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Adverse Childhood Experiences Module Nonresponse: Behavioral Risk Factor Surveillance System, 2019 and 2021

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Abstract

Introduction: Data on adverse childhood experiences are key to understanding their burden and informing prevention programs and strategies. Population-based surveys that collect adverse childhood experiences data may be affected by item nonresponse. This study examines differences in nonresponse to the optional Behavioral Risk Factor Surveillance System adverse childhood experiences module overall, by sociodemographic characteristics, by year, and by question.

Methods: This study used Behavioral Risk Factor Surveillance System adverse childhood experiences module data from 21 states in 2019 and 16 states in 2021. Weighted proportions and 95% CIs of responders and nonresponders to the adverse childhood experiences module by year and sociodemographic characteristics and percentages of nonresponders for each question were calculated. Chi-square tests were used to assess statistically significant ($p < 0.05$) differences. Analyses were conducted in 2023.

Results: In 2019 and 2021, 1.2% (95% CI=1.1, 1.4) and 2.4% (95% CI=2.2, 2.5) of Behavioral Risk Factor Surveillance System participants were nonresponders to the adverse childhood experiences module, respectively ($p < 0.01$). Nonresponders were more likely to be non-Hispanic Black ($p = 0.01$) or non-Hispanic Asian ($p = 0.01$), to be unemployed ($p < 0.01$), to have income

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SUPPLEMENTAL MATERIAL

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<\$15,000 ($p<0.01$), or to report poor health ($p<0.01$) than responders. Nonresponse by question increased as the module progressed, and nonresponse was highest for sexual abuse questions.

Conclusions: Overall, findings demonstrate that individuals are willing to respond to the adverse childhood experiences module questions. Although low, nonresponse to the module increased from 2019 to 2021. Higher nonresponse for sexual abuse questions may be due to their sensitivity or potential survey fatigue due to placement at the end of the module. Higher nonresponse among racial/ethnic minorities and economically disadvantaged groups highlights opportunities to improve existing surveillance systems.

INTRODUCTION

Adverse childhood experiences (ACEs)—preventable, potentially traumatic events, such as violence, abuse, and neglect, that occur during childhood—are associated with increased risk of adverse health and social consequences across the lifespan.^{1–5} ACEs can have a cumulative effect, with multiple adverse experiences putting individuals at greater risk for poor health outcomes.^{1,3,6,7} In the U.S., ACEs are common, with nearly 2 in 3 adults reporting at least 1 ACE and 1 in 6 adults reporting 4 or more ACEs.⁸ There are disparities in ACEs, with some groups experiencing higher rates.^{3,8,9}

Surveys and surveillance systems have been essential in assessing the magnitude of ACEs. The original Centers for Disease Control and Prevention (CDC)-Kaiser ACE study established ACEs as a concept, defined measurement, and examined the association between ACEs and health outcomes; subsequently, many instruments used in ACEs research and surveillance systems to date have been adapted from this study.^{10–12} One such surveillance system is the Behavioral Risk Factor Surveillance System (BRFSS)'s ACEs module. Since 2009, the BRFSS ACEs Module has provided key data to measure the prevalence of ACEs among the U.S. adult population, to understand the relationship between ACEs and health consequences and behaviors later in life, and to inform the development of ACEs prevention strategies.¹⁰

BRFSS is a cross-sectional state-based telephone survey that collects data in all U.S. states, the District of Columbia, and 3 U.S. territories. BRFSS collects a range of self-reported information from non-institutionalized U.S. adults aged ≥ 18 years regarding chronic health conditions, health behaviors, and the use of preventive services.¹³ The BRFSS ACEs Module collects information on an individual's exposure to abuse (emotional, physical, or sexual), neglect (emotional or physical), and household challenges (witnessing intimate partner violence, substance abuse in the household, mental illness in the household, or parental separation or divorce) during childhood (before the age of 18 years).¹⁴ In BRFSS, ACE questions were added either as an optional CDC module (2011–2012 and 2019 and onward) or as a state-added module (2013–2018).⁸ As a CDC-sponsored optional module, ACE questions are standardized, and states can choose to implement the entire module without modification. In state-added modules, by contrast, states can change the number, composition, and the language of ACE questions. Since 2009, all 50 states and the District of Columbia have included the ACEs module in their survey at least once, as either a

CDC-sponsored optional module or state-added module, with many states including it for multiple years.¹⁰

Although the BRFSS ACEs data provide a wealth of information across states related to ACEs, declining response rates to BRFSS (e.g., 2016 median response rate: 47.1%; 2021 median response rate: 44.0%) may have implications for ACEs data.^{15,16} In addition, item nonresponse (nonresponse to particular questions) can have implications for data quality, especially given the potential for nonresponse bias.^{17–19} Furthermore, nonresponse can impact the representativeness of data and estimates of the health behavior or topic assessed.¹⁷ Previous studies examining nonresponse within BRFSS, including optional modules, have found differences in sociodemographic characteristics between responders and nonresponders.^{18,20–24} In an analysis of individuals who declined to answer questions in the BRFSS Firearm Safety Module, men (compared with women) and White respondents (compared with Hispanic respondents) were more likely to refuse firearm-related questions.²¹ In studies examining nonresponse to the BRFSS ACEs Module, there were significant demographic differences between responders and nonresponders, with some groups (e.g., non-Hispanic Blacks, Asians, rural residents, those with riskier health behaviors, individuals with lower income) more likely to be nonresponders.^{22,24} These studies underline that the underrepresentation of certain groups may bias estimates of the ACEs burden among U.S. adults and, thus, have important implications for the response activities to address the lasting impacts of ACEs.^{22,24}

