

FINDINGS FROM THE **ADOLESCENT KENTUCKY TREATMENT OUTCOME STUDY (AKTOS)**

2024 Report



PROJECT ACKNOWLEDGEMENTS

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Suggested citation: Cole, J., Logan, T.,
& Scrivner, A. (2024). *Findings from the
Adolescent Kentucky Treatment Outcome
Study (AKTOS) 2024 Report*. Lexington, KY:
University of Kentucky, Center on Drug and
Alcohol Research.

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INTRODUCTION

Adolescence is a critical period of vulnerability to substance use. The neurodevelopment of the brain renders adolescents more vulnerable to addiction than adults.¹ Furthermore, the effects of substance use are more damaging to adolescents' brains than to adults' brains in many ways, and in some cases may have long-lasting effects.^{2,3,4,5} Early use of alcohol and drugs is a robust predictor of substance use disorders in adulthood.^{6,7} Even though the majority of adolescents who experiment with drug use curtail their use in young adulthood, most adults with a substance use disorder begin their substance use in adolescence.⁸ Symptomatic substance use disorder in adolescence is associated with SUD in middle age. For example, a longitudinal research has found that most adolescents with severe substance use disorder (SUD) at age 18 continued to have symptomatic substance use disorder at age 50.⁹ Adolescents with a SUD experience negative impacts in several areas of their lives: poorer relationships with family and peers, academic problems, riskier decision-making, mental health problems, and risk of overdose. Thus, early and effective treatment for substance use disorder among adolescents is a high priority for public health.

Substance use disorders in youth are best understood within the context of several interrelated problems,¹⁰ such as childhood adversity and victimization and comorbid mental health disorders.¹¹ An outcome evaluation of SUD treatment for adolescents benefits from examining outcomes beyond substance use exclusively. Several key psychosocial correlates that have been identified in research as contributing risk factors to substance use disorders among adolescents are included as outcomes in AKTOS (see Figure 1). First, adverse childhood experiences (ACE), defined as maltreatment and household dysfunction, are associated with initiating substance use during adolescence and increased risk of substance use disorders (see Figure 1).^{12,13} A specific type of ACE,

¹ Volkow, N., & Li, T.K. (2004). Drug addiction: The neurobiology of behavior gone awry. *Neuroscience*, 5, 963-970.

² Clark, D., Thatcher, D., & Tapert, S. (2008). Alcohol, psychological dysregulation, and adolescent brain development. *Alcohol Clinical and Experimental Research*, 32(3), 375-385.

³ Crews, F., He, J., & Hodge, C. (2007). Adolescent cortical development: A critical period of vulnerability for addiction. *Pharmacology, Biochemistry and Behavior*, 86(2), 189-199.

⁴ National Center on Addiction and Substance Abuse [CASA]. (2009). *Shoveling up II: The impact of substance abuse on federal, state and local budgets*. New York: The national Center on Addiction and Substance abuse at Columbia University.

⁵ Squeglia, L. M., Jacobus, J., & Tapert, S. F. (2009). The influence of substance use on adolescent brain development. *Clinical EEG Neuroscience*, 40(1), 31-38.

⁶ Grant, B. F., & Dawson, D. A. (1997). Age at onset of alcohol use and its association with DSM-IV alcohol abuse and dependence: Results from the National Longitudinal Alcohol Epidemiologic Survey. *Journal of Substance Abuse*, 9, 103-110.

⁷ Lopez-Quintero, C., Perez de los Cobos, J., Hasin, D.S., Okuda, M., Wang, S., Grant, B.F., & Blanco, C. (2011). Probability and predictors of transition from first use to dependence on nicotine, alcohol, cannabis, and cocaine: Results of the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC). *Drug & Alcohol Dependence*, 115(1-2), 120-130. DOI: 10.1016/j.drugalcdep.2010-11-004

⁸ King, K.M., & Chassin, L. (2007). A prospective study of the effects of age of initiation of alcohol and drug use on young adult substance dependence. *Journal of Studies on Alcohol and Drugs*, 68(2), 256-265.

