HHS Public Access

Author manuscript

J Prev (2022). Author manuscript; available in PMC 2024 November 14.

Published in final edited form as:

J Prev (2022). 2024 October ; 45(5): 815–831. doi:10.1007/s10935-024-00791-1.

Changes in Illicit Drug Use Among High School Students in Southeastern U.S. States—2009 to 2019

Greta Kilmer[1], **Sherry Everett Jones**[1], **Adriana Rico**[1], **Aaron Houston**[1], **Connie Lim**[1], **Michelle Leon-Nguyen**[1], **Alice K. Asher**[2]

[1]Division of Adolescent and School Health, National Center for HIV, Viral Hepatitis, STD, and TB Prevention, Centers for Disease Control and Prevention, Atlanta, USA

[2]Division of Overdose Prevention, National Center for Injury Prevention and Control, U.S. Centers for Disease Control and Prevention, Atlanta, USA

Abstract

To determine if decreasing lifetime use of methamphetamines, cocaine, ecstasy, and inhalants among high school students occurring from 2009 to 2019 in the U.S. also occurred in five southeastern states, Youth Risk Behavior Survey data representative of high school students in grades 9–12 in 2009 and 2019 were analyzed. In a classroom setting, lifetime use of methamphetamines, cocaine, ecstasy, and inhalants were self-reported. Students nationwide (n = 30,087) were compared to students in Alabama, Georgia, Louisiana, Mississippi, and South Carolina (n = 18,237). Lifetime methamphetamine use significantly increased from 4.8% in 2009 to 6.2% in 2019 in the southeast but decreased from 4.1 to 2.2% nationwide. Use of cocaine, ecstasy, and inhalants remained stable in the southeast while decreasing significantly nationwide from 2009 to 2019. During a period when use of methamphetamines, cocaine, ecstasy, and inhalants among high school students in the U.S. decreased, use in southeastern states did not change. Culturally specific programs and interventions may be needed to prevent illicit drug use in communities of southeastern states where youth remain at risk.

Keywords

Illicit drug use; Substance use; Adolescent; School; Region

Introduction

From 2009 to 2019, Youth Risk Behavior Survey data show lifetime illicit drug use among U.S. high school students declined from 20 to 15% (Centers for Disease Control and Prevention [CDC], n.d.). This shows great progress for U.S. youth aged approximately 14 to 18; however, illicit drug use continues to be a problem in some U.S. communities (Center

✉Greta Kilmer, gfq8@cdc.gov.

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

Competing interests The authors have no conflicts of interest or financial disclosures.

for Behavioral Health Statistics and Quality [CBHSQ], 2020). Although not all illicit drugs are monitored in every state across all years, findings from the national Youth Risk Behavior Survey (YRBS) showed declines from 2009 to 2021 in lifetime use of inhalants, ecstasy, cocaine, methamphetamine, heroin, and prescription opioids among high school students (Hoots et al., 2023). Some state-level prevalence estimates can be monitored using maps of YRBS results, and reveals a group of states in the southeast (Alabama, Georgia, Louisiana, Mississippi, and South Carolina) with high prevalence of lifetime inhalant, ecstasy, cocaine, methamphetamine, and heroin use (CDC, 2022c).

Early initiation of any drug use is a strong predictor of the development of a substance use disorder (CDC, 2022b), and adolescents who use substances are more likely to face behavioral, cognitive, and mental health issues than their peers who do not use drugs (CDC, 2022b). Further, youth who use substances are at risk for delinquency, academic underachievement, violence, and sexually transmitted diseases (Office of the Surgeon General [OSG], 2016). Youth at high risk for substance use include high school students who identify as lesbian, gay, or bisexual (CDC, n.d.) or experience homelessness (Smith-Grant et al., 2022), and adolescents in foster care (Keller et al., 2010) or in the juvenile justice system (Field MB, 2023). Some of the highest high school dropout rates from 2013 to 2017 were found in states in the southeast (National Center for Education Statistics, n.d.), and youth who drop out of high school have higher rates of illicit drug use (Tice et al., 2013).

Other attributes of the southeastern U.S. may contribute to substance use among youth, including higher rates of poverty than the national average, lower rates of insurance coverage, including among youth (Artiga, 2016), high rates of opioid prescribing (CDC, 2021b), and overall worse health outcomes (Artiga, 2016). This is compounded by intersecting factors including racism, poor health behaviors, and lack of public health investment (Harris et al., 2016; Leider et al., 2020). Prevention scientists have outlined an opportunity for dismantling racism and discrimination (Murry et al., 2024). Thus, the objective of this study was to determine if decreasing illicit drug use among high school students occurring from 2009 to 2019 at the national level also occurred in five southeastern states. The current study focused on select illicit drugs (e.g., methamphetamines, cocaine, ecstasy, and inhalants) because regulated substances (e.g., marijuana, alcohol) often have state-level policies that would impact changes in prevalence differently in each state.

Methods

This study used data from the 2009 and 2019 U.S. Centers for Disease Control and Prevention's Youth Risk Behavior Surveillance System (YRBSS) (Underwood et al., 2020). This system consists of the national Youth Risk Behavior Survey (YRBS), which is conducted by CDC, and site surveys which are state, territorial, tribal, and school district YRBSs conducted by education and health agencies in those jurisdictions. The national survey and site surveys are school-based, anonymous surveys that use sampling strategies designed to provide data representative of high school students in grades 9–12 in that jurisdiction. Surveys are conducted every other year, typically in odd years (Centers for Disease Control and Prevention, 2023b; Underwood et al., 2020).

National Survey

The national YRBS is not a summation of site surveys but rather is an independently sampled and independently administered survey. From a list of eligible schools in the nation, a probability sample was drawn to represent students in the nation (Underwood et al., 2020). The national survey contains CDC standard questions and additional questions chosen by the CDC. During 2009 and 2019, lifetime use of methamphetamines, cocaine, ecstasy, and inhalants data were available for the national YRBS. National data were available for 16,410 students in 2009 and 13,677 students in 2019. Overall response rates (the product of the school response rate and student response rate) were 71% in 2009 and 60% in 2019.

