

# **Considerations in Estimating the Prevalence of Post-Traumatic Stress Disorder (PTSD) in Populations Not Typically Covered in Household Surveys**

Richard A. Kulka  
Consultant  
Statistical, Survey and Social Research

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## Statement of Task

The National Academies Standing Committee on Integrating New Behavioral Health Measures into SAMHSA's Data Collection Programs is assisting SAMHSA with its responsibilities to expand behavioral health data collections in several key areas, including assessment of trauma and PTSD. Potential options for expanding SAMHSA's behavioral health data collection in these areas include: (1) adding new modules or follow-ups to the National Survey on Drug Use and Health (NSDUH), (2) using estimates based on existing data sources or modeling based on existing data sources, and/or (3) developing new surveys.

Much of the background and guidance to address this topic was recently addressed in a series of presentations and discussions at a "Workshop on Integrating New Measures of Trauma Impairment into the Substance Abuse and Mental Health Services Administration's (SAMHSA) Data Collection Programs," held in Washington, D.C., in December 2015 (National Academies of Sciences, Engineering, and Medicine, 2016). The workshop brought together experts in the measurement of exposure to traumatic events, the measurement of posttraumatic stress disorder (PTSD) and health survey methods to facilitate discussion of measures and mechanisms most promising for expanding SAMHSA's data collections in this area, notably to assist with their efforts of expanding behavioral health data collections, and, in particular, their goals to produce national estimates of exposure to trauma, post-traumatic stress and PTSD, as well as better understand the association between trauma, mental health and substance use. As a follow-up to that workshop, I have been asked to prepare a research paper focused on *population coverage* considerations in the context of producing estimates of trauma and PTSD. Typically, national surveys are limited to the civilian non-institutionalized population, due to cost and feasibility constraints or issues. Yet, with respect to the assessment of trauma, PTSD and their consequences, it is widely believed—based on a broad range of clinical and epidemiologic research—that many of the subpopulations explicitly excluded from the target populations under these sample designs are likely those most vulnerable to higher

levels of exposure to trauma and PTSD. As a result, national estimates that do not cover these subgroups are likely to significantly underestimate the prevalence of trauma and PTSD.

Specifically, the paper will focus on:

- What is missed in population surveys when they are restricted to households and other segments of the non-institutionalized civilian population, thereby excluding some of these other populations, such as the military, those institutionalized in prisons and jails, and the homeless?
- What are the prevalence rates of PTSD that have been found through special surveys of these populations?
- How do PTSD prevalence rates found in special population surveys compare with PTSD prevalence rates found in household surveys; and how does this impact national estimates of PTSD that are produced by household surveys?
- What are the issues and challenges in including non-household populations in national surveys?
- If feasible, what are options for including these special populations, or relevant subsets, in national surveys to estimate PTSD?

Also of considerable interest are rates of exposure to potentially traumatic events (PTEs)—of critical importance in trauma measurement and as predictors of PTSD, which will be discussed only briefly due to some significant limitations in the research literature about the special populations relative to that on general populations in the national surveys.

### **General Approach**

The basic strategy taken to address these key questions is based on the following questions:

1. What is the overall size of the population covered in our national surveys from which we have derived estimates of the prevalence of PTSD?
2. What is the range of PTSD prevalence estimates derived from these national surveys?
3. What is the total estimated size of the population that is *not covered* by these surveys?

4. Which specific segments of the population that are not covered are of particular interest based on (a) logic, (b) those reported on by SAMHSA to date, and (c) the likely availability of information on both population size and prevalence estimates?
5. For each non-covered segment selected, what is the best estimate of the size of this population?
6. For each non-covered segment selected, what is the range of PTSD prevalence estimates derived from special surveys or other available data?
7. By combining (a) our current national estimates of PTSD prevalence in the non-institutionalized civilian population, weighted by its population size, and (b) an estimate of PTSD prevalence for each non-covered subpopulation, weighted by its estimated population size, how much would inclusion of the latter impact national estimates of PTSD produced by the household surveys?
8. To the extent the likely impact is significant, for each selected non-covered subpopulation, what are the issues, challenges and feasible options for including these special populations in national surveys?

### **National Sample Estimates of the Prevalence of PTSD**

As noted by Norris and Sloan (2013), in spite of changing definitions, diagnostic criteria and measures--as well as population coverage--estimates of the prevalence of lifetime PTSD in the U.S. population have been quite consistent since the advent of *DSM-III-R*. The Detroit Health Maintenance Organization (HMO) study yielded a 9% prevalence (11% women, 6% men) of lifetime *DSM-III-R* PTSD (Breslau et al., 1991), the National Women's Study yielded a 12% prevalence for lifetime *DSM-III-R* PTSD (Resnick et al., 1993), and the original National Comorbidity Study (NCS) yielded a 7.8% prevalence (10.4% women, 5.0% men) of lifetime *DSM-III-R* PTSD (Kessler et al., 1995). Estimates of the prevalence of PTSD in the U.S. under *DSM-IV criteria* was provided by the NCS Replication (NCS-R; Kessler et al., 2008), with a lifetime prevalence of 6.8% (9.7% women, 3.6% men), slightly lower than in the original NCS. In another nationally representative sample of U.S. adults (Pietrzak et al., 2011)--Wave 2 of the National

Epidemiological Survey on Alcohol and Related Conditions (NESARC)--lifetime prevalence of PTSD was estimated at 6.4% (8.6% women, 4.1% men). In a study comparing the use of *DSM-IV* and *DSM-5* criteria in a national probability online panel, Kilpatrick and colleagues (2013) reported a lifetime PTSD prevalence of 9.8% and 8.3%, respectively.

Overall, then, these lifetime estimates of PTSD range from 6.4%-9.8%, with a mean and median of about 8% (8.6%-12% for women, centered on about 10%; and 3.6%-6.0% for men, centered on about 4.5%). These values will serve as our estimates of lifetime PTSD prevalence in current national sample surveys.

For some populations and studies, however, only current or recent prevalence of PTSD is reported, usually assessed over the past year, but also for the past 6 months or 30 days. Of course, the prevalence of current or recent PTSD is much smaller than the prevalence of lifetime PTSD, with a 12 month prevalence of approximately 3.5% in the U.S. adult population in the NCS-R (1.8% among men and 5.2% among women). Resnick et al. (1993) estimated 6 month prevalence at 4.6% in the National Women's Study. Kilpatrick et al. (2013) estimated 12 month and 6 month PTSD prevalence at 4.7% and 3.8%, respectively, under *DSM-5*, and 6.3% and 4.7% under *DSM-IV*. The Mental Health Surveillance Study (MHSS), in which clinicians administered semi-structured diagnostic interviews to a subsample of NSDUH adult respondents to assess the presence of selected mental disorders (Karg et al., 2014) also provided a 12 month prevalence estimate for PTSD of 0.7% (0.8% women, 0.6% men).