To further understand nonresponse to the ACEs module to improve measurement of ACEs and related outcomes, this study builds upon previous research to understand sociodemographic characteristics of the participants across multiple states who did and did not respond to the ACEs module and to assess whether there were differences by year and question.

METHODS

Study Population

Data from 21 states that included the optional BRFSS ACEs Module in 2019 (Alabama, Delaware, Florida, Indiana, Iowa, Michigan, Mississippi, Missouri, New Mexico, North Dakota, Pennsylvania, Rhode Island, South Carolina, Tennessee, Virginia, West Virginia, Wisconsin, Ohio, Kansas, Oklahoma, and New York) and 16 states in 2021 (Alabama, Arkansas, Iowa, Mississippi, Nevada, New Hampshire, North Dakota, Oregon, South Carolina, Virginia, Wisconsin, Kansas, Maine, New York, Ohio, and New Jersey), with 10 states including the module for both years, were analyzed. This study sought to examine nonresponse patterns across multiple years; given the coronavirus disease 2019 (COVID-19) pandemic's disruptive impact on society and public health in 2020, 2019 and 2021 were examined. When assessing nonresponse to the ACEs module, participants who partially completed the BRFSS survey and were assigned a partially complete disposition code from the analysis ($n=23,048$ in 2019 and $n=17,590$ in 2021) were excluded, because they were not necessarily introduced to the ACEs module and given a chance to respond. In addition, 52 individuals who took a survey in a state they did not live in were excluded. Therefore, for the ACEs module analysis, the analytic sample size was 126,753 (84.6% of the total sample)

in 2019 and 92,238 (83.9% of the total sample) in 2021 (Figure 1). BRFSS datasets are deidentified and publicly available; therefore, this study did not require IRB approval.

Measures

Because the ACEs module was updated in 2021 to include 2 neglect-related questions, responses to the 11 questions present in both 2019 and 2021 were compared. These questions represent 8 ACEs domains: mental illness in the household, household substance abuse, incarcerated household member, parents separated or divorced, witnessed intimate partner violence, witnessed physical abuse, witnessed emotional abuse, and witnessed sexual abuse (Appendix Table 1, available online).

To assess the nonresponse by ACE question, those who provided a response, including *don't know*, to the specific ACE question were categorized as a responder to that question. Nonresponders included those who (1) refused to answer the question, (2) completed their interviews but not the question, or (3) answered other module questions but not the question being assessed.

Individuals were also categorized as responders or nonresponders to the entire ACEs module. Responders included those who provided a response, including *don't know*, to questions for at least 5 of 8 ACE domains (Appendix Table 1, available online). Nonresponders were those who skipped questions for ≥ 4 ACE domains. In addition, individuals were categorized as complete responders (responded to all ACE questions), partial responders (answered questions for 5–7 ACE domains), partial nonresponders (skipped questions for ≥ 4 ACE domains), and complete nonresponders (skipped all ACE questions). These domain cut offs were used because those who skipped questions for ≥ 4 ACE domains did not respond to at least half of the unique domains of adversity assessed.

All BRFSS participants, ACEs responders, and non-responders were compared on self-reported sociodemographic characteristics: sex (male, female), age (18–24, 25–34, 35–44, 45–54, 55–64, ≥ 65 years), race/ethnicity (non-Hispanic White, non-Hispanic Black, non-Hispanic American Indian or Alaskan Native, non-Hispanic Asian, non-Hispanic Native Hawaiian or other Pacific Islander, Hispanic, non-Hispanic other race, and non-Hispanic multiracial), education (less than high school, high school graduate, some college, college graduate), income (<\$15,000; \$15,000–\$24,999; \$25,000–\$34,999; \$35,000–\$49,999; $\geq$ \$50,000), employment (employed, not employed), sexual orientation (straight or sexual minority [i.e., gay/lesbian, bisexual, and other]), and self-reported health status (excellent, very good, good, fair, poor). Sexual orientation data are presented for states that included the optional Sexual Orientation and Gender Identity Module ($n=13$ in 2019; $n=9$ in 2021).

Survey length was included for states for which copies of the questionnaire were available ($n=19$ in 2019; $n=13$ in 2021). Survey length (<15 modules, 15–20 modules, >20 modules) specifies how many state-added and optional modules were included in the survey.

