



## Adolescent health brief

## Substance Use and Mental Health in Homeschooled Adolescents in the United States

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## A B S T R A C T

**Purpose:** U.S. homeschooling increased by 50% over 2007–2016. Homeschooled adolescents may have lower substance use rates, but previous research treated other adolescents as homogeneous despite within-group differences. We used the 2015–2018 National Survey on Drug Use and Health to compare adolescent substance use and psychopathology by homeschooled/educational status.

**Methods:** Data were from 52,089 adolescents, classified by educational status (i.e., homeschooled; public/private school, low dropout risk; public/private school, at risk for dropout; and not in school) and compared on substance use and psychopathology variables.

**Results:** Substance use rates were lowest in adolescents at low dropout risk, with significantly lower past-year prescription opioid misuse, tobacco use, nonmarijuana illicit drug use, and nicotine dependence rates than homeschooled adolescents. Psychopathology treatment prevalence was lowest in homeschooled adolescents. Those at risk for dropout had the highest rates of substance use.

**Conclusions:** Although homeschooled adolescents have relatively low substance use rates, they exceed those of low dropout risk adolescents.

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IMPLICATIONS AND  
CONTRIBUTION

Previous research suggests that homeschooled adolescents have lower substance use rates than other adolescents. This study found that risk for dropout or having left school moderates these past findings, with the lowest substance use rates among adolescents in school at low dropout risk, with homeschooled adolescents somewhat higher.

In 2016, 3.3% of U.S. school-aged youth were homeschooled [1], with rates increasing, as only 2.2% were homeschooled in 2007 [2]. Homeschooling occurs for many reasons, including concerns about negative school and peer influences, concerns about instruction, and for religious reasons [1].

Homeschooled adolescents may have lower substance use rates. Vaughn et al. [3] found that homeschooled adolescents

(aged 12–17 years) had lower rates of past-year tobacco, alcohol, and marijuana use than nonhomeschooled adolescents, using the 2002–2013 National Survey on Drug Use and Health (NSDUH). Similarly, Thomson and Jang [4] found elevated alcohol use and intoxication among public and private school adolescents versus homeschooled adolescents (aged ≤13 years), via the 2002–2005 National Study of Youth and Religion. Homeschooled adolescents are heterogeneous, though, and less religious homeschooled adolescents may have higher substance use rates [2].

Major questions remain about homeschooled adolescents. First, their prescription drug misuse (PDM) rates are unstudied, despite notable recent changes in adolescent PDM, including

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increased PDM-involved overdose [5]. Second, their mental health functioning warrants further examination, with the only study, from Israel, suggesting differences in externalizing but not internalizing psychopathology [6]. Third, past studies treated nonhomeschooled adolescents as a homogeneous group, despite substance use differences based on dropout and risk for dropout [7]. Our aim was to address these questions using the 2015–2018 NSDUH, with multiple years aggregated to increase the homeschooled sample.

## Methods

The NSDUH is an annual U.S. survey, with an independent, multistage area probability design and weighting for nationally representative estimates. Further information is available elsewhere [8]. Participants were 52,089 adolescents (Table 1). A total of 2,777 adolescents had missing educational data (5.0%); they were more likely to be male, younger, black/Latinx, and of lower income. The first author's institutional review board exempted this research from further oversight.

The independent variable was past-year *educational status*: (1) homeschooled; (2) public/private school, low dropout risk; (3) public/private school, at risk for dropout; and (4) not in school. Homeschooled adolescents were “homeschooled at any time” in the past year. Dropout risks were having one or more of grades  $\leq D+$  at the last grading period,  $\geq 1$  year older than typical for grade, and the adolescent “hated going to school”; these have been linked to elevated dropout risk [9] and PDM [7].