### **Population Coverage in National Samples Reporting Prevalence of PTSD**

While the range of lifetime estimates of PTSD is relatively narrow across surveys, there is significant variation in the extent to which their target populations cover the full U.S. population. The Detroit Health Maintenance Organization (HMO) study was based on young adults in Detroit. The National Women's Study was based on telephone interviews with a sample of U.S. adult women (only) selected by random digit-dialing. Participants in the study

reported by Kilpatrick and colleagues (2013) were adults from a national online panel who completed the survey by web.

In contrast, both the NCS (Kessler et al., 1995) and NCS-R (Kessler et al., 2004) were based on stratified, multistage clustered area probability samples of (a) persons aged 15 to 54 years (in the NCS) or (b) English-speaking adults aged 18 or older (in the NCS-R) living in the non-institutionalized civilian household population of the coterminous US (excluding Alaska and Hawaii), plus students living in campus group housing. Wave 1 of NESARC also surveyed a representative stratified cluster sample of the civilian, noninstitutionalized U.S. population aged 18 years and older, residing in households and group quarters. The survey was conducted by the U.S. Census Bureau.

Each of these surveys has significant limitations in coverage with respect to our purposes. Accordingly, in my judgment, the survey with the best presumptive coverage of the full population of interest to use as a comparison standard for our purposes is the NSDUH, SAMHSA's flagship survey, although, other than its use as a baseline sample for the Mental Health Surveillance Study (MHSS; Karg et al., 2014), it has not been used as yet to assess prevalence of trauma and PTSD. Based on Section 2, Sample Design Report in the Methodological Resource Book for the 2013 NSDUH (Center for Behavioral Health Statistics and Quality, 2014), the respondent universe for the 2013 NSDUH was the civilian, noninstitutionalized population aged 12 years or older residing within the 50 States and the District of Columbia. Consistent with the NSDUH designs since 1991, the 2013 NSDUH universe included residents of non-institutional group quarters (e.g., shelters, rooming houses, dormitories, and group homes), residents of Alaska and Hawaii, and civilians residing on military bases. Persons excluded from the 2013 universe included those with no fixed household address (e.g., homeless and/or transient persons not in shelters), the active duty military, and residents of institutional group quarters, such as jails and hospitals (p. 1).

Of particular concern is that these exclude some key subpopulations that may have very different estimates of mental disorders and substance use—including trauma and PTSD. For

example, the survey explicitly excludes active duty military personnel, many of whom may be exposed to combat situations or other stressors associated with extended overseas deployment. The survey also excludes people living in institutional group quarters--such as prisons and residential mental health or substance abuse treatment centers--which may have higher rates of PTSD and other mental disorders compared with the general population. Yet another subpopulation excluded from NSDUH are homeless people not living in a shelter on the survey date, another population shown to have higher than average rates of mental disorders and illicit drug use. Several of these, and some others, such as nursing home residents and children in the child welfare system, are highlighted in a section on "Surveys of Populations Not Covered by NSDUH" in a report on mental health findings from the 2013 NSDUH (SAMSHA, 2014) and a previous report on Mental Health, United States, 2010 (SAMSHA, 2012). In the evidence reviewed to develop this paper, we have chosen to focus on five subpopulations: (1) those on active duty in the military, (2) inmates in jails and prisons; (3) the homeless; (4) children in foster care; and (5) nursing home residents.

For each survey year, the Population Estimates Branch of the U.S. Bureau of the Census produces, by special request, the necessary population estimates consistent with this universe that serve as the control totals used for post-stratification in the NSDUH. In Section 11 of the same report (Center for Behavioral Health Statistics and Quality, 2015), the total population covered is 262,391,455 (127,119,769 men and 135,271,686 women) (Appendix H, Table H1, page H3). Although totals for those not covered are not provided by the Census Bureau, SAMSHA (2014) estimates that "this population includes almost 98 % of the total U.S. population aged 12 or older (p.75)." This implies something between 97.5 to 97.9%, and the total population not covered at between 5,628,417 and 6,727,986 (5.6 to 6.7 million), including the subpopulations on which we have chosen to focus.

## Estimates for Subpopulations Not Currently Covered by National Surveys

### Some Initial Thoughts on Possible Levels of Impact

Prior to discussing each of these in turn, it is useful to consider these population numbers as a whole and their implications for how differences in prevalence of PTSD and trauma between those covered and not covered in the national surveys are likely to impact population estimates. To do this, we first assumed a lifetime PTSD prevalence rate of 8 % for the 262,391,455 people in the civilian, non-institutionalized population aged 12 years or older, and then sought to determine what the relative impact on estimates would be of adding 5,628,417 to 6,727,986 people (i.e., the estimate of the population not covered by NSDUH) with prevalence rates in multiples of 8%. For example, assuming a combined prevalence rate for all those not covered of 16% would increase the revised population estimate from 8 to 8.2%. In turn, for 24, 32, 40 and 48 %, the increases in the population estimate would be to 8.3-8.4, 8.5-8.6, 8.7-8.8 and 9%, respectively; only if the combined rate among all those not covered were 100% would the revised estimate increase from 8 to 9.9-10.3%. Thus, even when significantly higher prevalence rates are observed for various subpopulations, their impact on overall estimates of population prevalence--either for trauma or PTSD—will likely be modest, especially since the sizes of these selected populations are quite a bit smaller than the total. However, to paraphrase an observation articulated by Norris and Sloan (2013), even a 1% increase in prevalence of lifetime PTSD in the U.S. with a total (covered) population of 269 million yields 2.69 million people. And increasing our capacity to provide specific, reliable estimates for several of these groups not currently covered could still have a significant value beyond their impact on overall national estimates.

### Active Duty Military Personnel

*Estimates of PTSD Prevalence.* Among various subgroups of the U.S. population for which the prevalence of PTSD is generally recognized as being much higher are active duty military personnel and veterans, which are the focus of most of the research literature on this topic. However, until the last decade or so, most of these studies have focused primarily on veterans,



who are also covered in national household surveys, rather than on those serving on active duty, which are not. Overall, studies of PTSD prevalence among military and veteran populations are distinguished by their sheer numbers, their diversity in methods used, and the inconsistency of their findings. As a result, there have been many qualitative and quantitative reviews of this literature and efforts to understand the substantial variation observed in their estimates.