Statistical Analysis

Weighted proportions and corresponding 95% CIs were calculated for responders and nonresponders to the entire ACEs module by year and sociodemographic characteristics

and percentages of nonresponders for each question. Chi-square testing was used to assess statistically significant ($p<0.05$) differences in sociodemographic characteristics between nonresponders and responders, types of responders and nonresponders by year, and percentage of nonresponders for each question by year. Consistent with the National Center for Health Statistics standards, estimates were suppressed where the unweighted numerator was <10 , absolute CI width was $\geq 30\%$, or absolute CI width is between 5% and 30% and relative CI width was $>130\%$.²⁵ The analyses were conducted in 2023.

Supplemental descriptive analyses were conducted to assess proportions of responders and nonresponders for each state and differences in sociodemographic characteristics (sex, age, race/ethnicity, education, income, employment, sexual orientation, and self-reported health status). A sensitivity analysis of nonresponse was also conducted, restricting to the 10 states included in both years, to evaluate the role of differential inclusion of different states. In addition, survey break off was calculated by question, which was defined as those who responded to the previous questions but missing or refused for the question being assessed and the remainder of the module questions. All analyses accounted for the complex sampling design of BRFSS and were conducted using SAS, Version 9.4.

RESULTS

The analytic sample size was 126,753 in 2019 and 92,238 in 2021. An estimated 1.2% (95% CI=1.1, 1.4) and 2.4% (95% CI=2.2, 2.5) of BRFSS participants were nonresponders to the ACEs module in 2019 and 2021, respectively, a statistically significant difference ($p<.0001$) (Table 1). In 2019, nonresponders were more likely to be aged 18–24 years (16.0% vs 11.6%, $p=0.03$), be non-Hispanic Black (18.1% vs 12.7%, $p=0.01$), and be non-Hispanic Asian (5.9% vs 2.8%, $p=0.01$); have less than a high school education (20.4% vs 11.7%, $p<0.01$); have income $<\$15,000$ (17.0% vs 9.1%, $p<0.01$); be unemployed (53.0% vs 44.3%, $p<0.01$); or rate their health poor (9.7% vs 5.0%, $p<0.01$) than responders. Furthermore, in 2019, responders were significantly more likely to take a survey with fewer than 15 modules (43.0%) than nonresponders (35.9%, $p<0.01$). In 2021, a significantly greater proportion of nonresponders were male (52.7% vs 47.9%, $p=0.01$), were aged 45–54 years (20.1% vs 15.2%, $p<0.01$), were non-Hispanic Black (16.2% vs 13.0%, $p=0.04$), had less than a high school education (13.4% vs 10.6%, $p=0.04$), had an income of $\$25,000$ – $\$34,999$ (17.3% vs 12.6%, $p<0.01$), or had an income of $\$35,000$ – $\$49,999$ (17.7% vs 13.4%, $p=0.01$) than respondents.

For both years, the patterns in the type of responder and nonresponder were similar, with most individuals—96.3% in 2019 and 94.5% in 2021—being complete responders to the ACEs module (Table 2). However, there was a significant increase in nonresponse from 2019 to 2021, with individuals more likely to be partial (2019, 0.5%; 2021, 1.0%; $p<0.001$) or complete (2019, 0.7%; 2021, 1.4%; $p<0.001$) nonresponders in 2021 than in 2019. Furthermore, when comparing module questions, nonresponse increased as the module progressed (Figure 2). Although the percentage of nonresponders by question was higher in 2021 (ranged from 2.0% to 3.8%) than in 2019 (ranged from 0.9% to 2.5%), for both years, the nonresponses were highest for sexual abuse questions, which occur toward the end of the module (Appendix Table 2).

There was variability in nonresponse across states, ranging from 0.5% in West Virginia to 8.1% in Nevada (Appendix Table 3, available online). When examining the characteristics of responders and nonresponders by state, in some instances (e.g., sex in Indiana), the differences exceeded 10 percentage points. At the same time, this absolute difference did not translate into statistically significant differences owing to small cell sizes for nonresponders. For states that were included in both years, an estimated 1.3% (95% CI=1.1, 1.6) and 1.9% (95% CI=1.7, 2.1) of individuals were nonresponders to the ACEs module in 2019 and 2021, respectively. The proportion of participants who were break offs in response to ACE module questions was small (Appendix Table 4, available online). However, 2 questions on sexual abuse had the highest percentage of break offs (touched sexually: 0.5%; forced to have sex: 0.2%).

DISCUSSION

Across states and years, nonresponse for the BRFSS ACEs Module was low, at both the item and module level, suggesting that adults are willing to respond to questions assessing ACEs, consistent with findings of previous studies.^{22,26,27} Furthermore, individuals were most likely to respond to the complete ACEs module rather than partially responding or not responding to the module, pointing to the acceptability of the module questions among BRFSS participants. Notably, from 2019 to 2021, the percentage of nonresponders approximately doubled, which may reflect overall declines in response to the BRFSS survey.

