using the sexual violence module in the Behavior Risk Factor Surveillance System in an effort to ensure we had complete information for the states that replicated the NVAWS survey. Through this process we determined that Washington State had completed this module despite not being listed on the CDC website. As of the end of 2009, New Hampshire, Texas, Utah, Virginia and Washington appear to be the only states that have both replicated the NVAWS and used the BRFSS sexual violence module.

Survey Construction

Survey Introduction

We compared the survey introduction that is read to a potential participant by the survey interviewer for each of the three data sources. Previous research focuses on the survey interviewer's role in improving the response rate [34, 35]. For instance, research indicates the manner in which the survey is introduced has implications for the response rate [34, 36, 37]. Survey interviewers who read standardized introductions had lower response rates than survey interviewers who used conversation-style introductions with specified key words that enabled them to "inject" their personalities into the survey [37]. Alternately, interviewers who feel uncomfortable with the topic of the survey may unwittingly harm the response rate [35].

Section Introduction

We examined the introduction that preceded the sexual violence prevalence questions in order to understand how the topic of sexual violence was introduced to the participant. In particular, we looked at how the topic was introduced and the wording and behavioral specificity of the question(s) on the prevalence of sexual violence.

Question Specificity

We then compared question specificity on the BRFSS sexual violence module and the NVAWS in an effort to inform differences in prevalence rates. Previous research on SA prevalence studies indicates that increased use of behaviorally specific questions results in higher participant reporting of SA [7, 10] and may increase the likelihood of participants disclosing an assault [6, 18, 38]. Furthermore, sexual violence prevalence studies that use more than a single item measure of rape yield higher prevalence rates than surveys using a one-item measure [39]. While a higher prevalence rate does not indicate more accurate findings than a study with lower prevalence rates, participants may have a higher rate of recalling an incident when specific language is used to describe the behavior that occurred [10].

Environment

We compared the efforts by interviewers of both surveys to ensure the survey respondents were in a private and safe environment while answering the SA items.

Interviewer Gender

We examined whether the interviewer gender was specified for the survey administration. Previous research indicates that the gender of the interviewer can affect the participants' willingness to disclose and the extent of the disclosure [22, 40].

Prevalence Rate Comparison

For states that administered the NVAWS replication and the BRFSS sexual violence module, we obtained and, where the composite measures were not readily available, calculated the prevalence rates and confidence intervals. This enabled us to compare the results within the individual states.

Results

Table 2 shows the text used to introduce the survey and the text that is used to introduce the section where the questions focused on SA. Interviewers for NVAWS, NVAWS replications, and the BRFSS survey all followed scripted introductions (Table 2). The NVAWS and NVAWS replications were introduced as surveys about personal safety [7], while the BRFSS was introduced as a tool to gain information on the public's health (Table 2). Although the BRFSS sexual violence module and the NVAWS introductions follow similar formats, the introductions for the questions on the prevalence of sexual violence differ. The introduction to the BRFSS SA section is more specific than the NVAWS SA introduction regarding the definition of SA and gives the respondent examples of SA that read as follows. "Unwanted sex includes things like putting anything into your anus or mouth, or making you do these things after you said or showed that you didn't want to [15]." Alternately, the NVAWS SA section does not define SA at this point in the survey. Instead, the survey interviewer tells the participant that they are "going to ask you some questions about unwanted sexual experiences you may have had either as an adult or as a child [41]."

The BRFSS strategy used is to include some of this specificity in a less connected manner within the section introduction while the NVAWS strategy is to closely connect the behavioral specificity at the item level. The behavioral specificity of the questions used in the two surveys differs as the BRFSS survey uses two questions while the NVAWS uses five questions to determine the prevalence of SA with and without penetration. Unlike the BRFSS single item measure that asks about a completed assault; "Has anyone EVER had sex with you after you said or showed that you didn't want them to or without your consent," the NVAWS uses four questions addressing the types of penetration: oral penetration, anal penetration, digital/object penetration and vaginal penetration. For example, the vaginal penetration item asks "Regardless of how long ago it happened, has a man or boy ever made you have sex by using force or threatening to harm you or someone close to you? Just so there is no mistake, by sex we mean putting a penis in your vagina." The NVAWS's use of five items to capture the prevalence of SA results in a higher lifetime prevalence rate compared to the two item BRFSS measure. In addition to detecting higher rates of SA prevalence, behaviorally specific questions that use words that describe a familiar scenario [10] enable the respondent to remember specific experiences. A one- or two-item measure does not facilitate this recall and could increase the likelihood of underreporting [6, 18, 39, 42].