⁹ McCabe, S.E., Schulenberg, J.E., Schepis, T.S., McCabe, V.V., & Veliz, P.T. (2022). Longitudinal analysis of substance use disorder symptom severity at age 18 years and substance use disorder in adulthood. *JAMA Network Open*. DOI: 10.1001/jamanetworkopen.2022.5324

¹⁰ Jessor, R., & Jessor, S. L. (1997). *Problem behavior and psychosocial development: A longitudinal study of youth*. New York: Academic Press.

¹¹ Whitesell, M., Bachand, A., Peel, J., & Brown, M. (2013). Familial, social, and individual factors contributing to risk for adolescent substance use. *Journal of Addiction*, Article ID 579310, 9 pages.

¹² Dube, S., Felitti, V., Dong, M., Chapman, D., Giles, W., & Anda, R. (2003). Childhood abuse, neglect and household dysfunction and the risk of illicit drug use: The Adverse Childhood Experience Study. *Pediatrics*, 111(3), 564-572.

¹³ Dube, S., Miller, J., Brown, D., Giles, W., Felitti, V., Dong, M., & Anda, R. (2006). Adverse childhood experiences and the association with ever using alcohol and initiating alcohol use during adolescence. *Journal of Adolescent Health*, 38(4), 444e1-10.

child maltreatment, is a robust predictor of adolescent substance use.^{14,15} Types of interpersonal victimization that are not typically classified as ACE include peer victimization and intimate partner violence, which are also associated with greater risk of substance use and substance use disorders.¹⁶ Greater parental involvement is associated with lower risk of substance use and substance use disorders.^{18,19} The relationship between substance use and academic achievement in childhood and adolescence is robust.^{20,21} There is a wealth of evidence that school difficulties precede substance use.^{22,23,24} Mental health problems such as depression, anxiety, attention deficit-hyperactivity disorder (ADHD), internalizing problems, and externalizing problems are strongly correlated with substance use and SUDs among adolescents.^{25,26,27} Moreover, comorbid mental health disorders are associated with poorer substance use outcomes following SUD treatment.^{28,29} Among youth involved in juvenile justice, SUDs are the most common mental disorder.³⁰ Substance use is associated with greater recidivism.^{31,32}

¹⁴ Tonmyr, L., Thornton, T., Draca, J., & Wekerle, C. (2010). A review of childhood maltreatment and adolescent substance use relationship. *Current Psychiatry Reviews*, 6, 223-234.

¹⁵ Hagborg, J.M., Thorvaldsson, V., & Fahlke, C. (2020). Child maltreatment and substance-use-related negative consequences: Longitudinal trajectories from early to mid adolescence. *Addictive Behaviors*, 106, 106365.

¹⁶ Luk, J. W., Wang, J., & Simons-Morton, B. G. (2010). Bullying victimization and substance use among U.S. adolescents: Mediated by depression. *Prevention Science*, 11, 355-359. doi: 10.1007/s11121-010-0179-0

¹⁷ Temple, J. R., & Freeman, D. H. (2011). Dating violence and substance use among ethnically diverse adolescents. *Journal of Interpersonal Violence*, 26, 701-718. doi: 10.1177/0886260510365858.

¹⁸ Broman, C., Reckase, M., & Freeman-Doan, C. (2006). The role of parenting in drugs use among Black, Latino, and White adolescents. *Journal of Ethnicity in Substance Abuse*, 5(1), 39-50.

¹⁹ Choquet, M., Hassler, C., Morin, D., Falissard, B., & Chau, N. (2008). Perceived parenting styles and tobacco, alcohol and cannabis use among French adolescents: Gender and family structure differentials. *Alcohol & Alcoholism*, 43(1), 73-80.

²⁰ Jaynes, W. (2002). The relationship between the consumption of various drugs by adolescents and their academic achievement. *American Journal of Drug and Alcohol Abuse*, 28, 1-21.

²¹ Maggs, J.L., Staff, J., Kloska, D.D., Patrick, M.E., O'Malley, P.M., & Schulenberg, J. (2015). Predicting young adult degree attainment by late adolescent marijuana use. *Journal of Adolescent Health*, 57(2), 205-211. doi: 10.1016/j.jadohealth.2015.04.028.