For example, Fulton and her colleagues (2015) cited several recent reviews that examined posttraumatic stress disorder (PTSD) prevalence estimates among U.S. servicemembers deployed to Iraq and/or Afghanistan and reported PTSD prevalence estimates ranging from 1.4% to 60%, including: (a) 14-16% from Gates, Holowka, Vasterling, Keane & Marx (2012); (b) 0.6-31% from Kok, Herrell, Thomas, & Hoge (2012); (c) 4-17% from Ramchand et al. (2010); (d) 4-17.1% from Richardson, Frueh, & Acierno, 2010; and (e) 1.4-31% from Sundin, Fear, Iversen, Rona, & Wessely (2010). In their meta-analysis of 33 studies published between 2007 and 2013-- involving 4,945,897 Operation Enduring Freedom and Operation Iraqi Freedom veterans-- PTSD prevalence was estimated at 23%. Given the limited utility of such a wide range of estimates for public policy and projecting health care needs, several of these reviews have suggested or explored possible reasons for these striking differences across studies, including differences in demographics, level of combat exposure, time since return from deployments, strategies in sampling, definitions of case criteria, cutoff criteria on screening instruments, and anonymity of reporting.

Of particular interest for our purposes, however, are efforts to categorize studies in ways that better reflect variation and differences in the situations and exposures of different subgroups of the active duty military personnel who are deployed (or not deployed). For example, in their review of 62 different prevalence estimates, ranging from 1 to 60 %, Ramchand and his colleagues (2010) found that estimates of greater than 20 % were mostly seen among samples of veterans seeking treatment (many of whom were exposed to combat and/or injured while deployed). In more general samples representative of all those previously deployed, they observed rates of 5 to 20 %. Similarly, Sundin et al. (2010) found that anonymous surveys of

line infantry units reported higher levels of PTSD compared to studies representative of the entire deployed population. A key meta-analysis reported by Kok, Herrell, Thomas, & Hoge (2012) served to crystalize this important distinction by showing that there is much greater consistency across studies than initially recognized, provided that studies are suitably grouped. Studies involving stratified random sampling of all deployed personnel, including the large proportion in support roles, yielded a weighted PTSD prevalence of 5.5%, *comparable to non-deployed personnel*, while the larger body of research focused on combat infantry personnel yielded a weighted prevalence of 13.2%.

The estimates of greatest direct interest, however, are from surveys of all members of the active duty military, for which few estimates of PTSD are available. The Department of Defense Survey of Health Related Behaviors Among Active Duty Military Personnel (HRBS), conducted since 1980, is the largest population-based health behavior study of the force and constitutes the most representative and comprehensive data of this type available in the military. The 2005 and 2008 surveys (Bray, Pemberton, Lane, Hourani, Mattiko, & Babeu, 2010) were conducted largely by group administration from random samples of 16,000 and 28,500 servicemembers at 64 military installations worldwide, selected from a statistical sampling frame representing all active duty personnel. Probable PTSD (need for further evaluation) was assessed using the 17-item PTSD Checklist-Civilian Version (PCL-C) that asks respondents to rate the extent to which they have been bothered by PTSD symptoms during the previous 30 days. The overall current prevalence of possible PTSD in the active duty military, as measured with the PCL-C screening criteria cutoff of 50+ was 6.7% in 2005 and 10.7% in 2008.

The more recent 2011 HRBS was changed extensively from 2008 survey (Barlas, Higgins, Pflieger, & Diecker, 2013). The survey was administered using a web-based, individual self-administered questionnaire to a sample of 39,800 active-duty servicemembers rather than through an onsite group administration of paper-and-pencil questionnaires, and, though the sample was thus no longer clustered geographically, it did not include deployed personnel. PTSD was assessed as High Posttraumatic Stress (PTS) Level, based on a four-item measure of

symptoms they were experiencing in the past 30 days that indicated need for further PTS evaluation. Across all services, 5.0% of personnel were classified as having a high posttraumatic stress (PTS) level. The many changes made in this latest administration of the survey render it non-comparable to the 2005 and 2008 surveys, and its exclusion of those deployed from its sampling frame and its measurement of PTSD make it less useful than the 2005 and 2008 surveys for our comparisons, which is unfortunate given the time period in which it was conducted.

*Potential Impact of Including Active Duty Military on National Estimates.* For a number of reasons, determining what our estimate or range of estimates of PTSD prevalence should be for those on active duty in the military is not straightforward. Although a very large number of estimates have been published for military and veteran populations, many of these are for veterans or with a heavy emphasis on those deployed. In addition, the vast majority of estimates presented are for current rather than lifetime prevalence, for which fewer national estimates are available. Nevertheless, the Kok et al. (2012) estimate of 5.5% and 2008 HRBS estimate of 10.7% seem like reasonable proxies for current prevalence, and for a broader range this might be extended to the 5-20% postulated by those at RAND (Ramchand et al., 2010). As a national survey estimate, a current prevalence in the range suggested by the NCS-R and Kilpatrick et al. (2013)--3.8 to 6.3%--seems reasonable.

Armed Forces strength figures for February 29, 2016 indicate that there were 1,346,615 (1.35 million) personnel on active duty in the military (which are not included in national surveys), 20-24% of the total number of people we previously estimated are not covered by NSDUH (5.6 to 6.7 million).

Given these assumptions, including active duty personnel in a national survey with coverage comparable to NSDUH (if the national estimate is 3.8% or 6.3 % and the active duty estimate is 5.5%), and with a population size of 262,391,455 and active duty population of 1,346,615, would have virtually no meaningful effect on the population estimate. And, even if the active duty PTSD prevalence estimate is nearly doubled (10.7%), the total population estimate would

still increase only to 3.84 and 6.32 %, respectively. If the subpopulation estimate of PTSD prevalence were 20% (which seems unlikely), these population estimates would still increase only to 3.9% and 6.4%, respectively. Thus, from the perspective of total population estimates only, including those on active duty would have a negligible impact on national statistics on prevalence of PTSD. For other purposes, however, such as being able to provide—for this special population—reliable, comparable estimates, based on the same definitions, measures and methods used to generate statistics for other segments of the U.S. population that are covered by national surveys could make a major contribution to the generation of comprehensive mental health statistics and tracking the mental health status of the population, such as *Mental Health, United States, 2010* (SAMSHA, 2012).

*Feasibility of Including Active Duty Members in National Surveys.* If so, what are the issues, challenges and feasible options for including active duty military personnel in national surveys? In principle, including this subpopulation in the NSDUH or a “NSDUH-like” survey could be fairly straightforward, since its sampling frame already includes most of the capacity to do so. The NSDUH sampling universe already includes *civilians* residing on military bases, while explicitly excluding active duty personnel residing on the same bases, and those living in households and other living quarters off-base in these and other sampled areas. In fact, civilians in the same households are eligible for selection in the sample. By making these excluded servicemembers eligible, they could be included in the sample, although coordination with and assent by the Department of Defense to do this would undoubtedly be complicated.