The SA prevalence rates for the five states that have data from all three data sources are shown in Table 3. In the first column, data are presented from the BRFSS sexual violence module. Consistently, the BRFSS prevalence rates are lower than the extrapolated NVAWS and the NVAWS state replication prevalence rates. With the exception of Utah, the NVAWS extrapolation rates are consistently lower than the state NVAWS replication survey rates [15].

For example, in New Hampshire, the 2006 BRFSS results indicate a SA penetration prevalence of 10.3% compared to a 13.7% prevalence rate from the 1996 NVAWS extrapolation and a 19.5% prevalence rate from the 2006 replication. We believe the difference between the extrapolated and replication prevalence rates is likely due to the fact that the first study is an extrapolation of a national sample of 11,000 women in the combined 1996 NVAWS and the 1989 National Women's Study, while the second prevalence rate is from a randomly-selected sample of 508 NH women. Both of these prevalence rates are higher than the BRFSS prevalence which we believe is likely due to differences in the specificity and number of items.

Data for Washington, Virginia, and Texas display similar patterns. The lowest lifetime prevalence rates result from BRFSS. The prevalence rates from the national extrapolations are slightly higher, and the prevalence rates from the state replications are higher than either the BRFSS or extrapolation results. The pattern for Utah differs slightly. Unlike the other states the extrapolated life prevalence rates are slightly higher than the replicated rates. Like the other four states both the extrapolated and replicated rates are higher than the BRFSS rates [43].

Table 2 Comparison of BRFSS and NVAWS sexual assault measures

	BRFSS	NVAWS and state replications
Survey introduction	HELLO, I am calling for the (health department). My name is (name). We are gathering information about the health of (state) residents. This project is conducted by the health department with assistance from the Centers for Disease Control and Prevention. Your telephone number has been chosen randomly, and I would like to ask some questions about health and health practices	Hi, my name is____. I am calling you from the University of New Hampshire We are conducting a statewide survey on personal safety I would like to interview you regarding your relationship experiences The purpose of this study is to learn more about people's knowledge about relationship and community problems to improve community prevention programs and services Since the interview will address relationships and community problems some of the questions are graphic and sexually explicit Please know that participation in this project is strictly voluntary and you can refuse to answer any questions and can stop the interview at any point All information collected during this interview will remain confidential and will not be used in a manner that will make the participant identifiable with the exception of disclosed information indicating that a child is being or has been harmed. State laws indicate that information regarding child abuse cannot remain confidential The interview will take approximately 15 min of your time. Do you have any questions that I can answer at the present time? Would you like to begin?
Section introduction	Now, I am going to ask you questions about unwanted sex. Unwanted sex includes things like putting anything into your anus or mouth, or making you do these things after you said or showed that you didn't want to It includes times when you were unable to consent, for example, you were drunk or asleep, or you thought you would be hurt or punished if you refused	We are particularly interested in learning about violence women experience, either by strangers, friends, relatives or even by wives and partners I'm going to ask you some questions about unwanted sexual experiences you may have had either as an adult or as a child You may find the questions disturbing, but it is important we ask them this way so that everyone is clear about what we mean Remember the information you are providing is confidential
Items	1. Has anyone ever had sex with you after you said or showed that you didn't want them to or without your consent? 2. Has anyone ever attempted to have sex with you after you said or showed that you didn't want to or without your consent, but sex did not occur?	1. Regardless of how long ago it happened, has a man or boy ever made you have sex by using force or threatening to harm you or someone close to you? Just so there is no mistake, by sex we mean putting a penis in your vagina 2. Regardless of how long ago it happened, has anyone, male or female, ever made you have oral sex by using force or threat of harm? Just so there is no mistake, by oral sex we mean that a man or boy put his penis in your mouth or someone, male or female, penetrated your anus with their mouth or tongue. If this has happened multiple times please tell us about the most recent incident 3. Regardless of how long ago it happened, has anyone ever made you have anal sex by using force or threat of harm? Just so there is no mistake, by anal sex we mean that a man or boy put his penis in your anus. If this has happened multiple times please tell us about the most recent incident 4. Regardless of how long ago it happened, has anyone, male or female, ever put fingers or objects in your anus against your will by using force or threats? If this has happened multiple times please tell us about the most recent incident 5. Regardless of how long ago it happened, has anyone, male or female, ever attempted to make you have oral or anal sex against your will, but penetration did not occur? If this has happened multiple times please tell us about the most recent incident