²² Bachman, J., O'Malley, P., Schulenberg, J., Johnston, L., Freedman-Doan, P., & Messersmith, E. (2008). *The education-drug use connections: How successes and failures in school relate to adolescent smoking, drinking, drug use, and delinquency*. New York, NY: Taylor & Francis Group/Lawrence Erlbaum Associates.

²³ Henry, K., & Huizinga, D. (2007). Truancy's effect on the onset of drug use among urban adolescents placed at-risk. *Journal of Adolescent Health*, 40(4), e9-e17.

²⁴ Henry, K., Knight, K., & Thornberry, T. (2012). School disengagement as a predictor of dropout, delinquency, and problem substance use during adolescence and early adulthood. *Journal of Youth and Adolescence*, 41(2), 156-166.

²⁵ Chan, Y., Dennis, M., & Funk, R. (2008). Prevalence and comorbidity of major internalizing and externalizing problems among adolescents and adults presenting to substance abuse treatment. *Journal of Substance Abuse Treatment*, 34, 14-24.

²⁶ Charach, A., Yeung, E., Climans, T., & Lillie, E. (2011). Childhood attention-deficit/hyperactivity disorder and future substance use disorders: comparative meta-analyses. *Journal of the American Academy of Child & Adolescent Psychiatry*, 50(1), 9-21.

²⁷ Wu, P., Hoven, C. W., Okezie, N., Fuller, C. J., & Cohen, P. (2008). Alcohol abuse and depression in children and adolescents. *Journal of Child & Adolescent Substance Abuse*, 17(2), 51-69.

²⁸ Tomlinson, K. L., Brown, S. A., & Abrantes, A. (2004). Psychiatric Comorbidity and Substance Use Treatment Outcomes of Adolescents. *Psychology of Addictive Behaviors*, 18(2), 160-169. <https://doi.org/10.1037/0893-164X.18.2.160>

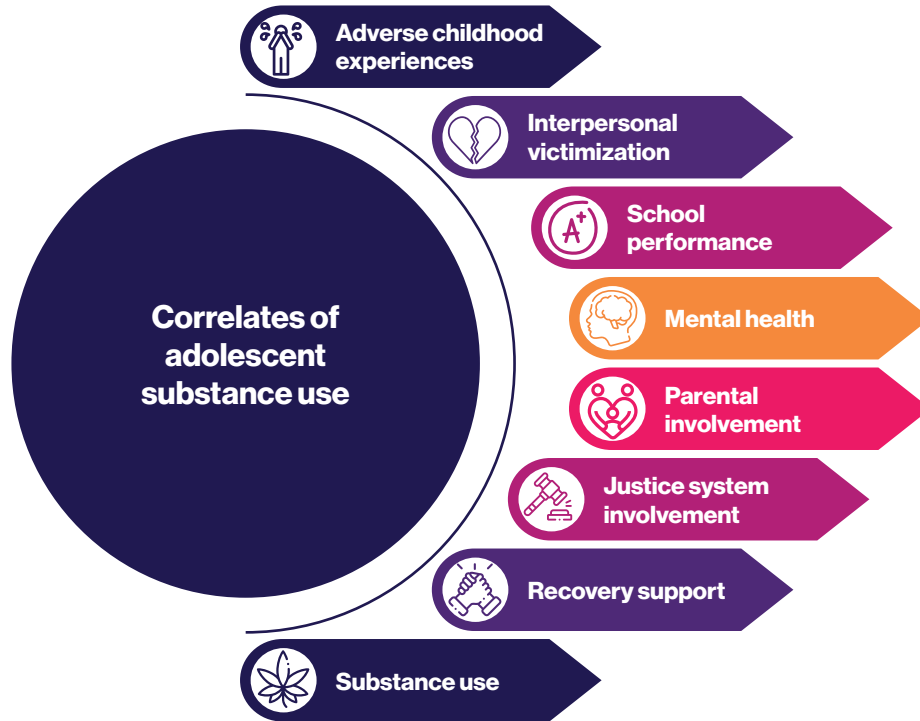
²⁹ Shane, P.A., Jasiukaitis, P., & Green, R.S. (2003). Treatment outcomes among adolescents with substance abuse problems: the relationship between comorbidities and post-treatment substance involvement. *Evaluation and Program Planning*, 26(4), 393-402.