Even if this were possible, however, there would still be a sizeable proportion of such personnel (150,00-200,000) stationed outside the U.S, either deployed or performing many other types of duties. To cover these would require development of a dual frame supplementary (list) sampling frame and use of other modes of data collection, most likely a combination of web and mail survey components, such as that used by the Millennium Cohort Study, which uses an extended survey period in part to increase participation by those outside the country. The 2011 HRB used a similar design, although those deployed were explicitly excluded. Another option, especially for including those deployed, would be to take advantage of the facts that (a)

individuals on active duty are for the most part not continuously deployed and (b) NSDUH interviews are conducted continuously through the year(s), which might well capture the vast majority of those deployed over a given time period. One could also use a modeling approach by asking those surveyed in the U.S. who have recently been deployed and those about to be deployed questions that might allow for statistical adjustment, although given the importance of the deployed population--especially those in combat--is such that a non-modelling approach would be preferable.

### **Inmates in Prisons and Jails**

*Estimates of PTSD Prevalence.* People with mental illnesses are understood to be overrepresented in the U.S. criminal justice system, and estimates of the prevalence of mental illnesses in corrections settings is thus of vital importance, as emphasized by Prins (2014) in his recent comprehensive review of the prevalence of mental illnesses in U.S. state prisons. Estimates of current and lifetime prevalence of mental illnesses cited in that review varied widely, but “the range of prevalence estimates for particular disorders was much greater—and tended to be higher—in prisons than community samples (p.1).” This is also the case for studies that focus on the prevalence of PTSD in particular.

Among the most widely cited studies on the prevalence of mental illness in these settings are reports from nationally representative surveys conducted by the Bureau of Justice Statistics, including two referenced in *Mental Health, United States, 2010* (SAMSHA, 2012) and its report on mental health findings from the 2013 NSDUH (SAMSHA, 2014). These include a key report by James and Glaze (2006) based on personal interviews with State and Federal prisoners in 2004 and local jail inmates in 2002, in which more than half of all prison and jail inmates reported a mental health problem. Mental health problems were defined by two measures: a recent history or symptoms of a mental health problem. They must have occurred in the 12 months prior to the interview. A recent history of mental health problems included a clinical diagnosis or treatment by a mental health professional. Symptoms of a mental disorder were based on criteria specified in the Diagnostic and Statistical Manual of Mental Disorders, fourth

edition (DSM-IV), but *did not include PTSD*; 56% of State prisoners, 45% of Federal prisoners, and 64% of jail inmates reported such a problem.

The National Inmate Survey conducted in 2011-2012 (NIS-3; Beck, Berzofsky, Caspar, R., & Krebs, 2013) also included similar questions on mental health; 36.6 % of prison inmates and 43.7 % of jail inmates in the NIS-3 reported having ever been told by a mental health professional that they had (any) mental disorder, including manic depression, bipolar disorder, or other depressive disorder; schizophrenia or another psychotic disorder; or an anxiety or other personality disorder. However, while the NIS-3 included post-traumatic stress disorder as one of the specific disorders assessed in the survey, the analyses presented in the report did not include specific analyses of PTSD per se, although a new (forthcoming) report that does include such analyses of these data is in preparation. Nevertheless, a special report on Veterans in Prison and Jail that is currently available (Bronson, Carson, Noonan, & Berzofsky, 2015) allows for a derivation of PTSD estimates from the NIS-3, at least for men. By combining the data for veterans and nonveterans from Table 7 in this publication, the lifetime prevalence rates for PTSD among male inmates, based on the “having ever been told by a mental health professional measure,” are 11.0% and 13.8% for prisoners and jail inmates, respectively, or 11.9% for prisoners and jail inmates combined. Although results are not provided for women in this publication due to the small numbers of women veterans, the sample sizes for both men and women are provided. So if one assumes that the prevalence rate for women is twice that of men (a ratio often reported in the general population), the prevalence estimates for all inmates would be 11.7% for those in prisons, 15.6% for those in jails, and 13.0% for all those incarcerated. These are the only national probability estimates for PTSD currently available for this important subpopulation, although--given the relative imprecision of the diagnostic measure used--it is likely that these rates significantly underestimate the true prevalence for prisoners and jail inmates.

The remainder of the empirical evidence is based on a number of smaller studies that generally provide much higher estimates with great variability. As reported in a recent review by Friedman et al. (2015), PTSD is much more common among female prison inmates than in their

community counterparts--the second most common disorder, after substance use disorders--with current prevalence in the United States ranging from 29–51% and lifetime prevalence as high as 30–42%. Among 387 incarcerated women in a maximum security prison (Harner et al., 2015), 44 % met PTSD criteria; and Grella et al. (2013) reported a lifetime rate of 40% among women in prison.

For women in jails, a recent study of 203 female prison inmates found that 51% met criteria for PTSD (Warren et al., 2009), and a multisite study of 491 women in urban and rural jails by Lynch and her collaborators (2014) reported a lifetime prevalence of 53% and 12 month prevalence of 29% for PTSD. Two earlier studies of female jail inmates reported lifetime PTSD prevalence at 33.5% (Teplin et al., 1996) and current prevalence at 22% (Teplin et al., 1996; Green et al., 2005).

Among male inmates, estimates of prevalence are generally lower than those for women, consistent with findings reported for the general population. Wolff and her colleagues (2014) concluded that rates estimated for incarcerated male samples, based on sample sizes of less than 220 and varying diagnostic methodologies, range from 21% (general prison population) to 39 % (jailed veterans) for current PTSD, with an estimated lifetime PTSD rate of 33% (general prison population). In their own study of 592 adult males residing in a high-security prison, Wolff et al. (2014) found rates of current PTSD symptoms and lifetime PTSD of 30 and 60%, respectively. Two studies of male jail and prison inmates in rural states (Powell et al., 1997; Gibson et al., 1999) found identical prevalence rates for PTSD, with 33% of the inmates meeting lifetime and 21% current (6-month) criteria for PTSD. Another study of male detainees in a jail (Ruzich et al., 2014) found that 21% met criteria for a diagnosis of probable (current) PTSD; and in a sample of 129 jailed veterans assessed by Saxon et al. (2001), 39 % screened positive for PTSD.

*Potential Impact of Including Inmates in Prisons and Jails on National Estimates.* Given the availability of prevalence estimates from the NIS-3 (Bronson, Carson, Noonan, & Berzofsky, 2015), it makes most sense to begin with that report to estimate prevalence in this population before considering other possible estimates and the size of this population. Recall that lifetime

prevalence rates for PTSD male inmates are 11.0% and 13.8% for prisoners and jail inmates, respectively, or 11.9% for prisoners and jail inmates combined. If women are included, we estimate that these rates for all inmates would be 11.7% for those in prisons, 15.6% for those in jails, and 13% for all those incarcerated. The population sizes on which these numbers are based are the number of inmates in prisons and jails in 2011-2012: 2,158,500 in total, 1,439,700 in prisons and 718,800 in jails. The statistics published for the correctional population in 2014 (Kaeble, Tsoutis, & Minton (2015) report 2,224,400 in total, 1,561,500 in prisons and 744,600 in jails. Although the 2011-2012 numbers were used to derive the prevalence estimates, the more recent estimates will be used for this analysis. With 2,224,400 (2.22 million) inmates in prisons and jails (which are not included in national surveys), they represent 33-40% of the total number of people we previously estimated are not covered by NSDUH (5.6 to 6.7 million).