Table 2 continued

	BRFSS	NVAWS and state replications
Environment safety	2005: If you are not in a safe place to answer these questions, I can skip to the next topic area 2006–2007: Please keep in mind that if you are not in a safe place you can ask me to skip any question you do not want to answer	Before we begin the interview I would like to clarify that you are in a situation where you are able to talk freely/safely? The survey interviewers will ask participants if they still feel comfortable proceeding with the survey every 3–4 min. The participant will be offered the opportunity to continues, continue the survey at a later or date or discontinue their participation
Gender of survey interviewer	Male or female	Female only

Table 3 Comparison of three types of sexual assault prevalence rates from the five states that collected all three types of prevalence data

State	Measure	BRFSS (C.I.)*	NVAWS extrapolations	State replication of NVAWS (C.I.)
NH	Penetration	10.3% (8.8–11.7)	13.7% [19]	19.5% (16.1–22.9) [14]
	Attempt	12.1% (10.6–13.6)	*	10.2% (7.57–12.83)
	Attempt and/or penetration	15.7% (14.0–17.3)	*	22.7% (19.1–26.3)
	N	5,123	*	508
	Year	2006	2003	2006
VA	Penetration	10.0% (8.4–12.0)	12.4% [20]	17.8% (16.0–19.6) [11]
	Attempt	11.1% (9.5–12.9)	*	9% (7.7–10.4)
	Attempt and/or penetration	14.8% (12.9–17.0)	*	*
	N	3,360	*	1,769
	Year	2006	2003	2003
UT	Penetration	8.5% (7.1–10.0)	20.6% [23]	17.1% (15.4–18.9) [15]
	Attempt	9.8% (8.3–11.6)	*	*
	Attempt and/or penetration	13.3% (11.5–15.4)	*	18.9% (17.1–20.7)
	N	2,767	*	1,788
	Year	2006	2003	2007
WA	Penetration	14.3% (12.4–16.2)	17.7% [21]	23% [13]
	Attempt	21.9% (19.6–24.1)	*	12%
	Attempt and/or penetration	26% (23.6–28.3)	*	*
	N		*	1,325
	Year	2005	2003	2001
TX	Penetration	7.8% (6.0–10.1)	12% [22]	*
	Attempt	9.8% (7.7–12.4)	*	*
	Attempt and/or penetration	12.4% (10.1–15.2)	*	20% [12]
	N	1,306	*	1,200
	Year	2008	2003	2003

Note: The states included in this table are the only five states that currently have three sets of sexual violence prevalence data; BRFSS data, extrapolated NVAWS data and state replicated NVAWS data

* Data not available

Discussion

Comparing national and state sexual violence prevalence data, we find that states conducting their own sexual violence prevalence studies, with one exception, report higher prevalence rates for both sexual and physical violence than the rates obtained by extrapolating national data. While the specificity of the questions used in the NVAWS

provides a clearer picture of the prevalence of SA than the BRFSS questions, the sexual violence module on the BRFSS survey has the advantage that it is used by some states on a regular basis, and questions are consistent across years and states. Perhaps the BRFSS measure can be viewed as reliable since the same measure used regularly produces consistent results, and changes in the trends of these measures can alert public health officials to prevalence changes. A limitation is that the lower level of BRFSS item specificity most likely does not accurately quantify the true prevalence (i.e., of questionable validity) as indicated in the comparison of the National College Women Sexual Victimization and National Violence Against College Women data [10].

The national and statewide surveys may be underestimating prevalence rates as younger and low income women are not adequately represented in the sampling [14, 15]. State leaders should exercise caution when using national data extrapolations to make state program and policy decisions as the sampling schema for such data was not designed to produce valid state-level estimates and therefore may not be adequately identifying population needs. Furthermore, policy makers and reporters for the media need to be informed about the methodological differences that can result in different prevalence estimates [7]. Improved data collection strategies should be identified in an effort to target violence prevention programs to segments of the population with high prevalence rates of sexual and physical violence.