There are important sociodemographic differences between responders and nonresponders. Although the BRFSS weighting helps to adjust for nonrepresentative participation in the survey overall, the weighting does not necessarily adjust for item nonresponse and break offs for optional modules.²³ For both years, participants who were non-Hispanic Black and had less than a high school education were significantly more likely to be nonresponders, which is consistent with the finding of Crouch et al.²² The BRFSS ACEs Module was adapted from the original CDC-Kaiser ACE study, which assessed ACEs most relevant to a White, middle-class community.^{10,11} Participants could have chosen not to respond to specific questions because they may have felt that it was irrelevant,²⁸ or they may have been more likely to experience ACEs and upset by the sensitive questions. The inclusion of expanded ACE questions,²⁹ which capture additional constructs of childhood adversity, may have more relevancy to diverse populations and potentially increase response. Furthermore, in 2021, nonresponders were more likely to be male than female. The sensitivity of the questions, particularly related to sexual abuse, could have potentially led to item nonresponse among males.^{12,30,31} In 2019, individuals who rated their health poor were almost twice as likely to be nonresponders as to be responders, indicating a possible self-selection bias among people with poor health. Grigsby and colleagues²⁴ also found that individuals rating their health fair or poor and those with different health conditions (e.g., depression, diabetes) were more likely to decline to respond to ACE items. Given that ACEs are a risk factor for poor health outcomes, higher nonresponse to ACE questions among individuals rating their health as poor may result in underestimation of the ACEs burden.¹ In 2021, nonresponders were older, had higher education and income, and were more likely to be employed than in 2019. Future research may be warranted to investigate the changing demographic patterns of nonresponders to determine whether this is consistent

across all ACE questions and other questionnaire modules and how these demographic patterns changed in the context of the COVID-19 pandemic.

When examining nonresponse by question, for both years, nonresponse increased as the module progressed, resulting in sexual abuse questions, which are located near the end of the survey, having the highest nonresponse. The sensitivity of these questions may have further contributed to item nonresponse, as indicated by higher break-off rates and corroborated by previous studies.^{32,33} In addition, in 2019, a significantly greater proportion of participants who took a shorter BRFSS survey (<15 modules) were more likely to be responders. However, it is unclear whether the comparatively high levels of nonresponse and break offs for these questions are due to their sensitivity or being later in the survey or both. Previous studies examining break off in BRFSS found that survey break off often occurred at the end of the survey after the core questionnaire.^{17,34} These findings may suggest participant survey fatigue, which warrants additional investigation.

Assessing the magnitude of ACEs is essential for informing the development of ACEs prevention and response activities. For this study, 1 form of nonresponse to ACE questions was examined, item nonresponse, which could potentially lead to biased estimates. Although item nonresponse does not automatically result in biased estimates, strategies to address nonresponse in existing surveillance systems can improve estimates of ACEs burden. For instance, placing the ACEs module earlier in the BRFSS survey may improve response to ACE questions and address potential survey fatigue at the time they are asked. However, although cumulative break off during the ACEs module is low, it may be higher than that in other modules, which could have implications for other survey sections if the ACEs module is moved earlier. Furthermore, adding text to the beginning of the module to describe the purpose of sensitive questions may improve participants' willingness to answer sensitive ACE questions. In addition, findings provide insight into understanding how to interpret missing data in the context of nonresponse and sociodemographic of nonresponse. Regarding unacceptability of questions, a qualitative study among nonrespondents could be conducted to examine why individuals are not responding to ACE questions or dropping off. Nevertheless, for researchers and public health professionals considering adding ACE questions to surveys and surveillance systems, findings indicate that respondents are willing to answer ACE questions, and asking such questions in surveys are likely to be acceptable to most survey participants. The favorable BRFSS response rates compared with those in similar surveys¹⁶ and the overall low nonresponse to the ACEs module highlight the usefulness of the BRFSS ACEs Module in providing information about ACEs in the U.S.

Limitations

This study has several limitations. First, findings may not be generalizable beyond the states included. Second, recall bias among adults reporting on their childhood experiences is well documented in previous studies, which could potentially lead to them declining to answer questions.^{12,35} Third, for some racial/ethnic and sexual minority groups, the data were insufficient in some instances to present results stratified by response or nonresponse. This limited the ability to examine the extent to which these groups do not respond to ACE questions. Fourth, BRFSS is administered at the state level, so any state differences could be

due to state-resident composition. Finally, 2 years of ACEs data were examined, which limit the ability to detect any trends or patterns of nonresponse to the module beyond these years or distinguish potential reasons for differences between these 2 years.

CONCLUSIONS

Although nonresponse to the ACEs module was overall low, there was an estimated overall increase in nonresponse from 2019 to 2021, with substantial differences across sociodemographic groups. Among ACE questions, the highest nonresponse was documented for sexual abuse questions, either hinting at sensitivity to those questions or indicating their proximity to the end of the module. Strategies to address nonresponse, for example, adding the ACEs module earlier in the BRFSS survey or as part of the core questionnaire, could improve the quality and representativeness of ACEs data. Overall, findings demonstrate that individuals are willing to respond to the ACEs module questions, highlighting the importance of the BRFSS ACEs module in measuring their burden in the U.S.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Disclaimers:

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

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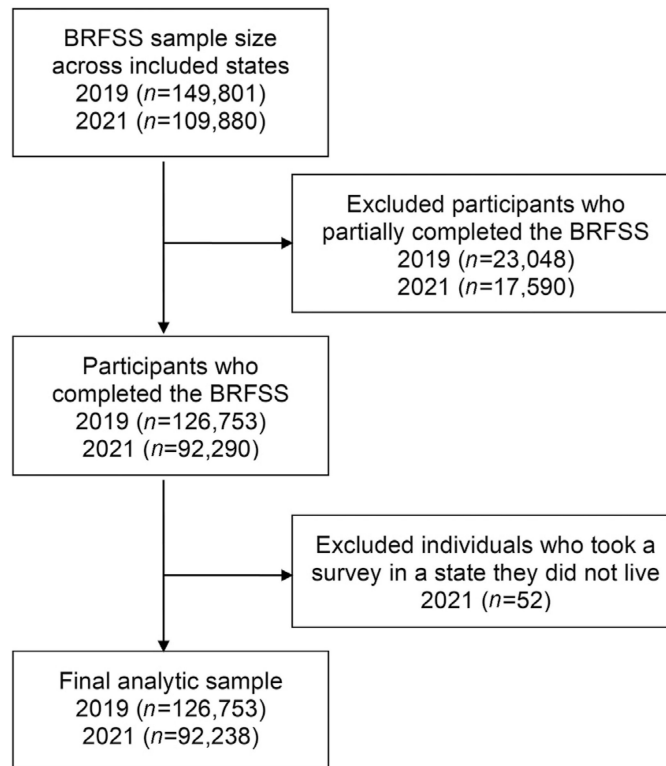


Figure 1.
Flow chart of final analytic sample.
BRFSS, Behavioral Risk Factor Surveillance System.

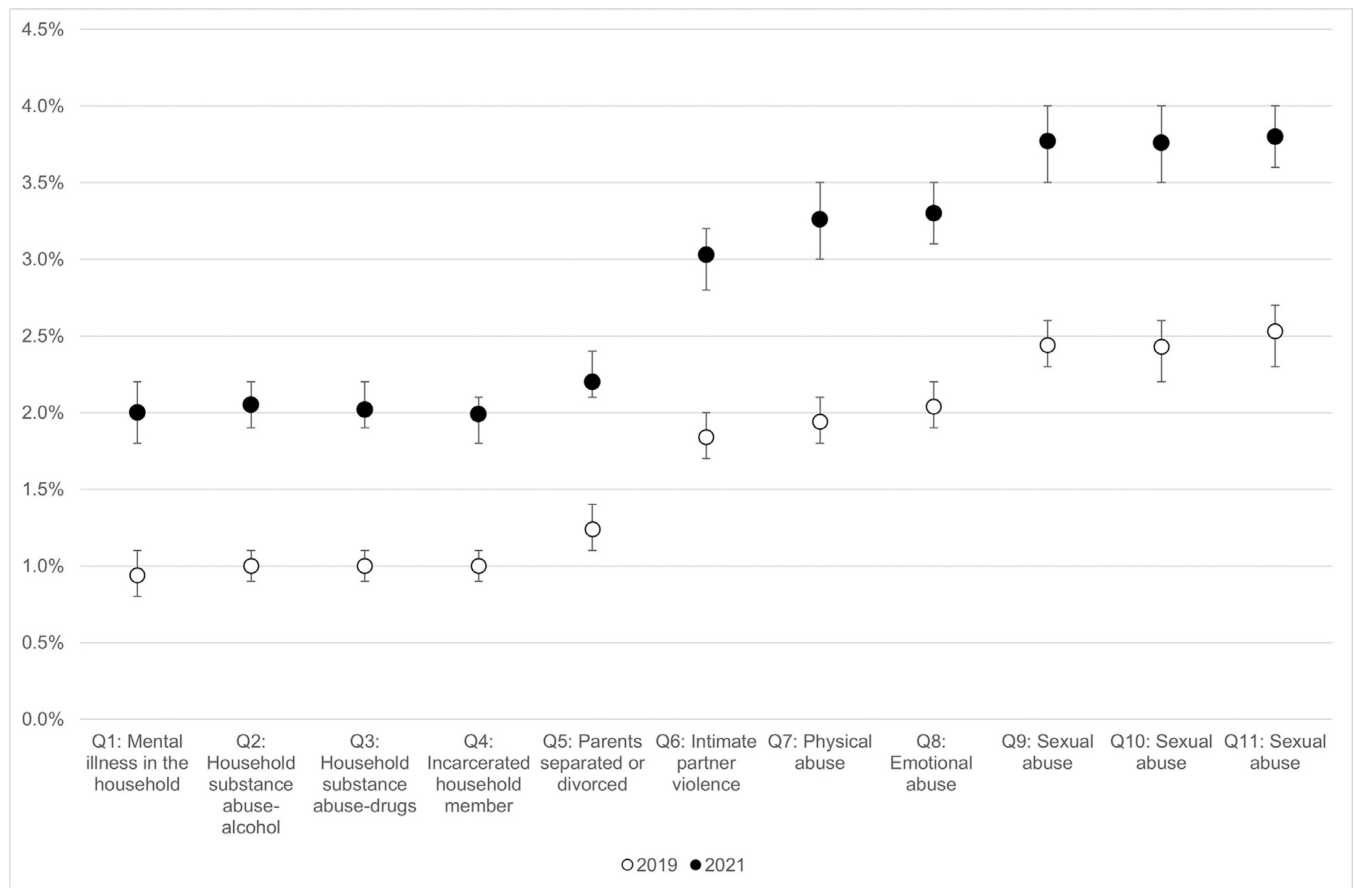


Figure 2.