³⁰ Teplin LA, Abram KM, McClelland GM, Dulcan MK, & Mericle AA (2002). Psychiatric disorders in youth in juvenile detention. *Archives of General Psychiatry*, 59 (12), 1133-1143. 10.1001/archpsyc.59.12.1133. [PubMed: 12470130]

³¹ Kopak AM, & Proctor SL (2016). Acute and chronic effects of substance use as predictors of criminal offense types among juvenile offenders. *Journal of Juvenile Justice*, 5, 50-64.

³² Tolou-Shams, M., Folk, J.B., Holloway, E.D., Ordorica, C.M., Dauria, E.F., Kemp, K., & Marshall, B.D. (2023). Psychiatric and substance-related problems predict recidivism for first-time justice-involved youth. *Journal of American Academy of Psychiatry & Law*, 51(1), 35-46. doi: 10.29158/JAAPL.220028-21.

FIGURE 1. CORRELATES OF ADOLESCENT SUBSTANCE USE ANALYZED AS OUTCOMES IN AKTOS



In the 2021-2022 National Survey on Drug Use & Health (NSDUH), among adolescents (ages 12-17) in Kentucky:

- 3.1% used tobacco products in the past month
- 5.9% used alcohol in the past month
- 3.1% binge alcohol use in the past month
- 6.4% used illicit drugs in the past month
- 4.5% used marijuana in the past month
- 1.9% used illicit drugs other than marijuana in the past month
- 9.0% used marijuana in the past year
- 8.4% had a substance use disorder in the past year
- 6.7% had a drug use disorder in the past year
- 3.0% had an alcohol use disorder
- 12.2% were classified as needing substance use treatment in the past year
- 4.7% received substance use treatment in the past year

Substance Abuse and Mental Health Services Administration, Center for Behavioral Health Statistics and Quality. (2023). *2021-2022 National Survey on Drug Use and Health: Model-Based prevalence estimates (50 states and the District of Columbia)*. Rockville, MD: SAMHSA. Retrieved on March 13, 2024 from <https://www.samhsa.gov/data/sites/default/files/reports/rpt44484/2022-nsduh-sae-tables-percent-CSVs/2022-nsduh-sae-tables-percent.pdf>.

Drug overdose deaths among adolescents have increased dramatically, largely because of fentanyl. From 2010 to 2019, annual drug overdose deaths among adolescents were stable, ranging between 2.36 per 100,000 (in 2019) to 2.40 per 100,000 (in 2010). Then in 2020 drug overdose deaths among adolescents increased to 4.57 per 100,000 and to 5.49 per 100,000 in 2021. Between 2019 and 2020, overdose mortality for adolescents increased by 94.03%.³³

³³ Friedman, J., Godvin, M., Shover, C.L., Gone, J.P., Hansen, H., Schriger, D.L. (2022). Trends in drug overdose deaths among US adolescents, January 2010 to June 2021. *JAMA*, 327(14), 1398-1399.

WHAT IS THE ADOLESCENT KENTUCKY TREATMENT OUTCOME STUDY (AKTOS)?

Kentucky's Community Mental Health Centers (CMHC) provide substance use disorder (SUD) treatment (including outpatient, intensive outpatient, residential, and case management) to adolescents (ages 12 - 17 years old). The Commonwealth of Kentucky funds SUD treatment programs using both federal block grants and state general fund dollars. To measure treatment effectiveness, the Division of Behavioral Health within the Department for Behavioral Health, Developmental and Intellectual Disabilities (DBHDID) funds the Adolescent Kentucky Treatment Outcome Study (AKTOS). The goal of AKTOS is to provide a biannual outcome evaluation for the DBHDID in partnership with the Behavioral Health Outcome Studies team at the University of Kentucky Center on Drug and Alcohol Research (UK CDAR).