State Surveys

The sample drawn for the national survey is not intended to be large enough to provide state-level estimates. For state-level estimates, an independent probability sample of schools is drawn to represent students in the state and is not a subset of the national sample (Underwood et al., 2020). Site-level surveys contain a mix of questions from a set of CDC standard questions and additional optional questions chosen by the state. During 2009 and 2019, lifetime use of methamphetamines, cocaine, ecstasy, and inhalants data were available in five southeastern states: Alabama, Georgia, Louisiana, Mississippi, and South Carolina. For years between 2009 and 2019 (i.e., 2011, 2013, 2015, and 2017), data for each of the four drugs were not available in all five states. For this reason, we proceeded with analyzing the change between 2009 and 2019 for these drugs, rather than testing linear trends across the decade. We did not include 2021 data for two reasons: (1) the five states did not collect data for all four drugs in 2021 (CDC, 2022c), and (2) other data collection efforts revealed that students reported increased use of drugs during the COVID-19 pandemic, which could result in temporarily high prevalence estimates that do not represent a long-term trend (Brener et al., 2022).

For the five included states combined, data were available for 7,340 students in 2009 and 10,897 students in 2019. Overall response rates (the product of the state's school response rate and student response rate) in 2009 and 2019, respectively, were 70% and 84% for Alabama, 70% and 52% for Georgia, 68% and 60% for Louisiana, 70% and 72% for Mississippi, and 62% and 57% in South Carolina. State-level samples are independent and not a subset of the national sample; however, overlaps do occur. For the five states included in this study, the national sample overlapped for two schools in 2009 and one school in 2019 (sample overlaps did not result in loss of data in this study). The CDC protocol for combining YRBS data across sites was followed during data analysis (CDC, 2023a).

In 2009 and 2019, students in the national survey and each of the five site surveys were asked identically worded illicit drug use questions:

- During your life, how many times have you used methamphetamines (also called speed, crystal meth, crank, ice, or meth)? (note: in 2009 only, this question was slightly different for all sites in its examples, which were limited to speed, crystal, crank, or ice);

- During your life how many times have you used any form of cocaine, including powder, crack, or freebase?;
- During your life, how many times have you used ecstasy (also called MDMA)?;
- During your life, how many times have you sniffed glue, breathed the contents of aerosol spray cans, or inhaled any paints or sprays to get high?

No other illicit drug use questions (e.g., heroin, hallucinogens) were used by all sites in both 2009 and 2019. Nonmedical use of prescription pain relievers was not available due to some states not including the question until 2019 (the question was first available in 2017). Regulated substances (e.g., marijuana, alcohol) were not included in the analyses because analytic methods would need to account for variations in state-level policies over time.

Weighted proportions and 95% confidence intervals that accounted for the complex survey design of YRBS and survey weights were calculated using SAS-callable SUDAAN version 11.0.3 (RTI International) in SAS version 9.4 (SAS Institute). Unadjusted statistical differences were tested using t-tests ($p < 0.05$) for independent samples (Xu et al., 2017). Prevalence differences from 2009 to 2019 were calculated as unadjusted descriptive statistics. For adjusted analyses testing changes in prevalence of illicit drug use between 2009 and 2019, each type of illicit drug use was modeled as a binary outcome variable in logistic regression. Age and sex were independent variables added to adjust for demographics, which may have differed between the southeast and the U.S. overall or changed over time. Adjusted differences in prevalence of illicit drug use between 2009 and 2019 and between geographic areas were tested using Wald F-tests in logistic regression ($p < 0.05$) and results were stratified by sex (male vs. female), age (under age 16 vs. age 16 or older), and race/ethnicity. Sensitivity analyses were conducted by repeating each overall adjusted test while excluding one state in the southeast.

Special considerations for analysis by race and ethnicity were incorporated into the analytic approach because the southeast has a higher proportion of Black students compared to the U.S. overall. An approach involving “adjusting away” this difference (i.e., as adjustment factors in models) would only support the notion that regional differences were attributable to the racial make-up of the population. Instead, race and ethnicity were used as stratification factors and each group was compared between the geographic areas while adjusting for age and sex. Comparisons were not made between ethnic or racial groups within the same geographic area. Models for race/ethnicity groups are first displayed in Table 4 as, (1) Hispanic ethnicity, any race(s) reported, (2) non-Hispanic Black or African American, only a single race reported, and (3) non-Hispanic White, only a single race reported. Subsequently displayed are groups with no restrictions based on indications of ethnicity or other race groups (including American Indian or Alaska Native, Asian, Black or African American, and Native Hawaiian or Other Pacific Islander). Each group was required to have at least 30 respondents in each survey year. To avoid smaller sample sizes, American Indian or Alaska Native, Asian, and Native Hawaiian or Other Pacific Islander students are not presented in the single race findings.

Results

Lifetime use of methamphetamines, cocaine, ecstasy, or inhalants was lower in 2019 compared to 2009 among U.S. high school students overall ($p < 0.01$ for all illicit drugs; Table 1). Other than students in Alabama reporting increased methamphetamine use (5.3% in 2009 vs. 10.4% in 2019; $p = 0.03$) and students in Georgia reporting decreased ecstasy (6.5% in 2009 vs. 5.1% in 2019; $p = 0.04$) and inhalant (11.6% in 2009 vs. 7.5% in 2019; $p < 0.01$) use, illicit drug use patterns did not change significantly in each of the five states in the southeast from 2009 to 2019.

When all five states in the southeast were combined (hereafter referred to as "the southeast"), lifetime methamphetamine use remained stable from 2009 (4.8%) to 2019 (6.2%) after adjustment for age and sex ($p = 0.11$), even as it was lower in the U.S. overall in 2019 (2.1%) compared to 2009 (4.1%)($p < 0.01$; Table 1). In the southeast, adjusted results for methamphetamine use were found to be sensitive to which states were included in the analysis (Table 2). A significant increase in methamphetamine use was found when Georgia was excluded ($p = 0.03$); however, exclusion of other states produced results consistent with the overall finding.

Lifetime use of cocaine, ecstasy, and inhalants also remained stable in the southeast in adjusted analyses while decreasing in the U.S. overall (Table 1; Fig. 1). Results for cocaine and ecstasy use were not sensitive to exclusion of any certain state in the southeast (Table 2). Overall results for inhalant use were close to the cut-off for statistical significance ($p = 0.05$) and conclusions were sensitive to which states were included in the analysis. A decrease in inhalant use was observed in the southeast when Alabama ($p < 0.01$) or Louisiana ($p = 0.04$) were excluded; however, exclusion of other states produced results consistent with the overall finding.

Demographic differences between students in the southeast and students in the U.S. were examined separately in 2009 and 2019 (data not shown). In both years, no differences by sex were found. The southeast had more students aged 16 or older compared to the U.S. in 2009 (68.9% vs. 63.7%, respectively) whereas in 2019, the percentages were similar (63.4% vs. 63.0%, respectively). Race/ethnicity differed between the southeast and the U.S. in both years. Students in the southeast were more likely to report Black race compared to students in the U.S. but were less likely to belong to other groups of color (Hispanic, American Indian or Alaska Native, Asian, or Native Hawaiian or other Pacific Islander).