Percentage of nonrespondents^a by BRFSS ACEs Module question by year, 2019 and 2021^b

All differences are significant at $p < 0.0001$.

^aNonresponders included those who refused to answer the question, those who completed their interviews but not the question, or those who answered other module questions but not the question being assessed.

^bThe 2019 states included Alabama, Delaware, Florida, Indiana, Iowa, Michigan, Mississippi, Missouri, New Mexico, North Dakota, Pennsylvania, Rhode Island, South Carolina, Tennessee, Virginia, West Virginia, Wisconsin, Ohio, Kansas, Oklahoma, and New York and 2021 states included Alabama, Arkansas, Iowa, Mississippi, Nevada, New Hampshire, North Dakota, Oregon, South Carolina, Virginia, Wisconsin, Kansas, Maine, New York, Ohio, and New Jersey.

ACE, adverse childhood experience; BRFSS, Behavioral Risk Factor Surveillance System; Q, question.

Table 1.

Characteristics of BRFSS Respondents and ACEs Module Respondents and Nonrespondents by Year, 2019 and 2021^a

Characteristic	Weighted % (95% CI)					
	2019			2021		
	BRFSS (n=149,801)	ACEs module nonresponder ^b (n=1,221)	ACEs module responder ^c (n=125,532)	BRFSS (n=109,880)	ACEs module nonresponder ^b (n=1,916)	ACEs module responder ^c (n=90,322)
Total	100.0	1.2 (1.1, 1.4)	98.8 (98.6, 98.9)	100.0	2.4 (2.2, 2.5)	97.6 (97.5, 97.8)
Sex						
Male	48.5 (48.0, 49.0)	47.9 (42.4, 53.3)	48.0 (47.5, 48.6)	48.5 (47.9, 49.0)	52.7 (48.8, 56.5)	47.9 (47.2, 48.5)
Female	51.5 (51.1, 52.0)	52.1 (46.7, 57.6)	52.0 (51.4, 52.5)	51.5 (51.0, 52.1)	47.3 (43.5, 51.2)	52.1 (51.5, 52.8)
Age group, years						
18–24	12.0 (11.6, 12.3)	16.0 (11.5, 20.5)	11.6 (11.1, 12.0)	11.7 (11.2, 12.1)	9.5 (7.0, 12.0)	11.4 (10.9, 11.9)
25–34	16.7 (16.3, 17.1)	18.5 (13.7, 23.2)	15.4 (15.0, 15.9)	16.8 (16.4, 17.3)	17.7 (14.5, 20.8)	16.1 (15.6, 16.6)
35–44	15.5 (15.2, 15.9)	12.0 (8.6, 15.5)	15.2 (14.8, 15.6)	16.0 (15.6, 16.4)	17.7 (14.5, 20.8)	15.6 (15.2, 16.1)
45–54	15.8 (15.5, 16.2)	14.8 (11.5, 18.0)	15.9 (15.6, 16.3)	15.5 (15.1, 15.9)	20.1 (17.0, 23.2)	15.2 (14.8, 15.6)
55–64	17.0 (16.7, 17.4)	14.8 (11.9, 17.7)	17.8 (17.4, 18.2)	16.8 (16.4, 17.2)	14.8 (12.3, 17.3)	17.3 (16.9, 17.8)
≥65	23.0 (22.6, 23.3)	24.0 (19.0, 28.9)	24.1 (23.7, 24.4)	23.1 (22.8, 23.5)	20.3 (17.6, 23.1)	24.4 (23.9, 24.8)
Race/ethnicity						
Non-Hispanic White	69.2 (68.7, 69.7)	61.3 (55.7, 66.9)	71.4 (70.9, 71.9)	67.5 (66.9, 68.0)	62.3 (58.1, 66.5)	68.9 (68.3, 69.5)
Non-Hispanic Black	13.4 (13.0, 13.7)	18.1 (13.6, 22.5)	12.7 (12.3, 13.1)	13.6 (13.2, 14.0)	16.2 (12.9, 19.6)	13.0 (12.6, 13.5)
Non-Hispanic AI/AN	1.3 (1.2, 1.4)	2.0 (0.9, 3.1)	1.2 (1.1, 1.4)	0.9 (0.8, 1.1)	1.2 (0.1, 2.3)	0.9 (0.8, 1.1)
Non-Hispanic Asian	3.1 (2.8, 3.3)	5.9 (2.5, 9.4)	2.8 (2.5, 3.0)	4.8 (4.5, 5.2)	5.7 (3.2, 8.2)	4.6 (4.2, 5.0)
Non-Hispanic NH/OPI	0.1 (0.1, 0.1)	NA ^e	0.1 (0.1, 0.1)	0.1 (0.1, 0.2)	NA ^e	0.1 (0.1, 0.1)
Hispanic	11.2 (10.8, 11.6)	10.0 (6.6, 13.3)	10.0 (9.6, 10.5)	11.1 (10.7, 11.5)	12.3 (9.3, 15.2)	10.6 (10.2, 11.0)
Non-Hispanic other race ^d	0.5 (0.5, 0.6)	1.0 (0.0, 2.2)	0.5 (0.4, 0.5)	0.7 (0.6, 0.8)	1.1 (0.4, 1.8)	0.7 (0.6, 0.8)
Non-Hispanic Multiracial	1.3 (1.2, 1.4)	1.5 (0.8, 2.2)	1.3 (1.2, 1.4)	1.2 (1.1, 1.2)	0.9 (0.4, 1.5)	1.2 (1.1, 1.3)
Education						
Less than high school	11.9 (11.5, 12.3)	20.4 (14.6, 26.1)	11.7 (11.3, 12.1)	11.0 (10.6, 11.4)	13.4 (10.4, 16.3)	10.6 (10.1, 11.0)
High school graduate	30.3 (29.9, 30.8)	31.0 (26.2, 35.8)	30.1 (29.6, 30.6)	28.6 (28.1, 29.1)	27.8 (24.4, 31.2)	28.1 (27.6, 28.7)
Some college	30.5 (30.0, 30.9)	28.3 (23.3, 33.3)	30.7 (30.2, 31.2)	29.9 (29.4, 30.4)	29.6 (26.0, 33.2)	30.2 (29.7, 30.8)