Once again, as a national survey estimate, a current prevalence in the range suggested by the NCS-R and Kilpatrick et al. (2013)—3.8 to 6.3%—seems reasonable. Even with a total incarcerated population of 2.22 million, the lower bound estimate of 3.8% increases only to 3.88%, even though the prevalence estimate derived from the NIS-3 is more than three times higher. If the two separate component populations—prisoners and jails inmates—are used instead, with their own respective estimates, the impact is even smaller (3.5 and 3.3 %). If the 6.3% estimate is used these differences are even smaller.

However, estimates derived from the research literature are considerably larger. Based on the range of estimates and their considerable variability, a possible upper bound for lifetime estimates might be 21 and 42% for men and women in prisons, and 39 and 53% for men and women in jails. A weighted estimate based on population sizes would be 22.4% for men and women in prisons, 40.8% for those in jails, and 28.5% for men and women in prisons and jails combined. Assuming a lifetime PTSD prevalence rate of 8 % for the 262,391,455 people in the civilian, non-institutionalized population, even with these considerably higher estimates, the 8% national estimate would still only increase to just 8.17% if the full population of those



incarcerated were included in a national survey. Even if the highest estimate in the ranges proposed (53%) were correct, the national estimate would increase only to 8.38%.

Thus, once again, from the perspective of total population estimates only, including men and women in prisons and jails would have a negligible impact on national statistics on the prevalence of PTSD. For other purposes, however, such as being able to provide—for this special population—reliable, comparable estimates, based on the same definitions, measures and methods used to generate statistics for other segments of the U.S. population that are covered by national surveys could make a major contribution to the generation of comprehensive mental health statistics and tracking the mental health status of the population, such as *Mental Health, United States, 2010* (SAMSHA, 2012). Given the very high levels of mental illness observed in these populations, these may be especially important for those in the criminal justice system.

*Feasibility of Including in National Surveys Inmates in Prisons and Jails.* If so, what are the issues, challenges and feasible options for including those in prison or jails in national surveys? Surveys of inmates in these institutions do not readily lend themselves to the survey practices followed in national surveys. Access to this population is strictly limited by the nature of these facilities and how they are managed, as well as considerable pressures on those with these responsibilities. The inmates themselves are also subject to special rules for certain classes of human subjects under Institutional Review Board reviews. However, the BJS does periodically conduct face-to-face interviews with inmates in these facilities, including the sensitive National Inmate Surveys on the prevalence of sexual victimization, which was successful in using ACASI technology (also used by NSDUH) to allow respondents to complete a portion of the interview in private. However, use of other survey modes, especially web surveys has not been considered to be feasible in these institutions. BJS also has a growing and vital interest in increasing its behavioral mental health content in its studies, although increases in such content are difficult, given the many other demands on the few surveys they conduct.

The only feasible way to accomplish these objectives, in my view, would be to establish an ongoing collaboration with BJS, either to periodically mount a special survey focused on these issues (e.g., every few years), or develop batteries of fully calibrated measures that might be used across surveys to capture the same content. One other way that some of these issues might be addressed is to periodically include some detailed questions in ongoing national surveys, such as NSDUH, that capture in some detail recent histories of incarceration for all respondents in these surveys; this would support analyses that describe trauma exposure and PTSD for all those who have been in prisons and jails, as well as comparisons with those who have not. Such an approach has already been implemented by Anderson et al. (2015) in a supplement to the National Comorbidity Survey-Replication (NCS-R). Such an assessment might also be coordinated with more limited interviews with inmates in facilities and with targeted interviews with inmates as they leave such facilities.

### **The Homeless Population**

*Estimates of PTSD Prevalence.* While each of the special populations of interest in this paper have substantial “churn” or turnover, this is especially the case for the homeless, because in most cases, homelessness is a temporary circumstance--not a permanent condition--such that the most appropriate measure of the magnitude of homelessness is the number of people who experience homelessness over time, not the number of "homeless people" (National Coalition for the Homeless, 2009). Basically, two different methods are currently used to measure and track homelessness. One attempts to count all the people who are literally homeless on a given day or during a given week (point-in-time counts). A second examines the number of people who are homeless at some time over a given period of time (period prevalence counts). Choosing between these has significant implications for understanding the magnitude and dynamics of homelessness. High turnover in the homeless population suggests that many more people experience homelessness than previously thought and that most of these people do not remain homeless. Point-in-time studies do not accurately identify these intermittently homeless people. In addition, regardless of the time period over which a study is conducted, many people will not be counted because they are not in places researchers can easily find. This

people, often referred to as "the unsheltered" or "hidden" homeless, frequently stay in automobiles, camp grounds, or other places that researchers cannot effectively search (e.g., Link et al., 1995).

Since 2007, the U.S. Department of Housing and Urban Development has released an annual report on the extent of homelessness in the United States—the Annual Homeless Assessment Report (AHAR). The report documents how many people are using shelter programs for homeless people and how many people are in unsheltered locations often referred to as “the street.” There are two types of estimates: (1) Point-In-Time (PIT) - PIT data estimate the number of people homeless *in shelter and on the street* on a single night in late January every year; (2) Homeless Management Information System (HMIS) - HMIS data estimate the number of people homeless *in shelter* at any time during the year. The 2014 AHAR (U.S. Department of Housing and Urban Development, 2015) reported that on a single night in January 2014, 578,424 people were homeless in the United States, and an estimated 1.49 million people used a shelter program at some point during the reporting year. Of the 578,424 people who were homeless on the night of the PIT count, 401,051 (69.3%) were in shelters, while 177,373 (30.7%) were in unsheltered locations. These numbers are important because, in principle, the only component of the homeless population that the NSDUH sample does not cover are those not in shelters, 177,373 based on the 2014 PIT estimate, although for many reasons, we should assume that this number is an underestimate even for the designated single night in question.