Stratifying by demographic groups, lifetime illicit drug use prevalence between students in the southeast and students in the U.S. were examined separately in 2009 and 2019. In Table 3, results among males and females are presented, followed by results in younger students (aged under 16 years) and older students (aged 16 or older). Finally, results among each racial/ethnic group for the southeast and U.S. are shown in Table 4.

Among both males and females, lifetime use of methamphetamines, cocaine, and ecstasy was similar between the southeast compared to the U.S. in 2009 but were each significantly higher in the southeast compared to the U.S. in 2019 ($p < 0.01$; Table 3). For inhalant use, male students in the southeast were more likely than male students in the U.S. to

report use in both 2009 (13.0% vs. 10.6%, respectively; $p = 0.02$) and 2019 (11.2% vs. 5.7%, respectively; $p < 0.01$); female students in the southeast were more likely than female students in the U.S. to use inhalants in 2009 (9.7% vs. 12.9%, respectively; $p < 0.01$) but not in 2019 (8.5% vs. 6.9%, respectively; $p = 0.08$).

The difference between the southeast and the U.S. was evident among younger students (aged under 16 years) and older students (aged 16 or older, Table 3). Lifetime use of each of the four illicit drugs was similar in 2009 but in 2019 each illicit drug was more commonly used in the southeast compared to the U.S. For example, among older students, lifetime methamphetamine use was similar in 2009 (4.9% in the southeast and 4.4% in the U.S. overall; $p = 0.33$) but in 2019 use was higher in the southeast (6.3% vs. 2.3%; $p < 0.01$).

Among Black students, results were calculated in two different ways depending on whether analysis was restricted to non-Hispanic students reporting a single race, or no restrictions were applied (Table 4). For either classification, use of each of the four illicit drugs was similar among Black students in the southeast compared to the U.S. in 2009. In 2019, prevalence estimates were higher in the southeast compared to the U.S. for all four illicit drugs for unrestricted Black race ($p < 0.05$). Among non-Hispanic, single race Black students, differences in 2019 between the southeast and the U.S. for cocaine (6.6% vs. 4.0%; $p = 0.03$) and inhalants (10.8% vs. 7.2%; $p = 0.01$) were significant but methamphetamines (6.6% vs. 3.8%) and ecstasy (6.2% vs. 3.8%) were not different ($p = 0.05$).

Among non-Hispanic, single race White students, lifetime methamphetamine and ecstasy use were more common in the southeast compared to the U.S. overall in both 2009 and 2019. For cocaine and inhalants, use was similar in 2009 but higher in the southeast in 2019.

Among Hispanic students (of any race), methamphetamines, ecstasy, and inhalants were similar in the southeast and U.S. in 2009 and higher in the southeast in 2019. For cocaine, use was similar in the southeast and the U.S. at both time points. Among Native Hawaiian or other Pacific Islander students, only cocaine use was higher in the southeast than the U.S. in 2019 (18.8% vs. 7.3%; $p < 0.05$).

Discussion

Previous reports have shown decreases in lifetime use of methamphetamines, cocaine, ecstasy, and inhalants from 2009 to 2019 among U.S. high school students (CDC, n.d.), but this study shows that the prevalence of these four illicit drugs did not change between 2009 and 2019 among students in the southeast (aggregate data from Alabama, Georgia, Louisiana, Mississippi, and South Carolina). In most cases, lifetime prevalence was similar in the southeast compared to the U.S. in 2009, but significantly higher in the southeast than the U.S. in 2019. The pattern was consistent for methamphetamines, cocaine, and ecstasy for males, females, younger students (aged under 16 years), and older students (aged 16 or older). The pattern was consistent for all illicit drugs among Black students (not restricted to non-Hispanic single race). The high prevalence of illicit drug use among Black students in the southeast compared to Black students in the U.S. overall, suggests that Black communities in the southeast would benefit from additional culturally relevant interventions

to reduce disparities in youth illicit drug use, such as a family-centered approach that builds on the strengths of African-American families (Brody et al., 2012; University of Georgia, n.d.). Future studies can also take steps to ensure representation of racial and ethnic groups (Buckley et al., 2023) while examining if there are differences with experiences of racism or other adverse events in the southeast that could explain the higher prevalence of illicit drug use compared to other regions. Interventions used elsewhere may require rebuilding or retooling to improve health equity in the southeastern U.S. (Murry et al., 2024).

This study found a high prevalence of drug use among Native Hawaiian or other Pacific Islander students in the southeast in 2019. Other studies have found similarly high rates of illicit drug use among Pacific Islanders in the United States (Wu & Blazer, 2015). Pacific Islanders are among the fastest growing populations in the United States, and experienced the highest increase in drug overdose deaths from 2020 to 2021 (Spencer et al., 2022). More information is needed to understand why this population has a higher prevalence of drug use and what culturally relevant interventions may be effective.

Illicit drug use among youth by region are not frequently published. The Youth Risk Behavior Surveillance System supports uniform YRBS data collection among states[20] and provides the opportunity to study regional patterns. Continued efforts to harmonize and modernize national and state-level data collection for surveillance purposes will ensure that trends can be analyzed and directly compared across geographical regions.

Two other national surveillance systems that collect drug use data among youth include Monitoring the Future (Miech, 2020) and the National Survey on Drug Use and Health (NSDUH) (CBHSQ, 2020). Monitoring the Future data found that lifetime use of methamphetamines, cocaine, MDMA (ecstasy/molly), and inhalants decreased among students in 8th, 10th, and 12th grades from 2009 to 2019 (Miech, 2020). State level data from Monitoring the Future are not available. Similar to our findings, national NSDUH results show lifetime cocaine use decreased among adolescents aged 12–17 from 2009 to 2019; trends for other substances were not available (CBHSQ, 2020). For state-level estimates, NSDUH employs model-based small area estimation due to small sample sizes. Whereas our analysis found cocaine use remained stable, NSDUH estimates using this methodology showed past-year cocaine use decreased among adolescents aged 12–17 in Alabama, Georgia, Louisiana, Mississippi, and South Carolina (CBHSQ, 2020). However, direct state-level comparisons between YRBS and NSDUH are not possible because YRBS measures lifetime rather than past-year cocaine use. Also, YRBS state-level sample sizes are large enough to produce direct rather than model-based estimates. NSDUH state-level trends for lifetime cocaine use and for use of other substances were not available.