Substance use variables included *past-year prescription use and misuse of opioid, benzodiazepine, or stimulant medication, past-month binge alcohol use, past-year tobacco use, past-year marijuana use, past-year nonmarijuana illicit drug use* (i.e., cocaine, heroin, methamphetamine, inhalant, and/or hallucinogen), *past-year substance use disorder (SUD), past-month nicotine dependence, and past-year SUD treatment*. Past-year SUD is DSM-IV alcohol, marijuana, cocaine, heroin, hallucinogen,

inhalant, methamphetamine, opioid, stimulant, tranquilizer, and/or sedative abuse/dependence.

Mental health variables were *past-year major depression and past-year mental health treatment*. Sociodemographics included *age, sex, race/ethnicity, household income, population density, and religiosity*. Religiosity was from the study by Grucza et al. [10] and captured the frequency of religious service attendance, importance and influence of beliefs, and importance that friends share beliefs.

Analyses used STATA 15.1, incorporating the NSDUH complex survey design. The prevalence rates of substance use or mental health variables by educational status were established via weighted cross-tabulations, and logistic models evaluated pairwise differences. Logistic models controlled for sociodemographics, with pairwise differences Bonferroni corrected (a priori  $p \leq .0083$ , or .05/6 comparisons).

## Results

The lowest substance use rates were generally in adolescents at low dropout risk (Table 2). Although homeschooled adolescents had lower past-year marijuana use rates (9.0%) than low dropout risk adolescents (11.1%), this difference was nonsignificant. In contrast, homeschooled adolescents had significantly higher rates of past-year prescription opioid misuse, benzodiazepine use, tobacco use and nonmarijuana illicit drug use, and past-month nicotine dependence than low dropout risk adolescents. Notably, homeschooled adolescents had the lowest rates of mental health variables, with significantly lower mental health treatment rates than all other groups. Adolescents at risk for dropout had the highest prevalence of all variables, followed by those not in school; both had significantly higher rates than low dropout risk adolescents.

Homeschooled adolescents had the highest mean religiosity (11.3), followed by low dropout risk adolescents (10.8), those not in school (9.9), and those at risk for dropout (9.5; Table 1).

**Table 1**  
Adolescent sociodemographics by educational status

	Homeschooled	Public/private school, low dropout risk	Public/private school, at risk for dropout	Not in school
Sample size (weighted %)	307 (.6%)	41,898 (80.8%)	5,350 (9.8%)	4,534 (8.8%)
Age (y), mean (95% CI)	14.1 (13.9–14.4)	14.6 (14.5–14.6)	14.8 (14.7–14.9)	14.7 (14.7–14.8)
Religiosity, mean (95% CI)	11.3 (10.7–11.8)	10.8 (10.7–10.9)	9.5 (9.4–9.6)	9.9 (9.7–10.2)
Sex, male, % (95% CI)	54.9 (46.1–63.4)	49.2 (48.5–49.9)	53.3 (51.6–55.0)	60.4 (58.5–62.3)
Race/ethnicity, % (95% CI)				
White	61.5 (53.3–69.0)	53.8 (53.0–54.6)	52.7 (50.9–54.5)	52.2 (50.1–54.3)
Black	12.2 (7.9–18.3)	12.8 (12.2–13.3)	15.5 (14.3–16.8)	16.6 (15.2–18.2)
Hispanic/Latinx	19.5 (14.3–26.1)	23.4 (22.7–24.1)	24.3 (22.7–26.0)	22.9 (21.2–24.6)
Asian American	2.9 (1.1–7.6)	5.9 (5.5–6.3)	2.5 (2.0–3.0)	4.2 (3.3–5.3)
Multiracial	2.4 (1.1–5.2)	3.2 (3.0–3.4)	3.4 (2.9–4.1)	2.8 (2.3–3.4)
American Indian/Native American	.8 (.3–2.4)	.5 (.5–.6)	1.1 (.8–1.6)	.7 (.5–1.0)
Hawaiian/Pacific Islander	.7 (.1–4.1)	.4 (.3–.5)	.4 (.2–.8)	.6 (.4–1.0)
Household income, % (95% CI)				
<\$20,000	20.6 (14.6–28.3)	13.4 (12.9–14.0)	23.7 (22.1–25.3)	21.2 (19.3–23.2)
\$20,000–49,999	28.2 (22.5–34.6)	26.6 (26.0–27.2)	33.0 (31.3–34.8)	30.0 (28.0–32.0)
\$50,000–74,999	11.2 (7.9–15.8)	14.6 (14.1–15.0)	13.3 (12.3–14.5)	13.5 (12.0–15.1)
≥\$75,000	40.0 (31.6–49.0)	45.4 (44.5–46.3)	30.0 (28.1–32.0)	35.4 (33.2–37.7)
Population density, % (95% CI)				
CBSA of 1 million or more persons	46.2 (39.6–53.0)	55.7 (54.8–56.6)	48.9 (47.0–50.7)	53.9 (51.9–55.9)
CBSA of under 1 million persons	42.2 (35.0–49.8)	38.8 (38.0–39.7)	44.0 (42.1–45.9)	39.3 (37.4–41.2)
Not in a CBSA	11.6 (7.7–17.1)	5.5 (5.0–6.0)	7.1 (6.3–8.1)	5.8 (5.3–6.3)