Recently, the CDC, National Institute of Justice (NIJ) and the Department of Defense (DOD) announced plans to implement the National Intimate Partner and Sexual Violence Surveillance System with improvements over NVAWS that include, but are not limited to, gathering more details on the context where the violence occurred and more detailed information on the tactics used to commit violence. In addition to the general population; the survey will include additional sampling of female military personnel and female spouses of military personnel. Administration of the National Intimate Partner and Sexual Violence Surveillance System survey is scheduled to begin in 2009/2010 [44].Over time the survey will be administered to a larger sample, and it is estimated that as the sample size increases estimates can be made at the state level [44]. State level estimates are not expected to be available until at least 2011. Additionally, the availability of state-level estimates will be influenced by the population size of each state. Therefore, we expect it will be some time before state-level data from this survey can be used by public health officials to make decisions about ongoing and existing programs. Presently, the most easily accessible data for these types of decisions are the BRFSS data, the extrapolated NVAWS data and the state replications of the NVAWS.

Limitations

There are several limitations that could not be addressed in this research and should be addressed in future research. First, while we compare data collected using the NVAW survey across five states, it is difficult to determine if some of the variation in state prevalence numbers results from the difference in the survey centers' experience in administering surveys that focus on sexual violence. The administrators of the 1996 NVAWS followed protocols to ensure that the interviewers are appropriately trained to handle the sensitive issue addressed in the survey [41]. Second, while the administrators of the state replications followed similar protocols, it is unknown whether the survey centers administering the state level surveys had the same level of expertise as the administrators of the national survey. Researchers need to address whether and how the survey center's administration of a survey can impact disclosure rates. Third, BRFSS interviewers, unlike interviewers for NVAWS and state NVAWS replications, ask the participant other health related questions prior to asking about the prevalence of SA. Presently, researchers have not examined whether the previous interactions with the interviewer affect the participants' willingness to disclose SA. Future research needs to examine this sequence to determine if it impacts disclosure rates. Fourth, we were unable to compare the point estimates across all of the different data sources because the standard deviations for some of the estimates have not been published and several attempts to obtain them for this analysis were unsuccessful. We have provided 95% confidence intervals whenever enough information was available to calculate them. Finally, there is also the chance that the SA prevalence rates varied across survey years; however, we believe this is unlikely to be significant because of the lifetime (ever) nature of the items.

Appendix

See Table 4.

Table 4 Detail of information captured by the NVAWS, NVAWS replications and BRFSS

Question type	National Violence Against Women Survey (ONLY)	State NVAWS replications (ONLY)	Behavioral risk factor surveillance system (BRFSS) (ONLY)	All 3 surveys
Demographic	Personal income, source of medical coverage	Personal income	Weight, height, veteran status	Age, race, ethnicity, number of adults and children in household, education level, employment status, family income
Relationships (past and present)	Questions about relationship history			Marital status
Health	Pregnancy history, questions about injuries, disabilities, depression, drug and alcohol and use	Pregnancy status, chronic disease, health conditions, and disabilities	Pregnancy status, question about health related issue	General health status
Sexual assault/ violence	Experience of sexual victimization	Experience of sexual victimization violence questions about care and treatment following incident and questions about reporting to police	Experience of sexual victimization	Experience of sexual violence
Physical assault questions	Questions addressing violence in current relationship and experience of physical assault and assailant type	Questions addressing violence in current relationship and experience of physical assault and assailant type	Questions addressing intimate partner violence	Intimate partner violence
Other types of assault/ violence	Questions addressing stalking victimization and emotional abuse			
Miscellaneous	Questions addressing fear of violence and accommodation behavior	Perceptions of violence and sexual violence in community	Emotional support and life satisfaction, family planning, attitudes regarding race, large-scale disaster/ emergency preparedness	

