Children and Youth Services Review 91 (2018) 259–262

Contents lists available at ScienceDirect

Children and Youth Services Review

journal homepage: www.elsevier.com/locate/childyouth

Behavioral risk factor surveillance system state survey on exposure to adverse childhood experiences (ACEs): Who declines to respond?

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ARTICLE INFO

Keywords:
Health surveys
Behavioral risk factor surveillance system
Surveys
Adverse childhood experiences

ABSTRACT

Background: A wealth of research has examined the prevalence and impact of adverse childhood experiences (ACEs) via various research methodologies. Some of these studies have also examined the presence of non-response bias, showing minimal nonresponse bias effects. More recently, many states and the District of Columbia have used the Behavioral Risk Factor Surveillance System (BRFSS) to examine ACEs, however, limited research exists on the impact of nonresponse bias in ACE studies using the BRFSS.

Methods: This study used data from the 2014–2015 South Carolina BRFSS to examine nonresponse bias to the ACE module.

Results: Significant differences between responders and non-responders were found for sex, age, race/ethnicity, education, income, and rurality. Findings indicate that marginalized populations were more likely to be under-represented in ACE survey data because of nonresponse, potentially limiting targeted prevention and intervention efforts.

Conclusion: Future research should examine differences in health and social outcomes between responders and non-responders to the ACE module in the BRFSS and ways to increase responses from marginalized groups.

1. Introduction

Adverse childhood experiences (ACEs) are stressful or traumatic events that occur in a child's family or social environment that cause harm or distress (Felitti et al., 1998). ACEs have been associated with negative health and well-being outcomes as an adult, including an increase in the likelihood of developing certain physical and psychological health conditions, potential engagement in risky behaviors, and greater healthcare utilization (Anda et al., 2006; Crouch, Strompolis, Bennett, Morse, & Radcliff, 2017; Felitti et al., 1998). For example, ACEs have also been associated with increased risk of chronic disease, cancer, and depression and anxiety (Brown et al., 2009; Brown et al., 2010; Chapman et al., 2004; Chapman et al., 2013; Dube et al., 2003; Gilbert et al., 2015). These effects are likely the result of toxic stress, which is the prolonged activation of the body's stress system (Shonkoff, Boyce, & McEwen, 2009; Shonkoff & Garner, 2012). Therefore, ACEs come with a heavy economic toll for society (Fang, Brown, Florence, & Mercy, 2012).

To inform prevention and intervention efforts, numerous studies have replicated the ACE survey questions in various study populations. Yet, since the initial ACE study, researchers have been concerned about the potential for nonresponse bias due to the length of the ACE Study questionnaire and the sensitive nature of some of the questions. In the original ACE study, non-respondent bias was investigated by comparing information from the previously collected standardized medical histories of those who returned the mailed ACE Study questionnaire and those who had not responded after the questionnaire had been mailed twice (Felitti et al., 1998)The overall response rate to the original ACE Study was quite high (70.5%), and differences between respondents and non-respondents were minimal. Respondents were, however, older, more likely to be white, and slightly more likely to answer “yes” to a question about childhood sexual abuse than non-respondents (Dube, Anda, Felitti, Edwards, & Croft, 2002).

Additional ACE studies have expressed concerns about bias from nonresponse, with mixed results from further investigation. In a study of the association between tender points in arthritis, psychological distress, and ACEs, researchers found that, compared to those who completed both the interview and the ACE questionnaire, those who did not complete the interview were not significantly different in terms of self-reported health or ACEs, but were more likely to report a lower level of self-care (Mcbeth, Macfarlane, Benjamin, Morris, & Silman, 1999). Bias resulting from nonparticipation would thus lead to an

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https://doi.org/10.1016/j.childyouth.2018.06.024
Received 24 April 2018; Received in revised form 20 June 2018; Accepted 20 June 2018
Available online 22 June 2018
0190-7409/

underestimate of observed associations. A study of the association between ACEs and social services use by university students reported a response rate of 18.6% (72.7% female, 27.2% male), from which they inferred "obvious non-response bias" despite finding ACE scores comparable to American college-educated populations and similar response rates as other online surveys with similar populations (Mcgavock & Spratt, 2014). There are numerous reasons for non-response, including reluctance to answer sensitive questions, method of survey administration, and willingness to respond from marginalized groups.

In the presence of nonresponse bias, generalizability of the survey data is limited, and biased estimation of population characteristics is possible, potentially leading to misunderstanding health phenomena and misdirected policy efforts (Berg, 2005). When reasons for study (non) participation are associated with the epidemiologic/health area of interest, nonresponse bias makes it more difficult to obtain survey samples that are generalizable to the whole population (Galea & Tracy, 2007). As nonresponse rates increase in household surveys, nonresponse bias studies become increasingly important (US Centers for Disease Control and Prevention, 2014).

Since 2009, a total of thirty-two states and the District of Columbia have collected ACE data for at least one year through the Behavioral Risk Factor Surveillance System (BRFSS) (Prevention, US Centers for Disease Control, 2015). However, the literature lacks studies on individuals who decline to respond to the BRFSS ACE questionnaire. This study will examine the distribution of sociodemographic variables among respondents and non-respondents to the ACE module of questions associated with the South Carolina (SC) BFRSS survey. Based on previous literature, we expect to find significant differences in response by race and ethnicity, age, and gender as well as by age and educational level (Dube et al., 2002; Mcgavock & Spratt, 2014). Findings can potentially identify populations under-represented in the ACE exposure.