Client-level outcome evaluation data provides valuable key performance indicator data on SUD. The IOM committee that examined how to establish evidence-based standards for psychosocial interventions for mental and substance use disorders conceptualized client-level outcomes as fitting into three categories:

1. target symptoms (e.g., substance use, depression, anxiety),
2. functional status (participation in school/work, relationships, community involvement) and
3. well-being (quality of life, recovery, client perceptions of care).³⁴

Recovery from a mental or substance use disorder is a more meaningful objective than solely abstaining/reducing substance use or a reduction in target symptoms. Recovery is "a process of change through which individuals improve their health and wellness, live self-directed lives, and strive to reach their full potential" (p. 3).³⁵ The client-level outcomes assessed in the AKTOS evaluation are presented within the classification of the IOM categories for outcomes in Figure 2.

FIGURE 2. CATEGORIES OF CLIENT-LEVEL OUTCOMES IN AKTOS

Target Symptoms	Functional Status	Well-being
<ul style="list-style-type: none"> ▪ Substance use ▪ Attention problems ▪ Internalizing problems ▪ Externalizing problems ▪ Suicidality ▪ Disordered eating 	<ul style="list-style-type: none"> ▪ School participation and performance ▪ Caregiver involvement ▪ Justice system involvement 	<ul style="list-style-type: none"> ▪ Recovery supports ▪ Perceptions of care

³⁴ Institute of Medicine. (2015). *Psychosocial interventions for mental and substance use disorders: A framework for establishing evidence-based standards*. Washington, DC: The National Academies Press. <https://doi.org/10.17226/19013>.

³⁵ Substance Abuse and Mental Health Services Administration (SAMHSA). (2012). *SAMHSA's working definition of recovery: 10 guiding principles of recovery*. Accessed at <https://store.samhsa.gov/sites/default/files/d7/priv/pep12-recdef.pdf>

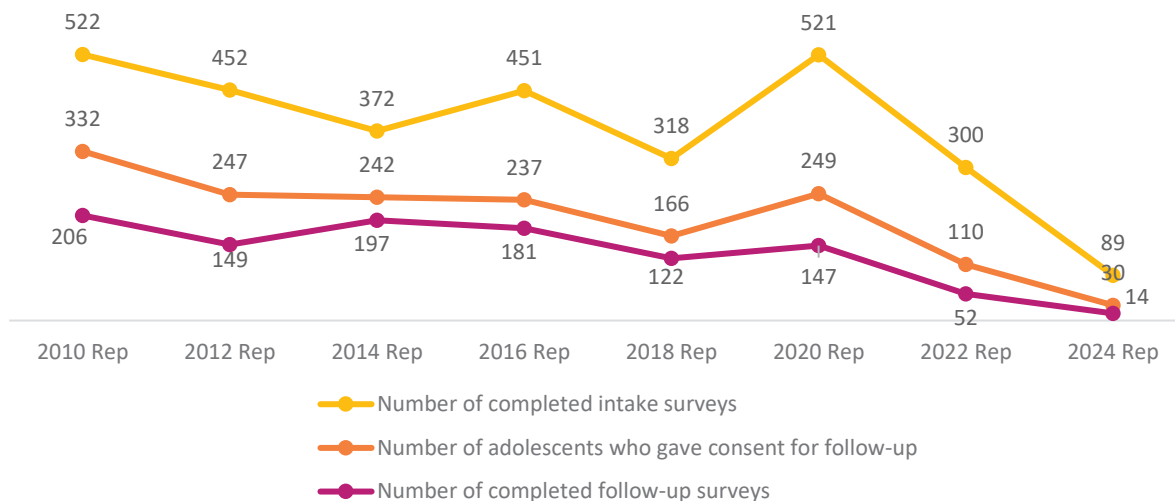
AKTOS collects self-reported data at two periods to evaluate outcomes. First, intake data are collected from adolescents by clinicians using an evidence-based assessment via a structured, online, secure survey as adolescents begin SUD treatment (i.e., intake survey). Second, among adolescents who give consent to be contacted for the follow-up survey, the CDAR team conducts telephone surveys with adolescents about 12 months after they completed the intake survey (i.e., follow-up survey).