Based on HMIS data, the estimated number of people who used a program at any point from October 1, 2013 through September 30, 2014 was 1,488,465 people. Information on where people lived before entering shelter indicated that: (1) prior to entering shelter, two in five adults (450,742) were living in a housed situation, another two in five were already homeless, and about one in five was staying in an institutional or other setting; and (2) of the adults who were already homeless before entering a shelter program during the reporting year, nearly half were living in unsheltered locations. Although these estimates are only for adults in shelters, if one extrapolates these proportions to all of the 1,488,465 people who used emergency shelter or transitional housing over the reference period, about 595,386 were homeless before

entering a shelter and, of these, 46.7% (278,045) were living in unsheltered locations just prior to entry. So, in addition to those who would be missed on a PIT sweep on a given night (some of which would likely be included in these numbers), at least a portion of this total (e.g., one-third) might be added to the likely size of the unsheltered population, which would increase the estimated unsheltered group that is not covered by these surveys to about 270,000, a number still considerably smaller than other subpopulations that are uncovered. Of equal or greater importance is that for a continuous national survey, with data collection spread over the entire year, many of those living unsheltered just prior to using emergency shelter or emergency housing could be included in the survey, thereby effectively supporting coverage of some of the those previously uncovered.

These issues are also quite relevant to the nature of estimates of PTSD prevalence available in the literature for those who are homeless. Although some of these estimates include interviews with people unsheltered or “on the street,” many include or even focus explicitly on those in shelters, emergency housing or other programs. Given the considerable fluidity among the homeless in their exposure to these various circumstances and settings, attention to the full range of estimates available for this population seems appropriate, and of practical necessity in any case.

A significant number of these studies that included estimates of prevalence have focused on young people experiencing homelessness—young adults and adolescents (cf. Thompson, 2012). A recent systematic review by Hodgson et al. (2013) of 38 studies found 10 reporting prevalence estimates for PTSD, including all those also identified in another review by Medlow et al. (2014) of 21 articles on homeless adolescents. This research estimated that between 18 and 48% of these young people met diagnostic criteria for PTSD, and lifetime prevalence rates for PTSD were between 35 and 52%. Two more recent articles by Bender and her colleagues on street-involved (2014) and homeless (2015) youth reported that 28% and 22.7% met criteria for PTSD, both estimates also falling within this range.

Using the Diagnostic Interview Schedule (DIS) in a study of homeless single women and mothers, 53% were diagnosed as exhibiting full-blown cases of PTSD (Smith, 1991). In a sample

of homeless women caring for children, one in three had experienced full or partial PTSD at some time in their lives (Ford and Frisman, 2002). In a sample of 148 adult women experiencing episodes of homelessness in three U.S. cities, Whitbeck and his colleagues (2015) found that 42.6% of the women met criteria for lifetime PTSD and 39.7% met criteria for past-year PTSD. In a study of 600 homeless men and 300 homeless women using the Diagnostic Interview Schedule (DIS), 18 % of the men and 34 % of the women met criteria for a lifetime diagnosis of PTSD (North and Smith, 1992). Although these are obviously wide ranges, all but one of these additional estimates fall in the ranges previously observed for young people: between 18 and 48% meeting diagnostic criteria for PTSD and lifetime prevalence rates for PTSD between 35 and 52%. Thus, using these as our lower and upper bound estimates for the unsheltered homeless seems reasonable.

*Potential Impact of Including Unsheltered Homeless on National Estimates.* As a national survey estimate, a current prevalence in the range suggested by the NCS-R and Kilpatrick et al. (2013)-- 3.8 to 6.3%-- again seems reasonable, as does the lifetime estimate of 8% from the NCS. Assuming that the unsheltered group that is not covered by these surveys is about 270,000, they would represent only 4-5% of the total number of people we previously estimated are not covered by NSDUH (5.6 to 6.7 million). With a total unsheltered population estimated at 270,000, the impact on any of these national estimates, no matter how large the difference in prevalence, will naturally be quite small. The lower bound estimate for current prevalence of 3.8% increases only to 3.81%, even though the lower bound prevalence estimate derived from the homeless literature of 18% is nearly five times higher, and increases to only 3.85% when the upper bound estimate of 48% is used. If the 6.3 national estimate is used, these differences are 6.31 and 6.34 %, respectively. For lifetime prevalence, the 8% national estimate would increase only to just 8.03-8.05%, using the 35-52% range reported in the literature for this population if they were included in a national survey. Thus, the impact of including the unsheltered homeless in national surveys would have a negligible effect on national estimates of the prevalence of PTSD. Once again, however, for other purposes, such as being able to provide--for this special population—reliable, comparable estimates, based on the same definitions, measures and methods used to generate statistics for other segments of the U.S. population could be of value

for benchmarking the full homeless population with other subgroups of the total population. The prevalence rates reported in the literature are quite high, and many of them are based on estimates from collaborative studies by Whitbeck and colleagues (e.g., Whitbeck et al., 2015), many of which used the CIDI measures of PTSD used in the NCS and NCS-R.

*Feasibility of Including the Unsheltered Homeless in National Surveys.* In spite of the potential value of doing so, the challenges of including the segment of the homeless population who are not staying in emergency shelters or transitional housing programs (i.e., people whose primary nighttime residence is a public or private place not designated for or ordinarily used as a regular sleeping accommodation for people, such as the streets, vehicles, or parks) loom large. Since the 1980s, considerable attention has been devoted to how to count and survey all of the homeless, including the unsheltered. And even as recently as the 2010 Census, the focus has been on emergency and transitional shelters, defined as places where people experiencing homelessness stay overnight, as part of total group quarters population (U.S. Census Bureau, 2010). This is the portion of the homeless population that NSDUH and some other major national surveys also try to cover. Census data collectors also go out to designated street locations and try to count people who are living on the street, by targeting people at non-sheltered outdoor locations where people experiencing homelessness stay without paying, but it is explicitly acknowledged that such efforts are not entirely successful, and the methods used are not readily compatible with national surveys. Thus, it does not seem feasible for SAMSHA to try to incorporate such an assessment into NSDUH or even a new national survey. To be sure, there have been many studies, including many of those cited, that have located and interviewed street dwelling homeless people, and several different methodologies have been used or proposed (e.g., Kovess, 2002), but they are generally most feasible in specific cities and communities, rather than on a larger scale. Some of these might be used, either as individual studies or in combination, to estimate the size of differences typically observed between the sheltered and unsheltered, and potentially use this information to calibrate or adjust estimates derived only from those in emergency and transitional shelters.

In addition, it may be possible to take advantage of the fact that homelessness is largely a temporary circumstance--e.g., episodic, with substantial turnover both in its experience and settings—by using NSDUH and other national household surveys to capture information on individual periods or episodes of experiencing homelessness from respondents who are captured in these surveys (e.g., Greene et al, 2003). In particular, a striking finding from the AHAR HMIS data, which is collected by Continuums of Care (CoC) local planning bodies throughout the year, is that roughly one in five people (20%) who entered emergency shelter or transitional housing over the reference period were living in unsheltered locations just prior to entry. To the extent that such people could be identified (ideally in real time) and interviewed shortly after entry to these shelters, they likely represent a substantial portion of those not covered over a year. Since NSDUH interviews people continuously throughout the year, with some modifications in procedures for these settings it might be possible to capture these people in ways not currently possible for special studies of the homeless.