CBSA = core-based statistical area; CI = confidence interval.  
Data: 2015–2018 National Survey on Drug Use and Health.

**Table 2**

Adolescent substance use and mental health characteristics by educational status

	Homeschooled	Public/private school, low dropout risk	Public/private school, at risk for dropout	Not in school
Sample size (weighted %)	307 (.6%)	41,898 (80.8%)	5,350 (9.8%)	4,534 (8.8%)
Prescription use and misuse, % (95% CI)				
Past-year opioid use	20.0 (14.3–27.2)	17.9 (17.5–18.4) <sup>c,d</sup>	23.9 (22.2–25.7) <sup>b</sup>	23.6 (22.0–25.3) <sup>b</sup>
Past-year opioid misuse	5.3 (3.2–8.8) <sup>b</sup>	2.8 (2.6–3.0) <sup>a,c,d</sup>	6.2 (5.5–7.0) <sup>b</sup>	5.2 (4.5–5.9) <sup>b</sup>
Past-year stimulant use	6.8 (3.6–12.5)	6.4 (6.1–6.7) <sup>c,d</sup>	11.1 (10.0–12.1) <sup>b</sup>	10.1 (9.1–11.2) <sup>b</sup>
Past-year stimulant misuse	1.6 (.6–4.4)	1.5 (1.4–1.7) <sup>c,d</sup>	3.1 (2.6–3.7) <sup>b</sup>	2.6 (2.1–3.2) <sup>b</sup>
Past-year benzodiazepine use	5.3 (3.1–9.2) <sup>b</sup>	2.5 (2.4–2.7) <sup>a,c,d</sup>	6.7 (5.9–7.6) <sup>b</sup>	5.9 (5.1–6.9) <sup>b</sup>
Past-year benzodiazepine misuse	2.4 (1.0–5.6)	1.3 (1.2–1.4) <sup>c,d</sup>	3.7 (3.1–4.4) <sup>b</sup>	3.1 (2.6–3.7) <sup>b</sup>
Other substance use, % (95% CI)				
Past-month binge alcohol use	6.9 (3.8–12.2)	4.6 (4.3–4.8) <sup>c,d</sup>	8.8 (8.0–9.7) <sup>b</sup>	8.0 (7.2–8.9) <sup>b</sup>
Past-year tobacco use	14.1 (9.7–20.0) <sup>b</sup>	8.5 (8.2–8.9) <sup>a,c,d</sup>	18.5 (16.9–20.1) <sup>b,d</sup>	15.9 (14.6–17.3) <sup>b,c</sup>
Past-year marijuana use	9.0 (5.7–14.0)	11.1 (10.8–11.5) <sup>c,d</sup>	21.4 (20.0–22.9) <sup>b,d</sup>	17.8 (16.5–19.1) <sup>b,c</sup>
Past-year non-marijuana illicit drug use	7.7 (4.8–12.2) <sup>b</sup>	3.7 (3.4–3.9) <sup>a,c,d</sup>	7.9 (7.0–8.9) <sup>b</sup>	6.6 (5.9–7.5) <sup>b</sup>
Past-year any SUD, % (95% CI)	3.9 (2.1–7.0)	3.4 (3.2–3.6) <sup>c,d</sup>	9.6 (8.5–10.8) <sup>b,d</sup>	7.2 (6.4–8.1) <sup>b,c</sup>
Past-year nicotine dependence, % (95% CI)	1.8 (.8–3.6) <sup>b</sup>	.3 (.2–.3) <sup>a,c,d</sup>	2.1 (1.7–2.6) <sup>b</sup>	1.4 (1.0–1.9) <sup>b</sup>
Past-year SUD treatment % (95% CI)	.9 (.4–2.2)	.5 (.4–.6) <sup>c,d</sup>	1.9 (1.5–2.5) <sup>b</sup>	1.7 (1.3–2.2) <sup>b</sup>
Mental health % (95% CI)				
Past-year major depression	10.8 (7.2–15.8) <sup>c</sup>	12.6 (12.1–13.2) <sup>c</sup>	23.4 (21.9–24.9) <sup>a,b,d</sup>	11.7 (10.3–13.3) <sup>c</sup>
Past-year mental health treatment	11.3 (7.1–17.7) <sup>b,c,d</sup>	22.7 (22.1–23.3) <sup>a,c</sup>	35.2 (33.5–36.9) <sup>a,b,d</sup>	23.6 (21.9–25.4) <sup>a,c</sup>