Outside the U.S., results from school surveys show mixed trends in substance use prior to the COVID-19 pandemic. Results from the European School Survey Project on Alcohol and Other Drugs show lifetime use of illicit drugs from 2007 to 2019 “slightly decreased or stabilized, except in Estonia, Montenegro, and Portugal” (ESPAD Group, 2020). The Ontario Student Drug Use and Health Survey showed most past year drug use measures showed a significant downward trend from 1999 to 2019 (Boak et al., 2020). Australian

students aged 16–17 reported increased lifetime use of inhalants, cocaine, and ecstasy from 2011 to 2017 (Guerin & White, 2020).

This analysis did not include any information on drug use among high school students during the COVID-19 pandemic. The Adolescent Behaviors and Experiences Survey, administered by CDC during January – June 2021, found that nearly one-third of students who reported using marijuana, synthetic marijuana, cocaine, or other illegal drugs strongly agreed or agreed they used more drugs during the COVID-19 pandemic (Brener et al., 2022). Overall, research examining trends in substance use among adolescents during the pandemic have thus far yielded inconsistent results, and may be related to which substances (i.e., illicit drugs vs. prescription drugs) students were able to access during stay-at-home orders (Lundahl & Cannoy, 2021) or whether an adult was home while schools were closed.

This study could not examine changes in opioid use during 2009 to 2019 because questions about opioid use were not incorporated into the national and state YRBS until after 2009. Given the evolving overdose crisis (CDC, 2022a), this is a notable gap in this study. However, an increasing number of overdose deaths involve cocaine or psychostimulants such as methamphetamines or ecstasy (Spencer et al., 2022). In 2021, one in every five overdose deaths involved cocaine (Spencer et al., 2022). Although most racial and ethnic groups have seen increases in stimulant-involved overdoses, increases are among the highest in Black and Native American persons (CDC, 2021a). However, as the vast majority of overdose deaths involve opioids (Spencer et al., 2022), it would be useful if surveillance systems include questions on heroin use and prescription opioid misuse such as now found in the national YRBS.

Interventions aimed at curbing the opioid crisis may be a factor in declining rates in other substance use among high school students across the U.S. The Drug-Free Communities Program uses evidence-based frameworks to support local leaders in fostering safe environments for youth (CDC, 2024). Implementation of evidence-based programs at multiple levels of the social ecology may impact modifiable risk and protective factors as well as behaviors. Community factors (e.g., access to mental health and social services) may contribute to the higher prevalence of substance use in high school students in the southeast compared to the U.S. overall; regardless, the results of this study suggest that highly effective and culturally relevant interventions are needed for students in the southeast.

With a disproportionate number of historically underserved communities, the southeast may struggle to fully implement equitable public health interventions (Southern Poverty Law Center, 2021). For example, school interventions designed to develop social and emotional skills can help reduce substance use, but additional local efforts may be required to ensure programs are efficacious for students of color (Jones et al., 2021). Low resource interventions, such as standardized health education requirements for substance use prevention (Bruckner et al., 2014) or positive use of social media and peer-to-peer strategies, could be evaluated as approaches to reduce illicit drug use in particular communities (Evans et al., 2017; OSG, 2016). Availability of options for substance use disorder treatment for students of color, especially in rural areas, may also need to be addressed (Pullen & Oser, 2014).

Limitations

This study is subject to three limitations. First, the YRBS is administered only to students who are enrolled in schools and attending in-person (Underwood et al., 2020). Drop-out students, including those engaged in the juvenile penal system, are at a higher risk of illicit drug use (Field MB, 2023; Tice et al., 2013), and are not eligible for the YRBS; thereby potentially leading to under-estimation of illicit drug use among high school age youth. Second, rural/urban status was unavailable in state-level YRBS data, therefore, analyses could not be conducted by this characteristic, although researchers have found that rural youth may have higher rates of substance use (Lambert et al., 2008) and rural/urban patterns of drug use vary by state (Hedegaard & Spencer, 2021). Lastly, these study findings (years 2009 and 2019) reflect pre-COVID-19 data; YRBS data comparing drug use during and after the pandemic have been published elsewhere (Hoots et al., 2023).

Interventions proven to impact youth at risk for substance use may not be reaching all populations. This study showed that between 2009 and 2019, there were reductions nationwide in lifetime use of methamphetamines, cocaine, ecstasy, and inhalants among high school students, but reductions occurring in the southeast were not statistically significant after adjustment for age and sex. To address the disparities in drug use between the southeast and the U.S. overall, a special focus on interventions that are tailored to communities in the southeast may be needed. Generally, awareness of the issues discovered in this study can prompt a closer look at the suitability and availability of drug use interventions in the region.

Acknowledgements

The authors wish to acknowledge Jennifer Smith-Grant, MSPH in the Division of Adolescent and School Health at the Centers for Disease Control and Prevention and the YRBS coordinators from Alabama (Angie Pelton), Georgia (Rana Bayakly), Louisiana (Michael Comeaux), Mississippi (Louis King), and South Carolina (Sabrina Moore).

References

Artiga SD,A (2016). Health and Health Coverage in the South: A Data Update. Issue brief. Issue. https://files.kff.org/attachment/issue-brief-health-and-health-coverage-in-the-south-a-data-update.

Boak A, Elton-Marshall T, Mann R, & Hamilton H (2020). Drug use among Ontario students, 1977–2019: Detailed findings from the Ontario Student Drug Use and Health Survey (OSDUHS).

Brener ND, Bohm MK, Jones CM, Puvanesarajah S, Robin L, Suarez N, Deng X, Harding RL, & Moyse D (2022). Use of Tobacco products, Alcohol, and other substances among High School Students during the COVID-19 pandemic - adolescent behaviors and experiences Survey, United States, January-June 2021. MMWR Suppl, 71(3), 8–15. 10.15585/mmwr.su7103a2. [PubMed: 35358166]

Brody GH, Chen YF, Kogan SM, Yu T, Molgaard VK, DiClemente RJ, & Wingood GM (2012). Family-centered program deters substance use, conduct problems, and depressive symptoms in black adolescents. Pediatrics, 129(1), 108–115. 10.1542/peds.2011-0623. [PubMed: 22157131]

Bruckner TA, Domina T, Hwang JK, Gerlinger J, Carpenter C, & Wakefield S (2014). State-level education standards for substance use prevention programs in schools: A systematic content analysis. Journal of Adolescent Health, 54(4), 467–473. 10.1016/j.jadohealth.2013.07.020.

Buckley PR, Murry VM, Gust CJ, Ladika A, & Pampel FC (2023). Racial and Ethnic Representation in Preventive Intervention Research: A methodological study. Prevention Science, 24(7), 1261–1274. 10.1007/s11121-023-01564-8. [PubMed: 37386352]

Center for Behavioral Health Statistics and Quality [CBHSQ] (2020). Results from the 2019 National Survey on Drug Use and Health: Detailed tables. Retrieved May 12, 2023 from https://www.samhsa.gov/data/report/2019-nsduh-detailed-tables.