Characteristic	Weighted % (95% CI)					
	2019			2021		
	BRFSS (n=149,801)	ACEs module nonresponder ^b (n=1,221)	ACEs module responder ^c (n=125,532)	BRFSS (n=109,880)	ACEs module nonresponder ^b (n=1,916)	ACEs module responder ^c (n=90,322)
College graduate	27.3 (26.9, 27.7)	19.8 (16.1, 23.4)	27.4 (27.0, 27.8)	30.5 (30.0, 31.0)	27.9 (24.5, 31.3)	30.9 (30.4, 31.5)
Income						
<\$15,000	9.4 (9.0, 9.7)	17.0 (11.7, 22.3)	9.1 (8.7, 9.4)	6.7 (6.4, 7.0)	9.2 (6.0, 12.5)	6.5 (6.2, 6.9)
\$15,000–\$24,999	16.4 (16.0, 16.8)	17.4 (13.6, 21.3)	16.0 (15.6, 16.4)	10.8 (10.4, 11.2)	11.5 (8.4, 14.6)	10.6 (10.2, 11.0)
\$25,000–\$34,999	10.6 (10.2, 10.9)	12.8 (8.5, 17.1)	10.5 (10.2, 10.9)	12.9 (12.5, 13.3)	17.3 (13.7, 20.9)	12.6 (12.2, 13.0)
\$35,000–\$49,999	13.5 (13.1, 13.8)	8.9 (6.2, 11.7)	13.6 (13.2, 14.0)	13.5 (13.1, 13.9)	17.7 (14.0, 21.4)	13.4 (12.9, 13.8)
≥\$50,000	50.2 (49.7, 50.7)	43.8 (37.5, 50.1)	50.8 (50.2, 51.4)	56.1 (55.5, 56.7)	44.2 (39.5, 49.0)	56.9 (56.3, 57.6)
Employment ^f						
Employed	56.3 (55.8, 56.7)	47.0 (41.4, 52.6)	55.7 (55.2, 56.2)	57.0 (56.4, 57.5)	56.2 (52.4, 60.1)	56.2 (55.5, 56.8)
Not employed	43.7 (43.3, 44.2)	53.0 (47.4, 58.6)	44.3 (43.8, 44.8)	43.0 (42.5, 43.6)	43.8 (39.9, 47.7)	43.8 (43.2, 44.5)
Sexual orientation ^g						
Straight	93.2 (92.8, 93.6)	92.0 (85.9, 98.1)	93.2 (92.8, 93.6)	92.5 (92.0, 92.9)	92.9 (89.6, 96.2)	92.3 (91.9, 92.8)
Sexual minority	6.8 (6.4, 7.2)	NA ^e	6.8 (6.4, 7.2)	7.5 (7.1, 8.0)	7.1 (3.8, 10.4)	7.7 (7.2, 8.1)
Self-reported health status						
Excellent	16.6 (16.2, 17.0)	15.1 (11.6, 18.6)	16.0 (15.6, 16.4)	19.0 (18.5, 19.5)	18.0 (15.1, 21.0)	18.5 (17.9, 19.0)
Very good	31.9 (31.4, 32.3)	26.5 (20.9, 32.1)	32.2 (31.7, 32.7)	33.2 (32.7, 33.7)	31.4 (27.7, 35.2)	33.7 (33.1, 34.3)
Good	32.6 (32.1, 33.0)	32.6 (27.7, 37.5)	32.5 (32.0, 33.0)	31.8 (31.3, 32.3)	33.9 (30.2, 37.5)	31.7 (31.1, 32.3)
Fair	13.9 (13.6, 14.2)	16.1 (12.7, 19.5)	14.3 (13.9, 14.7)	12.1 (11.7, 12.4)	11.7 (9.5, 13.9)	12.2 (11.8, 12.6)
Poor	5.1 (4.9, 5.3)	9.7 (5.9, 13.5)	5.0 (4.8, 5.2)	3.9 (3.7, 4.2)	4.9 (3.3, 6.6)	3.9 (3.7, 4.2)
Length of survey ^h						
<15 modules	40.8 (40.5, 41.1)	35.9 (30.9, 40.9)	43.0 (42.7, 43.4)	17.3 (17.1, 17.5)	15.5 (12.9, 18.1)	17.0 (16.7, 17.2)
15–20 modules	41.4 (41.1, 41.7)	47.2 (40.9, 53.4)	42.2 (41.8, 42.6)	76.8 (76.5, 77.0)	77.4 (74.4, 80.3)	76.8 (76.5, 77.1)
>20 modules	17.8 (17.5, 18.1)	16.9 (12.8, 21.0)	14.8 (14.4, 15.1)	6.0 (5.9, 6.0)	7.2 (5.9, 8.4)	6.2 (6.1, 6.3)