Past-year non-marijuana illicit drug use includes cocaine, heroin, methamphetamine, inhalant and/or hallucinogen use. Superscript letters denote differences from the group with the letter (i.e., a denotes a significant difference from homeschooled adolescents), with comparisons adjusted for age, race/ethnicity, sex, income, population density, and religiosity and Bonferroni corrected for multiple comparisons (i.e., *p* value for significance is .0083, or .05/6 comparisons).

CI = confidence interval; SUD = DSM-IV Substance Use Disorder.

Data: 2015–2018 National Survey on Drug Use and Health.

## Discussion

Public/private school adolescents at low dropout risk had the lowest prevalence rates of substance use, contrasting with prior research [3,4]. This difference was likely because Vaughn et al. [3] aggregated all adolescents, and Thomson and Jang [4] did not differentiate public/private school-attending adolescents by dropout risk. Adolescents not in school and those at risk for dropout have significantly higher substance use rates [7,9], highlighting the importance of comparison groups in studying homeschooled adolescents.

Similarly, homeschooled adolescents are diverse [1,2], and Hodge et al. [2] found that highly religious homeschooled adolescents had significantly lower substance use rates. Although the available sample size was not sufficient to replicate their latent classes, we accounted for self-reported religiosity in analyses, and homeschooled adolescents still had higher rates of past-year prescription opioid misuse, benzodiazepine use, tobacco use and nonmarijuana illicit drug use, and past-month nicotine dependence. In contrast, homeschooled adolescents had lower rates of major depression and psychopathology treatment, highlighting a potential strength.

Limitations include self-selection and response bias, the inability to infer causality (i.e., does elevated substance use result in homeschooling or vice versa?), and limited available measures. Adolescents with missing data differed from those with complete data, and only .6% of the sample was homeschooled, consistent with past research [3]. Still, 3.3% of adolescents nationwide are homeschooled, suggesting greater response bias among homeschooled adolescents.

Future research needs to account for within-group differences both in homeschooled and comparison adolescents, and investigations of whether the lower homeschooled rates of psychopathology treatment reflect better mental health or unmet treatment needs are warranted. In addition, future longitudinal research is needed to capture potential causality in the

relationships among educational status, substance use, and mental health. Policies are needed to limit adolescent dropout by addressing underlying factors, including substance use and academic factors [9]; screening for psychopathology is recommended in at-risk adolescents. As some homeschooled adolescents have elevated substance use rates, careful substance use screening for *all* adolescents is warranted.

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