Centers for Disease Control and Prevention (2021a). Cocaine and Psychostimulant-involved Overdose Deaths Disproportionately Affect Racial and Ethnic Minority Groups. Retrieved July 12, 2022 from https://www.cdc.gov/drugoverdose/featured-topics/psychostimulant-cocaine-race-ethnic-minorities.html.

Centers for Disease Control and Prevention (2021b). September 22, 2021). U.S. State Opioid Dispensing Rates, 2020 Retrieved September 15, 2023 from https://www.cdc.gov/drugoverdose/rxrate-maps/state2020.html.

Centers for Disease Control and Prevention (2022a). Drug Overdose Deaths Remain High. Retrieved May 12, 2023 from https://www.cdc.gov/drugoverdose/deaths/index.html.

Centers for Disease Control and Prevention (2022c). Youth Online https://nccd.cdc.gov/Youthonline/App/Default.aspx.

Centers for Disease Control and Prevention (2023a). Combining YRBS Data Across Years and Sites. https://www.cdc.gov/healthyyouth/data/yrbs/pdf/2021/2021_YRBS_combining_data_508.pdf.

Centers for Disease Control and Prevention (2023b). A Guide to Conducting Your Own Youth Risk Behavior Survey. https://www.cdc.gov/healthyyouth/data/yrbs/pdf/2021/2021_yrbs_conducting_your_own_508.pdf.

Centers for Disease Control and Prevention (2024). Drug-Free Communities. Retrieved May 9, 2024 from https://www.cdc.gov/drugoverdose/drug-free-communities/index.html.

Centers for Disease Control and Prevention (n.d.). Youth Risk Behavior Survey Data Summary & Trends Report: 2009–2019. https://www.cdc.gov/healthyyouth/data/yrbs/pdf/YRBSDataSummaryTrendsReport2019-508.pdf.

Centers for Disease Control and Prevention (2022b). High-Risk Substance Use Among Youth. Retrieved May 12, 2023 from https://www.cdc.gov/healthyyouth/substance-use/index.htm#:~:text=Youth%20with%20substance%20use%20disorders,and%20potential%20progression%20to%20addiction.

ESPAD Group. (2020). ESPAD Report 2019: Results from the European School Survey Project on Alcohol and other drugs. EMCDDA Joint Publications, Publications Office of the European Union.

Evans W, Andrade E, Goldmeer S, Smith M, Snider J, & Girardo G (2017). The living the Example Social Media Substance Use Prevention Program: A pilot evaluation. JMIR Ment Health, 4(2), e24. 10.2196/mental.7839. [PubMed: 28655704]

Field MB, & Lauger DE (2023). AD. Drug and Alcohol Use Reported by Youth in Juvenile Facilities, 2008–2018 – Statistical Tables. https://bjs.ojp.gov/document/dauryjf0818st.pdf.

Guerin N, & White V (2020). ASSAD 2017 Statistics & Trends: Trends in Substance Use Among Australian Secondary Students.

Harris JK, Beatty K, Leider JP, Knudson A, Anderson BL, & Meit M (2016). The Double Disparity Facing Rural Local Health Departments. Annual Review of Public Health, 37, 167–184. 10.1146/annurev-publhealth-031914-122755.

Hedegaard H, & Spencer MR (2021). Urban-rural differences in Drug Overdose Death Rates, 1999–2019. Nchs Data Brief(403), 1–8.

Hoots BE, Li J, Hertz MF, Esser MB, Rico A, Zavala EY, & Jones CM (2023). Alcohol and other Substance Use before and during the COVID-19 pandemic among High School Students - Youth Risk Behavior Survey, United States, 2021. MMWR Suppl, 72(1), 84–92. 10.15585/mmwr.su7201a10. [PubMed: 37104552]

Jones SM, Brush KE, Ramirez T, Mao ZX, Marenus M, Wettje S, Finney K, Raisch N, Podoloff N, Kahn J, Barnes S, Stickle L, Brion-Meisels G, McIntyre J, & Cuartas J (2021). & R. B Navigating SEL from the inside out. https://www.wallacefoundation.org/knowledge-center/Documents/navigating-social-and-emotional-learning-from-the-inside-out-2ed.pdf.

Keller TE, Salazar AM, & Courtney ME (2010). Prevalence and Timing of Diagnosable Mental Health, Alcohol, and substance use problems among older adolescents in the child Welfare

System. Children and Youth Services Review, 32(4), 626–634. 10.1016/j.childyouth.2009.12.010. [PubMed: 20305829]

Lambert D, Gale JA, & Hartley D (2008). Substance abuse by youth and young adults in rural America. Journal of Rural Health, 24(3), 221–228. 10.1111/j.1748-0361.2008.00162.x.

Leider JP, Meit M, McCullough JM, Resnick B, Dekker D, Alfonso YN, & Bishai D (2020). The State of Rural Public Health: Enduring needs in a New Decade. American Journal of Public Health, 110(9), 1283–1290. 10.2105/ajph.2020.305728. [PubMed: 32673103]

Lundahl LH, & Cannoy C (2021). COVID-19 and Substance Use in adolescents. Pediatric Clinics of North America, 68(5), 977–990. 10.1016/j.pcl.2021.05.005. [PubMed: 34538307]

Miech RA, Johnston LD, O'Malley PM, Bachman JG, Schulenberg JE, & Patrick ME (2020). Monitoring the future national survey results on drug use, 1975–2019: Volume I, secondary school students. Institute for Social Research, The University of Michigan. https://files.eric.ed.gov/fulltext/ED608265.pdf.

Murry VM, Bradley C, Cruden G, Brown CH, Howe GW, Sepùlveda MJ, Beardslee W, Hannah N, & Warne D (2024). Re-envisioning, retooling, and Rebuilding Prevention Science Methods to address structural and systemic racism and promote Health Equity. Prevention Science, 25(1), 6–19. 10.1007/s11121-022-01439-4. [PubMed: 36223046]

National Center for Education Statistics (n.d.). Trends in High School Dropout and Completion Rates in the United States, Indicator 2: Status Dropout Rate. Retrieved from https://nces.ed.gov/programs/dropout/ind_02.asp.

Office of the Surgeon General [OSG] (2016). Facing Addiction in America: The Surgeon General's Report on Alcohol, Drugs, and Health. HHS. https://www.ncbi.nlm.nih.gov/books/NBK424857/.