Note: Boldfaces indicate statistical significance ($p<0.05$).

^aThe 2019 states included Alabama, Delaware, Florida, Indiana, Iowa, Michigan, Mississippi, Missouri, New Mexico, North Dakota, Pennsylvania, Rhode Island, South Carolina, Tennessee, Virginia, West Virginia, Wisconsin, Ohio, Kansas, Oklahoma, and New York, and 2021 states included Alabama, Arkansas, Iowa, Mississippi, Nevada, New Hampshire, North Dakota, Oregon, South Carolina, Virginia, Wisconsin, Kansas, Maine, New York, Ohio, and New Jersey.

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^b ACEs module nonrespondents were those who skipped questions for 4 or more ACE domains.

^c ACEs module respondents were those who answered questions for 5 or more ACE domains.

^d Includes those who self-reported race as other.

^e Unstable estimate (unweighted numerator is <10, absolute CI width is $\geq 30\%$, or the absolute CI width is $>5\%$ and $<30\%$, and the relative CI width is $>130\%$).

^f Employed includes those who are employed for wages or self-employed; not employed includes those who were out of work, a homemaker, student, retired, or unable to work.

^g Includes data from states that included the optional Sexual Orientation and Gender Identity Module: Delaware, Florida, Iowa, Rhode Island, South Carolina, Tennessee, Virginia, West Virginia, Wisconsin, Ohio, Kansas, Oklahoma, and New York (2019) and Arkansas, Iowa, Mississippi, Nevada, Virginia, Wisconsin, Kansas, Ohio, and New Jersey (2021).

^h The number of optional and state-added modules in BRFSS survey.

ACE, adverse childhood experience; AI/AN, American Indian/Alaska Native; BRFSS, Behavioral Risk Factor Surveillance System; NA, not available; NH/OPI, Native Hawaiian or other Pacific Islander.

Table 2.Types of BRFSS ACEs Module Responders and Nonresponders by Year, 2019 and 2021^a

Type of responder	2019		2021		p-value
	n	% (95% CI)	n	% (95% CI)	
Complete responder ^b	122,877	96.3 (96.1, 96.6)	87,785	94.5 (94.3, 94.8)	<0.0001
Partial responder ^b	2,655	2.4 (2.2, 2.6)	2,537	3.1 (2.9, 3.3)	<0.0001
Partial nonresponder ^b	532	0.5 (0.4, 0.6)	688	1.0 (0.8, 1.0)	<0.0001
Complete nonresponder ^b	689	0.7 (0.6, 0.8)	1,228	1.4 (1.3, 1.5)	<0.0001

Note: Frequencies are unweighted, and percentages are weighted.

^aThe 2019 states included Alabama, Delaware, Florida, Indiana, Iowa, Michigan, Mississippi, Missouri, New Mexico, North Dakota, Pennsylvania, Rhode Island, South Carolina, Tennessee, Virginia, West Virginia, Wisconsin, Ohio, Kansas, Oklahoma, and New York, and 2021 states included Alabama, Arkansas, Iowa, Mississippi, Nevada, New Hampshire, North Dakota, Oregon, South Carolina, Virginia, Wisconsin, Kansas, Maine, New York, Ohio, and New Jersey.

^bComplete responders were those who answered all ACE questions, partial responders were those who answered questions for 5–7 of 8 ACE domains, partial nonresponders were those who skipped questions for 4 or more of 8 ACE domains, and complete nonresponders were those who skipped all ACE questions.

ACE, adverse childhood experience; BRFSS, Behavioral Risk Factor Surveillance System.