References

1. Tjaden, P., & Thoennes, N. (2000). *Full report of the prevalence, incidence, and consequences of violence against women*. U.S. Department of Justice: Office of Justice Programs NCJ 183781.
2. Fisher, B. S., Daigle, L. E., Cullen, F. T., & Turner, M. G. (2003). Reporting sexual victimization to the police and others: Results from a national-level study of college women. *Criminal Justice and Behavior, 30*(1), 6–38.
3. Rennison, C. M. (2002). *Rape and sexual assault: Reporting to police and medical attention, 1992–2000*. Washington, DC: U.S. Department of Justice Office of Justice Programs.
4. Dube, S. R., Anda, R. F., Whitfield, C. L., et al. (2005). Long-term consequences of childhood sexual abuse by gender of victim. *American Journal of Preventive Medicine, 28*(5), 430–438.
5. Schneider, V. W., & Wiersema, B. (1990). Limits and the use of the uniform crime reports. In P. J. Baunach & R. R. Roberg (Eds.), *Measuring crime: Large-scale, long-range efforts*. New York: SUNY Press.
6. Belknap, J., Fisher, B. S., & Cullen, F. T. (1999). The development of a comprehensive measure of the sexual victimization of college women. *Violence Against Women, 5*(2), 185–214.
7. Bachman, R. (2000). A comparison of annual incidence rates and contextual characteristics of intimate partner violence against women from the National Crime Victimization Survey (NCSV) and the National Violence Against Women Survey (NVAWS). *Violence Against Women, 6*, 839–867.
8. Koss, M. P. (1996). The measurement of rape victimization in crime surveys. *Criminal Justice and Behavior, 23*, 55–69.
9. Koss, M. P., Gidcyz, C. A., & Wisniewski, N. (1987). The scope of rape: Incidence and prevalence of sexual aggression and victimization in a national sample of higher education students. *Journal of Consulting and Clinical Psychology, 55*, 162–170.
10. Fischer, B. S. (2009). The effects of survey question wording on rape estimates: Evidence from a quasi-experimental design. *Violence Against Women, 15*, 133–147.
11. Masho, S. W., Odor, R. K., & Adera, T. (2005). Sexual assault in Virginia: A population-based study. *Women's Health Issues, 15*(4), 157–166.
12. Busch, N. B., Bell, H., DiNitto, D., & Neff, J. A. (2003). *A health survey of Texans: A focus on sexual assault*. Austin, TX: Institute on Domestic Violence and Sexual Assault, The University of Texas at Austin.
13. Berliner, L., Fine, D., & Moore, D. (2001). *Sexual assault experiences and perceptions of community response to sexual assault: A survey of Washington State women*. Harbor View Center for Sexual Assault and Traumatic Stress and Washington State University.
14. Potter, S. J., Laflamme, D., Banyard, V. L., Mattern, G., Moynihan, M. M., & Stapleton, J. G. (2006). *NH state wide sexual assault survey*. Durham, NH: University of New Hampshire and