Pullen E, & Oser C (2014). Barriers to substance abuse treatment in rural and urban communities: Counselor perspectives. Substance Use and Misuse, 49(7), 891–901. 10.3109/10826084.2014.891615. [PubMed: 24611820]

Smith-Grant J, Kilmer G, Brener N, Robin L, & Underwood JM (2022). Risk behaviors and experiences among Youth Experiencing Homelessness-Youth Risk Behavior Survey, 23 U.S. States and 11 local School districts, 2019. Journal of Community Health, 47(2), 324–333. 10.1007/s10900-021-01056-2. [PubMed: 35013979]

Southern Poverty Law Center (2021). Inequity in School Funding. Retrieved May 9, 2024, from https://www.splcenter.org/southern-schools-funding-inequities.

Spencer MR, Miniño AM, & Warner M (2022). Drug overdose deaths in the United States, 2001–2021. Nchs Data Brief, 457. 10.15620/cdc:122556.

Tice P, Lipari RN, & Van Horn SL (2013). Substance use among 12th Grade aged youths, by Drop-out Status. The CBHSQ Report (pp. 1–10). Substance Abuse and Mental Health Services Administration (US).

Underwood JM, Brener N, Thornton J, Harris WA, Bryan LN, Shanklin SL, Deputy N, Roberts AM, Queen B, Chyen D, Whittle L, Lim C, Yamakawa Y, Leon-Nguyen M, Kilmer G, Smith-Grant J, Demissie Z, Jones SE, Clayton H, & Dittus P (2020). Overview and Methods for the Youth Risk Behavior Surveillance System - United States, 2019. MMWR Suppl, 69(1), 1–10. 10.15585/mmwr.su6901a1. [PubMed: 32817611]

University of Georgia. (n.d.). Strong African American Families Teen Program. Retrieved May 10 (2024). from https://cfr.uga.edu/saaf-programs/saaf-t/.

Wu LT, & Blazer DG (2015). Substance use disorders and co-morbidities among Asian americans and native Hawaiians/Pacific islanders. Psychological Medicine, 45(3), 481–494. 10.1017/s0033291714001330. [PubMed: 25066115]

Xu M, Fralick D, Zheng JZ, Wang B, Tu XM, & Feng C (2017). The differences and similarities between two-sample T-Test and paired T-Test. Shanghai Arch Psychiatry, 29(3), 184–188. 10.11919/j.issn.1002-0829.217070. [PubMed: 28904516]

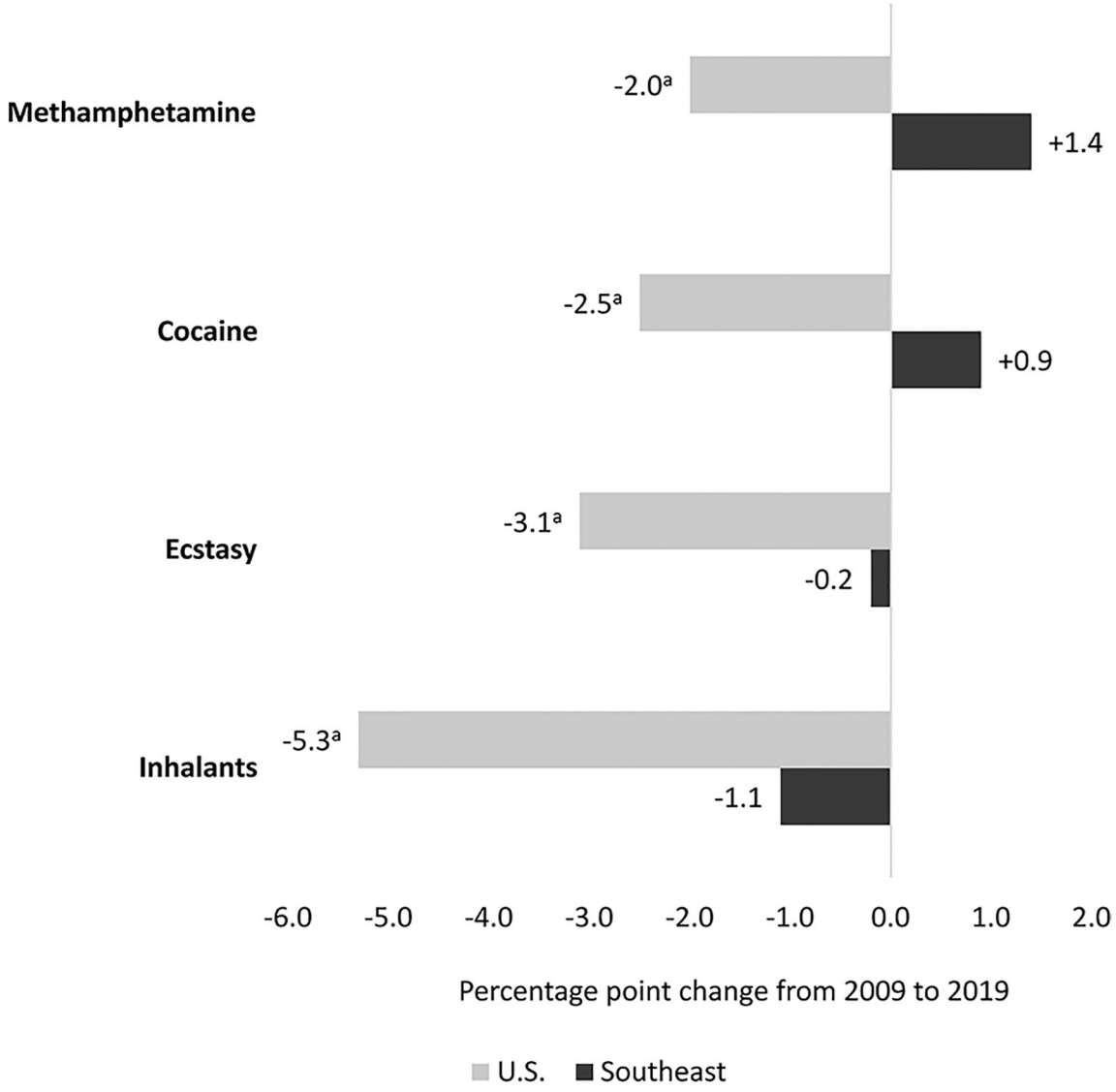

Fig. 1.

Percentage point change from 2009 to 2019 in prevalence of lifetime use of methamphetamines, cocaine, ecstasy, and inhalants among high school students, in five southeastern states[a] compared to the U.S. overall: Youth Risk Behavior Surveillance System

J Prev (2022). Author manuscript; available in PMC 2024 November 14.