### **Children in Foster Care and Child Welfare**

At the end of 2014, there were 415,129 children in foster care in the United States, according to data from the federal Adoption and Foster Care Analysis and Reporting System (AFCARS). The majority of children in foster care in the United States lived with foster families, either relative (29 %) or non-relative (46 %) in 2014. Fourteen percent of children in foster care were living in group homes or institutions (U.S. Department of Health and Human Services, 2015). Children in the child welfare system, and especially those in foster care and group home and residential programs, are at substantial risk of mental health and behavioral problems (Casanueva, Wilson, Smith, Dolan, Ringeisen, & Horne, 2012), and up to half of these are not covered in the national surveys.

From a probability sample of 1,848 children and adolescents (8 to 14 years) who were referred to the child welfare system for investigation of neglect and abuse under the National Survey of Child and Adolescent Well-Being, Kolko et. al. (2010) reported an overall PTSD prevalence rate

of 11.7%, with the prevalence of PTSD symptoms higher in children who were placed in out-of-home care (19.2%) as compared to those maintained at home (10.7%). In the second cohort of NSCAW II, 5,873 children ranging in age from birth to 17.5 years old who came in contact with the child welfare system were interviewed; 11.6% scored in the clinical range on the Posttraumatic Stress scale (Casanueva et al., 2012).

Greeson et al. (2011) examined a large sample of 2,251 youth (age 0 to 21) with recent child welfare system contact and subsequent placement in foster care. 22.0% of the total sample fell in the clinical range for PTSD. In a population-based, multi-state, cohort of older adolescents about to exit child welfare systems, Keller et al. (2010) found a lifetime PTSD prevalence of 15.1% of the sample meeting lifetime criteria, a rate quite similar to that reported by McMillen and colleagues (2005) in a similar study of youth about to exit foster care (14%). Salazar et al. (2013), in a longitudinal panel study of 732 adolescents aged 17 and 18 in out-of-home foster care found a lifetime prevalence rate of 18.8%, as assessed by the CIDI. And, in a detailed review of recent studies on the mental health of current and former recipients of foster care using diagnostic measures, Pecora et al. (2009) found estimates of lifetime PTSD prevalence ranging from 12.5 to 30% and past year prevalence from 3.8 to 25.2%. All of these other estimates fall in these two ranges.

*Potential Impact of Including Children in Foster Care and Child Welfare on National Estimates.*

While these prevalence rates are somewhat lower on average than those observed for the previous three populations examined, they are still notably higher than those observed in the general survey population, both for adults and young people. However, since the maximum size of the foster care population is only 415,129, and those not covered are likely better estimated at no more than half of this number--i.e., the sum of those in non-relative foster families (46 %) and those living in group homes or institutions (14%)--or about 200,000 children and adolescents. Thus, consistent with our previous analyses, if these children (those 12-18) were included in the national samples and estimates, the impact would be negligible, and for comparison purposes, many of these other studies are already routinely providing comparisons



with other surveys that provide national estimates for these age ranges. Overall, the national surveys already likely cover most of this population, and, although they could be tweaked to provide even greater coverage, there currently appear to be no compelling reasons to do so.

### **Nursing Homes and Long-Term Care**

Because of the complex methodological issues involved with collecting data from people in institutions, the institutionalized population is usually excluded from large national household based surveys, a factor explicit in the charge for this paper. Persons living in assisted living facilities, group homes, continuing care retirement communities---and other types of residential settings as alternatives to long term care in nursing homes--have typically been defined and sampled as part of the non-institutionalized population. Among the institutionalized population as a whole, roughly equal numbers reside in correctional facilities and nursing homes/skilled nursing facilities, but the distribution of those institutional settings by age are highly skewed. While the vast majority of those in correctional facilities are under 65 years of age, the nursing home population is primarily composed of those aged 65+, making this group (1,568,499 in 2008) a dominant component of the institutionalized population, a factor that merits some attention in this assessment (Cohen, 2011). Even as this nursing home population had shrunk to 1,369,700 current residents by 2014 (Harris-Kojetin et al., 2016), it is still as large a component of the population that is not covered by NSDUH and the other national surveys as the active duty military. In addition, many have observed that nursing homes have become the de facto mental institution for many persons with mental illness as a result of the dramatic downsizing and closure of state psychiatric hospitals spurred on by the deinstitutionalization movement over the years (e.g., Grabowski, 2009).

A key question, however, is: what is the prevalence of trauma and PTSD among residents of these facilities? It turns out that the answer is not that easy to access or determine. There are virtually no studies of the prevalence of PTSD in this population other than a few small studies of veterans in long-term care (e.g., Cook et al., 2005; Carlson et al., 2008). There are, however, health statistics available from the National Center for Health Statistics (CDC) and the Centers for Medicare and Medicaid Services (CMS). For example, through 2004, there are data from the

National Nursing Home Survey on the number and percentage of nursing home residents by prevalence of diagnoses at time of interview by ICD–9–CM code. Although these data included the diagnosis and code for PTSD, the prevalence estimate for PTSD was so low that it could not be reported under NCHS reliability standards. The successor to that survey series, the National Study of Long-Term Care Providers (NSLTCP) also provides health status information for nursing home residents from the Minimum Data Set Active Resident Episode Table (MARET) data, which contain information on all residents who reside in Medicare- or Medicaid-certified nursing homes. Reports from these data include the numbers of residents diagnosed with Alzheimer’s disease or other dementias, depression, and diabetes (Harris-Kojetin et al., 2016). They do not include post-traumatic stress disorder, although the diagnostic code is contained in the database. However, (based on unpublished data provided by special request from Lauren Harris-Kojetin, Jessica Lendon and Manisha Sengupta at NCHS on March 24, 2016), the prevalence rates for PTSD among nursing home residents in the four quarters of 2015 ranged from 0.45 to 0.52%. Thus, based on these very low rates, including this currently uncovered population in national estimates of PTSD prevalence would slightly *reduce* our national current prevalence rates of 3.8 and 6.3% by .02 and .03 percentage points, respectively.

Several studies suggest that older veterans and people in the community have lower rates of PTSD than those who are younger. For example, in a recent article by Reynolds et al. (2016) based on NESARC data, the prevalence of past-year PTSD was significantly higher for those aged 20–34 (4.3%) and 35–64 (5.2%) compared with those 65+ (2.6%). These very low rates may not be surprising, although it is also possible that current estimates may underrepresent the true prevalence of PTSD among older adults (Cook & Niederehe, 2007). For example, Cook (2001) postulated that:

Cohort differences that may affect the presentation, assessment, and treatment of trauma-related distress in older adults include misinterpretation of psychological difficulties as somatic complaints and reluctance to admit to psychological difficulties due to the associated stigma for this generation. Also, for the current cohort of older adults, trauma that occurred before their middle adulthood preceded the introduction

of PTSD into the diagnostic nomenclature in 1980. Thus, knowledge of the effects of traumatic experiences was less developed, and specific terminology, understanding, and support were less available for this generation.