the New Hampshire Coalition Against Domestic and Sexual Violence.
15. Peterson, B. (2009). Research Consultant, Utah Commission on Criminal And Juvenile Justice. Salt Lake City, UT.
16. Tjaden, P., & Thoennes, N. (1999). Prevalence and incidence of violence against women: findings from the National Violence Against Women Survey. *The Criminologist*, *24*(3), 1, 4, 13–14.
17. Tjaden, P., & Thoennes, N. (2000). Prevalence and consequences of male-to female and female-to male intimate partner violence as measured by the National Violence Against Women Survey. *Violence Against Women, 6*(2), 142–161.
18. Basile, K. C., Chen, J., Black, M. C., & Saltzman, L. E. (2007). Prevalence and characteristics of sexual violence victimization among U.S. adults, 2001–2003. *Violence and Victims, 22*(4), 437–448.
19. Kilpatrick, D. G., & Ruggiero, K. J. (2003). *Rape in New Hampshire: A report to the state*. Charleston, SC: National Violence Against Women Prevention Research Center, Medical University of South Carolina.
20. Kilpatrick, D. G., & Ruggiero, K. J. (2003). *Rape in Virginia: A report to the commonwealth*. Charleston, SC: National Violence Against Women Prevention Research Center, Medical University of South Carolina.
21. Kilpatrick, D. G., & Ruggiero, K. J. (2003). *Rape in Washington: A report to the state*. Charleston, SC: National Violence Against Women Prevention Research Center, Medical University of South Carolina.
22. Kilpatrick, D. G., & Ruggiero, K. J. (2003). *Rape in Texas: A report to the state*. Charleston, SC: National Violence Against Women Prevention Research Center, Medical University of South Carolina.
23. Kilpatrick, D., & Ruggiero, K. (2003). *Rape in Utah: A report to the state*. Charleston, SC: National Violence Against Women Prevention Research Center, Medical University of South Carolina.
24. Center for Disease Control and Prevention. (2006). *Behavioral risk factor surveillance, operational and user's guide, version 3.0*.
25. Figgs, L. W., Bloom, Y., Dugbatey, K., Stanwyck, C. A., Nelson, D. E., & Brownson, R. C. (2000). Uses of behavioral risk factor surveillance system data, 1993–1997. *American Journal of Public Health, 90*(5), 774–776.
26. Yu, E. S. H., Chen, E. H., Kim, K. K., & Abdulrahim, S. (2002). Smoking among Chinese Americans: Behavior, knowledge, and beliefs. *American Journal of Public Health, 92*(6), 1007–1013.
27. Keeter, S., Miller, C., Kohut, A., Groves, R., & Presser, S. (2000). Consequences of reducing nonresponse in a national telephone survey. *Public Opinion Quarterly, 64*, 125–148.
28. Piazza, T. (1993). Meeting the challenge of answering machines. *Public Opinion Quarterly, 57*, 219–231.
29. Kinne, S., & Topolski, T. D. (2005). Inclusion of people with disabilities in telephone health surveillance surveys. *American Journal of Public Health, 95*(3), 512–517.
30. Nelson, D. E., Powell-Griner, E., Town, M., & Kovar, M. G. (2003). A comparison of national estimates from the National Health Interview Survey and the behavioral risk factor surveillance system. *American Journal of Public Health, 93*(8), 1335–1341.
31. Siegel, P. Z., Qualters, J. R., Mowery, P. D., Campostrini, S., Leutzinger, C., & McQueen, D. V. (2001). Subgroup-specific effects of questionnaire wording on population-based estimates of mammography prevalence. *American Journal of Public Health, 91*(5), 817–820.
32. Waller, A. E., Martin, S. L., & Ornstein, M. L. (2000). Health related surveillance data on violence against women: State and local sources. *Violence Against Women, 6*(8), 868.
33. Choudhary, E., Coben, J. H., & Bossarte, R. M. (2008). Gender and time differences in the associations between sexual violence victimization, health outcomes, and risk behaviors. *American Journal of Men's Health, 2*(3), 254.
34. Couper, M. P. (1997). Survey introductions and data quality. *Public Opinion Quarterly, 61*, 317–338.
35. O'Brien, E. M., Black, M. C., Carley-Baxter, L. R., & Simon, T. R. (2006). Sensitive topics, survey nonresponse, and considerations for interviewer training. *American Journal of Preventative Medicine, 31*(5), 419–426.
36. Smith, D. M., Schwarz, N., Roberts, T. R., & Ubel, P. A. (2006). Why are you calling me? How study introductions change response patterns. *Quality of Life Research, 15*(4), 621–630.
37. Houtkoop-Steenstra, H., & Van Den Bergh, H. (2000). Effects of introductions in Large-Scale Telephone Survey interviews. *Sociological Methods & Research, 28*(3), 281–300.
38. Dekeseredy, W. S. (1995). Enhancing the quality of survey data on women abuse: Examples from a national Canadian study. *Violence Against Women, 1*, 158–173.
39. Koss, M. P. (1993). Detecting the scope of rape: A review of prevalence research methods. *Journal of Interpersonal Violence, 8*, 198–222.
40. Catania, J. A., Binson, D., Canchola, J., Pollack, L. M., Hauck, W., & Coates, T. J. (1996). Effects of interviewer gender, interviewer choice, and item wording on responses to questions concerning sexual behavior. *Public Opinion Quarterly, 60*(3), 345.
41. Tjaden, P., & Thoennes, N. (1998). *Violence and threats of violence against women and men in the United States, 1994–1996*. Denver, CO/Ann Arbor, MI: Center for Policy Research/Inter-University Consortium for Political and Social Research 1999.
42. Koss, M. P. (1992). The underdetection of rape: Methodological choices influence incidence estimates. *Journal of Social Issues, 48*(1), 61–75.
43. Wrathall, J. (2009). Survey Coordinator, Utah Department of Health. Salt Lake City, Utah.
44. Centers for Disease Control and Prevention. (2009). *Intimate partner violence prevention scientific information: Data sources*. http://www.cdc.gov/NCIPC/dvp/IPV/ipv-data.htm. Accessed July 1, 2009.
45. National Center for Chronic Disease Prevention and Health Promotion. (1984–2008). *Behavioral risk factor surveillance system*.
46. Center for Disease Control and Prevention. (1991–2007). *YRBSS: Youth Risk Behavior Surveillance System*.
47. Federal Bureau of Investigation. (1995–2008). *Uniform crime reports*: U.S. Federal Government.
48. Center for Disease Control and Prevention. (1997). *Youth risk behavior surveillance: National College Health Risk Behavior Survey—United States, 1995*.
49. Bureau of Justice Statistics. (1992–2008). *National Crime Victimization Survey (NCVS)*. U.S. Department of Justice, Office of Justice Programs.
50. Wasco, S. M. (2006). Responding to sexual assault victims' medical and emotional needs: A national study of the services provided by SANE programs. *Research in Nursing and Health, 29*, 384–398.
51. Speck, P., & Aiken, M. (1995). 20 Years of community nursing service: Memphis sexual assault resource center. *Tennessee Nurse, 58*, 15–18.