Table 1

Prevalence of lifetime use of methamphetamines, cocaine, ecstasy, and inhalants among high school students in five southeastern states[*] and the U.S. overall, by race/ethnicity: 2009 and 2019 youth risk behavior surveillance system

	Southeast (*n* = 18,237)			U.S. (*n* = 30,087)		
Substance	**2009% (95% CI)**	**2019% (95% CI)**	**2019 vs. 2009, prevalence difference**	**2009% (95% CI)**	**2019% (95% CI)**	**2019 vs. 2009, prevalence difference**
Race/ethnicity						
Hispanic or Latino						
Methamphetamines	8.1 (5.7–11.3)	7.0 (4.9–10.0)	−1.1	5.7 (4.5–7.1)	2.7** (1.8–4.0	−3.0
Cocaine	10.9 (7.5–15.6)	7.4 (5.4–9.9)	−3.5	9.4 (8.1–11.0)	5.6 (4.5–6.9)	−3.8
Ecstasy	9.0 (6.6–12.1)	8.7 (6.4–11.6)	−0.3	8.2 (7.1–9.5)	4.4** (3.6–5.3)	−3.8
Inhalants	14.4 (10.3–19.7)	10.6 (8.1–13.8)	−3.8	14.0 (12.1–16.2)	6.6** (5.5–7.9)	−7.4
NH Black***						
Methamphetamines	2.8 (2.1–3.7)	6.6 (5.0–8.6)	+3.8	2.7 (1.7–4.3)	3.8 (2.4–6.0)	+1.1
Cocaine	2.9 (2.1–3.9)	6.6 (5.3–8.3)	+3.7	2.9 (2.0–4.1)	4.0** (2.7–5.9)	+1.1
Ecstasy	4.1 (3.3–5.2)	6.2 (4.8–8.0)	+2.1	5.1 (3.9–6.7)	3.8 (2.4–5.8)	−1.3
Inhalants	9.0 (7.8–10.4)	10.8 (9.1–12.7)	+1.8	8.2 (6.7–10.1)	7.2** (5.4–9.5)	−1.0
NH White***						
Methamphetamines	5.5 (4.6–6.7)	4.6 (3.5–6.2)	−0.9	37** (3.1–4.5)	1.2** (0.9–1.6)	−2.5
Cocaine	6.9 (6.0–8.0)	7.0 (5.8–8.4)	+0.1	6.3 (5.3–7.4)	2.9** (2.2–3.7)	−3.4
Ecstasy	8.7 (7.5–10.1)	5.4 (4.2–6.7)	−3.3	6.4** (5.4—7.6)	2.7** (2.0–3.7)	−3.7
Inhalants	12.4 (10.9–14.1)	8.5 (7.2–9.9)	−3.9	11.5 (10.1–13.1)	6.4** (5.4–7.5)	−5.1
Unrestricted race[†]						

	Southeast (*n* = 18,237)			U.S. (*n* = 30,087)		
Substance	**2009% (95% CI)**	**2019% (95% CI)**	**2019 vs. 2009, prevalence difference**	**2009% (95% CI)**	**2019% (95% CI)**	**2019 vs. 2009, prevalence difference**
American Indian/Alaska Native						
Methamphetamines	9.0 (5.1–15.3)	9.6 (5.7–15.7)	+0.6	6.9 (5.0–9.4)	4.9 (3.0–7.8)	−2.0
Cocaine	6.7 (4.0–11.1)	8.8 (5.9–12.9)	+2.1	9.1 (6.9–11.9)	7.6 (5.2–11.0)	−1.5
Ecstasy	7.6 (4.9–11.7)	13.5 (7.8–22.5)	+5.9	10.6 (8.1–13.9)	8.4 (6.0–11.5)	−2.2
Inhalants	16.1 (11.5–22.1)	10.7 (6.7–16.7)	−5.4	19.7 (16.3–23.6)	10.0 (6.7–14.9)	−9.7
Asian						
Methamphetamines	9.4 (5.7–14.9)	11.5 (7.1–18.1)	+2.1	47** (2.8–7.6)	2.9** (1.8–4.6)	−1.8
Cocaine	9.6 (5.9–15.2)	9.1 (6.1–13.3)	−0.5	5.2 (3.4—7.8)	2.9** (1.9–4.4)	−2.3
Ecstasy	12.0 (7.7–18.2)	10.9 (7.2–16.1)	−1.1	5.8** (3.7–9.0)	3.8** (2.6–5.7)	−2.0
Inhalants	15.4 (11.0–21.3)	16.9 (12.0–23.3)	+1.5	12.8 (10.1–16.2)	4.4** (2.9–6.5)	−8.4
Black						
Methamphetamines	3.3 (2.5–4.3)	6.7 (5.3–8.5)	+3.4	3.7 (3.0–4.9)	4.1** (2.8–5.8)	+0.4
Cocaine	3.5 (2.7–4.7)	6.8 (5.6–8.4)	+3.3	3.9 (2.9–5.3)	4.6** (3.5–6.0)	+0.7
Ecstasy	4.7 (3.8–5.8)	6.7 (5.4–8.3)	+2.0	6.2 (5.0–7.9)	4.6** (3.4–6.1)	−1.6
Inhalants	9.5 (8.3–10.9)	11.1 (9.4–13.0)	+1.6	9.9 (8.4–11.6)	7.7** (6.2–9.7)	−2.2
Native Hawaiian or Other Pacific Islander						
Methamphetamines	15.1 (9.2–23.7)	12.7 (6.4–23.7)	−2.4	7.8 (4.6–12.9)	5.8 (3.0–11.1)	−2.0
Cocaine	22.7 (14.9–33.0)	18.8 (11.0–30.2)	−3.9	9.0** (5.6–14.2)	73** (3.9–13.4)	−1.7
Ecstasy	19.6 (12.8–28.8)	12.5 (7.8–19.6)	−7.1	11.5 (6.6–19.4)	6.4 (3.2–12.3)	−5.1

J Prev (2022). Author manuscript; available in PMC 2024 November 14.

	Southeast (*n* = 18,237)			U.S. (*n* = 30,087)		
Substance	**2009% (95% CI)**	**2019% (95% CI)**	**2019 vs. 2009, prevalence difference**	**2009% (95% CI)**	**2019% (95% CI)**	**2019 vs. 2009, prevalence difference**
Inhalants	18.8 (12.2–27.8)	18.1 (10.8–28.8)	−0.7	15.2 (10.8–20.9)	13.3 (9.2–18.8)	−1.9

* Significantly different from 2009 based on analysis using logistic regression models controlling for age and sex

** Significantly different from 2009 (unadjusted)

*** Students are not Hispanic or Latino and reported one race

† Students may have reported one race or more than one race and may be Hispanic or Latino; groups are not mutually exclusive.