In particular, special consideration may need to be made when assessing PTSD with regard to the special needs of those in long-term care settings. As noted by Cook et al. (2005), nursing home patients are frequently undiagnosed, misdiagnosed, or diagnosed in a way that obscures treatable conditions, such that older adults living in institutional care with PTSD may be overlooked because their symptoms (or medication effects) may be confused with dementia or psychosis. These concerns are heightened by a growing number of studies showing that several conditions often associated with nursing home placement—including falls (Chung et al., 2009; Jayasinghe et al., 2014); myocardial infarction (Chung et al., 2006); stroke (Sembi et al., 1998; Norman et al., 2012; Edmondson et al., 2013); cognitive impairment (Cook et al., 2003; Schuitevoerder et al., 2013); and dementia (Borson, 2010); Qureshi et al., 2010; Yaffe et al., 2010)—are related to PTSD. With regard to cognitive impairment and dementia, Cook (2001) notes that aging individuals with cognitive impairment are typically excluded from studies of trauma and PTSD; and, indeed, in their review of eight studies, Carlson et al. (2008) found that none had used standard self-report measures of PTSD to assess elderly persons with cognitive impairments or dementia. Since cognitive impairment and dementia are common among elderly persons in long-term care settings, some alternative to standard self-report assessments of posttraumatic stress symptoms is needed for this population to assess persons with mild to moderate cognitive impairment, along with an observer-report measure for assessing observable posttraumatic symptoms in persons with severely deteriorated cognitive functioning. In sum, it seems highly likely that the current estimates of PTSD prevalence among the elderly in nursing homes underestimate the true prevalence in the population. However, given some of the complex and daunting challenges associated with achieving adequate assessments of PTSD and trauma in this population, achieving adequate coverage for this important special population in national studies does not seem feasible in the near term.

## **A Note on the Assessment of Potentially Traumatic Events**

Although rates of exposure to potentially traumatic events (PTEs)—obviously of critical importance in trauma measurement and as predictors of PTSD—are also relevant here, my initial assessment was that there were some significant limitations in the research literature derived from the special populations relative to that on general populations in the national surveys. In addition, from my initial assessments of the impact of these special populations on national PTSD prevalence estimates, it became clear that the impact on national estimates would be negligible or modest at best. Given the high levels of exposure to one or more PTEs reported in the national sample populations, it seemed unlikely that, even if these levels of trauma were nearly universal in the special populations, the impact of adding these to the national sample estimates would be even more modest.

A key issue alluded to in this second reason, was that, with regard to the detailed and “standardized” measurement of PTEs based on official DSM-defined or driven assessments of qualifying traumatic events, I felt that the literature currently available is not yet “mature” enough to systematically make comparisons and estimates for these detailed PTEs (including conditional rates of PTSD). While, after completing this review, I still believe that that is largely true, a more systematic look at the array of literature compiled suggests that this was more accurate for some of these special populations than for others. For example, as noted by Norris and Sloan (2013), research on the prevalence of PTSD in military and veterans populations focuses primarily, although not exclusively, on combat trauma and its components rather than non-military PTEs and the prevalence of trauma per se. While there are a some exceptions, with a few studies focusing on a selected general population PTEs (e.g., intimate partner violence) and some others on a broader (and even full) range of PTEs, that is still the exception in that population. In contrast, for inmates in prisons and jails, and to a lesser extent the homeless, the impact of the broader general population literature on stimulating assessments of both individual events and cumulative trauma is more common, such that at least a preliminary assessment would be possible.

## Summary and Discussion

The key focus of this research paper has been on population coverage considerations in the context of producing estimates of trauma and PTSD. Typically, national surveys are limited to the civilian non-institutionalized population, due to cost and feasibility constraints or issues. A review of studies focused on several of the key populations excluded in national survey samples verifies some of the assumptions driving this paper, namely that many of these special populations, which account for most of those not covered, do indeed appear to experience significantly higher prevalence rates of PTSD than those currently included in national estimates, although the ranges of estimates reported, both within and between these populations vary widely.

However, the proportion of the total U.S population that is already covered in these surveys is still quite high. In NSDUH, for example, 262.4 million people (nearly 98% of the target population of civilian, non-institutionalized population aged 12 years or older) are covered, leaving only about 5.6 to 6.7 million people who are not. While the special populations considered constitute a large majority of those not covered, the relative size of the total non-covered population is still so small in relation to the total population that is covered that, no matter how much higher the prevalence rates are for these special populations, their impact on overall estimates of population prevalence--either for trauma or PTSD—will in fact be quite modest.

However, it is important to note that, even a 1% increase in prevalence of lifetime PTSD in the U.S. with a total (covered) population of 269 million yields 2.69 million additional people. And, increasing our capacity to provide specific, reliable and comparable estimates for several of these groups not currently covered could still have a significant value beyond their impact on overall national estimates, making a major contribution to the generation of comprehensive mental health statistics and tracking the mental health status of the U.S population. Moreover, although the potential barriers of doing so may be formidable, the technical feasibility of including some of these special populations in a NSDUH does not appear to be entirely

unresolvable, and some other methodological approaches to generate these statistics also merit some additional thought.

There are also some additional limitations in this research paper worth noting. One is the limited attention given to the potential impact of population coverage on estimated rates of exposure to potentially traumatic events (PTEs), due to some significant limitations noted in the research literature from the special populations on these issues relative to those focused on general populations in the national surveys. These limitations will likely be resolved as this literature continues to expand and mature; but this would not change the basic conclusions on the impact of coverage on national estimates of the prevalence of trauma.

Not discussed at all, however, is—aside from estimates of prevalence—whether there is any potential impact on analyses aimed at understanding relationships and associations between trauma and PTSD, as well as between PTSD, mental health, and substance abuse. That is, although estimates of trauma and PTSD prevalence would not change much, their relationships between each other, and in turn with other key measures of behavioral health, might be quite different within these special populations than within populations covered by national surveys. In principle, the same questions could be asked about differences in the nature and strength of relationships between population segments that are covered by these surveys, although in most cases, the sizes of these population subgroups would be (or oversampled to be) large enough to examine such differences. The difference is that, while examining potential differences in such relationships might be especially important in these special populations (given their higher levels of exposure to trauma and PTSD), even if these special populations were included in a national survey, their numbers would likely be too small to conduct statistically reliable analyses of these relationships both within these groups and comparisons to other subgroups. Unless these groups were oversampled relative to their numbers, targeted studies of these special populations would more likely be required to support such analyses.

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