2. Methods

This study utilized data from the 2014–2015 South Carolina Behavioral Risk Factor Surveillance System (BRFSS). The BRFSS is a cross-sectional, telephone-based survey of health-related risk behaviors, preventative behaviors, and history of chronic health conditions (US Centers for Disease Control and Prevention, 2014). The survey was developed by CDC to gather information on health risk behaviors at the state level. In South Carolina, the BRFSS is managed by the South Carolina Department of Health and Environmental Control (SCDHEC) and is run by the University of South Carolina's Institute of Public Service and Policy Research. The survey is conducted daily, by landline and cell phone, of adults who are eighteen years or older and non-institutionalized (Morse, Strompolis, Priester, & Srivastav, 2017). All respondents, both by landline and cellphone, receive the same survey, including the optional modules. In 2014, there were 11,027 respondents; in 2015, 11,607 respondents. Our sample was further restricted to those that had complete interviews for the core survey; in 2014, there were 10,080 respondents; in 2015, 10,277 respondents.

Children's Trust of South Carolina, a nonprofit organization focused on the prevention of child abuse and neglect, partnered with SCDHEC to supplement the SC BRFSS with eleven additional questions to determine ACE exposure among SC respondents (Morse et al., 2017). Every respondent is asked the ACE module at the end of the survey due to the sensitive nature of the questions. Survey respondents who did not answer any of the ACE questions were considered non-responders. Respondents who may not wish to answer an ACE question can answer "don't know/refused" and are coded as responding to the question. These eleven questions are located in Table 1 and focus on childhood experiences of household dysfunction (household mental illness, substance use/misuse, incarceration, and parental separation/divorce), emotional and physical abuse (witnessing household violence and experiencing physical abuse), and sexual abuse.

Nonresponse bias can be assessed in numerous ways (Groves, 2006). One of the most common forms of assessment includes comparing response rates across subgroups. In this case, respondent and non-respondent distributions are compared along various subgroup variables of the target population (e.g., race, age, SES). If response rates are similar across subgroups, it's assumed that there may be evidence of nonresponse bias (as long as the subgroup variables are the only possible causes of response bias; however, bias may be existing similarly across subgroups). If rates are dissimilar, post-collection statistical adjustments can be made (e.g., weighting, multiple imputation) to reduce bias in population estimates resulting from nonresponse probabilities (Bethlehem, 1988).

Sociodemographic variables investigated include sex, age, race/ethnicity, educational attainment, income, and rurality. Age was categorized into six groups for interpretability and comparison to previous research: 18 to 29, 30 to 39, 40 to 49, 50 to 59, 60 to 69, and 70 to 80. Race was divided into four categories: Non-Hispanic White, Non-Hispanic African-American, Hispanic, and "Other" Non-Hispanic. Education was divided into those with less than or equal to high school degree/GED and those with at least some college. The BRFSS data on income was collected in categories and thus reported similarly as those making: less than $25,000, $25,000 to $49,999, and $50,000 or more. Lastly, rurality was measured using the county to classify respondents as living in a rural or urban area. Rural counties included Micropolitan (UICs 3,5,8), small adjacent (UICs 4,6,7), and remote rural (UICs 9,10, 11, 12) counties. Urban counties included Metropolitan counties (UICs 1,2).

Differences among sociodemographic variables between respondents and non-respondents were examined using chi-square tests with $\alpha = 0.01$, in order to minimize the possibility that due to a large sample size, trivial differences will yield significant results. In order to account for the sampling strategy, sampling weights were used, and analyses were conducted with statistical software (SAS, version 9.3; SAS Institute Inc.). The [blinded for review]'s institutional review board approved this study as exempt.

3. Results

Our study sample was comprised of 18,472 adults who responded to the SC BRFSS survey in 2014 and 2015. Survey results were calculated on values weighted according to CDC guidelines and are thus presented only as percentages; results are shown in Table 2. The study sample was 52.1% female, 66.6% non-Hispanic white, and 26.4% non-Hispanic black. Just over 37% of the sample was under the age of 40, 35.3% of the sample was between the ages of 40 and 59, and 27.3% was between the ages of 60 and 79. Over half of the sample had at least some college education (55.0%); 28.0% had a yearly income of less than $25,000 and 35.1% reported a yearly income of $50,000, with 13.3% not reporting income. Rural residents made up 16.0% of the study sample. Among all those completing the SC BRFSS survey, 90.2% also agreed to complete the 11-question ACE module (responders). Nearly 10% (9.8%) declined to answer the ACE module (non-responders).

Comparing responders to non-responders, we found significant differences in each of the demographic categories. A higher percentage of males were non-responders than females. A higher percentage of individuals below 40 years of age or between 50 and 59 were non-responders, compared to those in their forties or 60 years of age and older. A higher percentage of non-Hispanic blacks were non-responders when compared the other racial and ethnic groups. Those with a high school diploma or less or earning less than $25,000 yearly had higher percentages of non-responders when compared to those reporting a higher income or more education. Finally, rural residents had a higher percentage of non-responders than urban residents.

4. Discussion

Many states have collected ACE data via the BRFSS. The data