Table 2

Change in the prevalence of lifetime use of methamphetamines, cocaine, ecstasy, and inhalants among high school students in five southeastern states and the U.S. overall: 2009 and 2019 Youth Risk Behavior Surveillance System

Substance, by location	2009, %	2019, %	2019 vs. 2009, prevalence difference
Methamphetamines			
Alabama	5.3	10.4*	+5.1
Georgia	4.6	4.9	+0.3
Louisiana	7.9	7.8	−0.1
Mississippi	2.8	3.4	+0.6
South Carolina	3.2	5.6	+2.4
Five southeastern states combined	4.8	6.2**	+1.4
U.S.	4.1	2.1*,**	−2.0
Cocaine			
Alabama	6.1	9.6	+3.5
Georgia	5.9	5.6	−0.3
Louisiana	7.9	8.8	+1.0
Mississippi	3.8	3.7	−0.1
South Carolina	5.0	6.4	+1.4
Five southeastern states combined	5.8	6.7	+0.9
U.S.	6.4	3.9*,**	−2.5
Ecstasy			
Alabama	7.1	9.8	+2.7
Georgia	6.5	5.1*	−1.4
Louisiana	9.5	8.9	−0.6
Mississippi	5.3	6.0	+0.7
South Carolina	7.4	6.8	−0.6
Five southeastern states combined	7.0	6.8	−0.2
U.S.	6.7	3.6*,**	−3.1
Inhalants			
Alabama	11.9	15.0	+3.1
Georgia	11.6	7.5*,**	−4.1
Louisiana	12.4	12.9	+0.5
Mississippi	9.7	10.0	+0.3
South Carolina	10.6	10.5	−0.1
Five southeastern states combined	11.4	10.3	−1.1
U.S.	11.7	6.4*,**	−5.3

Note: Estimates for 2009 and 2019 were compared using logistic regression models controlling for age and sex

*Significantly different from 2009 based on analysis using logistic regression models controlling for age and sex

**Significantly different from 2009 (unadjusted)

Table 3

P-values from sensitivity analyses for the change in lifetime use of methamphetamines, cocaine, ecstasy, and inhalants among high school students in five southeastern states*: 2009 and 2019 Youth Risk Behavior Surveillance System

	Methamphetamines	Cocaine	Ecstasy	Inhalants
Five southeastern states combined	0.11	0.41	0.41	0.05
Exclude Alabama	0.66	0.99	0.05	< 0.01
Exclude Georgia	0.03	0.08	0.70	0.54
Exclude Louisiana	0.06	0.50	0.51	0.04
Exclude Mississippi	0.14	0.46	0.32	0.05
Exclude South Carolina	0.22	0.53	0.59	0.06

*Alabama, Georgia, Louisiana, Mississippi, and South Carolina

Table 4

Prevalence of lifetime use of methamphetamines, cocaine, ecstasy, and inhalants among high school students in five southeastern states* and the U.S. overall, by sex and age: 2009 and 2019 Youth Risk Behavior Surveillance System

	Southeast (*n* = 18,237)			U.S. (*n* = 30,087)		
Substance	**2009% (95% CI)**	**2019% (95% CI)**	**2019 vs. 2009, prevalence difference**	**2009% (95% CI)**	**2019% (95% CI)**	**2019 vs. 2009, prevalence difference**
Males						
Methamphetamines	5.9 (4.8–7.3)	7.6 (6.3–9.1)	+ 1.7	4.7 (4.1–5.5)	2.7** (2.1–3.4)	−2.0
Cocaine	7.4 (6.2–8.7)	8.0 (6.8–9.5)	+ 0.6	7.3 (6.3–8.4)	4.9** (4.2–5.8)	−2.4
Ecstasy	8.9 (7.8–10.2)	8.2 (7.0–9.7)	−0.7	7.6 (6.4–9.1)	4.6** (3.8–5.6)	−3.0
Inhalants	13.0 (11.4–14.8)	11.2 (9.8–12.7)	−1.8	10.6** (9.3–12.1)	5.7** (4.9–6.6)	−4.9
Females						
Methamphetamines	3.5 (2.9–4.3)	4.0 (2.8–5.5)	+ 0.5	3.3 (2.8–4.0)	1.5** (1.0–2.2)	−1.8
Cocaine	4.2 (3.4–5.2)	4.5 (3.5–5.9)	+ 0.3	5.3 (4.6–6.2)	2.7** (2.0–3.7)	−2.5
Ecstasy	5.1 (4.2–6.1)	4.5 (3.5–5.8)	−0.6	5.5 (4.7–6.4)	2.4** (1.8–3.1)	−3.1
Inhalants	9.7 (8.7–10.8)	8.5 (7.1–10.3)	−1.2	12.9** (11.8–14.0)	6.9 (6.0–8.0)	−6.0
Age < 16 years						
Methamphetamines	4.6 (3.4–6.0)	6.0 (4.9–7.4)	+ 1.4	3.4 (2.8–4.1)	1.9** (1.2–3.0)	−1.5
Cocaine	4.4 (3.2–6.0)	6.2 (4.9–7.8)	+ 1.8	4.6 (3.8–5.6)	2.8** (1.9–4.1)	−1.8
Ecstasy	5.7 (4.5–7.3)	6.4 (5.1–7.9)	+ 0.7	4.7 (3.9–5.6)	3.0** (2.1–4.2)	−1.7
Inhalants	13.8 (11.7–16.2)	11.3 (10.0–12.8)	−2.5	12.8 (11.1–14.6)	7.2** (6.2–8.4)	−5.6
Age 16 + years						
Methamphetamines	4.9 (4.1–5.8)	6.3 (5.0–8.0)	+ 1.4	4.4 (4.0–5.0)	2.3** (1.8–2.9)	−2.1
Cocaine	6.5 (5.6–7.6)	7.0 (5.8–8.4)	+ 0.5	7.3 (6.6–8.1)	4.6** (3.8–5.6)	−2.7
Ecstasy	7.7 (6.7–8.7)	7.0 (5.9–8.4)	−0.7	7.7 (6.7–8.8)	3.9** (3.3–4.7)	−3.8
Inhalants	10.3 (9.2–11.4)	9.7 (8.3–11.3)	−0.6	11.0 (10.0–12.2)	6.0** (5.1–6.9)	−5.0

* Alabama, Georgia, Louisiana, Mississippi, and South Carolina

** Significantly different from the southeast (2019) based on analysis using logistic regression models controlling for age and sex