At the completion of the intake interview, treatment staff inform clients about the opportunity to participate in the AKTOS follow-up study using a one-page description of the follow-up survey that is embedded in the AKTOS intake survey. About one-third of adolescents (33.7%) who completed an intake survey in FY 2021 and FY 2022 gave consent for be contacted for the follow-up interview.

According to the TEDS-Admission data for Kentucky, in 2020 and 2021, there were 342 admissions for 12-17 year old clients to SUD treatment, including duplicated clients.³⁶ In 2020, 98 (20.5%) of the 477 programs in Kentucky that participated in the annual National Survey of Substance Abuse Treatment Services (N-SSATS) reported that they had specifically tailored programs for adolescents. According to the 2020 N-SSATS 27,353 clients were in SUD treatment on March 31, 2020, with 473 (1.7%) being under the age of 18.³⁷

In the first seven AKTOS biannual reports, the number of completed intake surveys (for unduplicated clients per report period) fluctuated from a high of 522 for the 2010 report to a low of 300 in the 2022 report (see Figure 3). For this year's report, which corresponds to intake surveys conducted in FY 2021 and FY 2022, only 89 intake surveys were completed, which is a dramatic decrease.

FIGURE 3. NUMBER OF ADOLESCENTS WHO COMPLETED INTAKE SURVEYS, GAVE CONSENT TO BE CONTACTED FOR THE FOLLOW-UP SURVEY, AND COMPLETED THE FOLLOW-UP SURVEY BY REPORT YEAR³⁸



³⁶ Substance Abuse and Mental Health Services Administration (SAMHSA). (2024) TEDS-A Public Use Files, 2020 and 2021. Retrieved from <https://www.samhsa.gov/data/data-we-collect/teds-treatment-episode-data-set>.

³⁷ Substance Abuse and Mental Health Services Administration. (2022). *2020 state profile-Kentucky National Survey of Substance Abuse Treatment Services (N-SSATS)*. Retrieved from https://www.samhsa.gov/data/sites/default/files/reports/rpt35969/2020%20NSSATS%20State%20Profiles_FINAL.pdf on April 8, 2023.

³⁸ Because the target dates for the follow-up surveys are 12 months after the intake surveys are completed, and data cleaning, data analysis, and report writing takes several months, report data sets include intake surveys conducted in the following fiscal years: 2010 Report (FY 2007-2008), 2012 Report (FY 2009-2010), 2014 Report (FY 2011-2012), 2016 Report (FY 2013-2014), 2018 Report (FY 2015-2016), 2020 Report (FY 2017-2018), 2022 Report (FY 2019-2020), and 2024 Report (FY 2021-2022).

DESCRIPTION OF CLIENTS WHO COMPLETED AN INTAKE SURVEY

Of the 89 adolescents who completed an intake survey in FY 2020 and FY 2021:

AGE



15.5

Average age with 53.9% being 16 or 17 years old

GENDER



51.7%
Male



46.1%
Female



2.2%
Transgender

RACE



- **80.9%**, White
- **4.5%**, Black
- **4.5%**, American Indian
- **4.5%**, Hispanic
- **5.6%**, Multiracial

REFERRAL



- **42.7%**, Court (e.g., court designated worker, judge)
- **18.0%**, School
- **13.5%**, Decided on their own to participate
- **11.2%**, Department for Community Based Services
- **15.0%**, Other

Not all CMHC regions submitted AKTOS intake surveys from adolescents in FY 2020 and FY 2021.³⁹

SUBSTANCE USE AT TREATMENT INTAKE

Average ages of initiation of use:

12.9

Average age initiated smoking tobacco regularly

12.8

Average age initiated alcohol use (other than a few sips)

12.8

Average age initiated illicit drug use

³⁹ The following numbers of completed AKTOS intake surveys were submitted by the following CMHC region programs: RiverValley (n = 1), LifeSkills (n = 33), Communicare (n = 13), Pathways (n = 4), Kentucky River (n = 7), Cumberland River (n = 18), Adanta (n = 1), and New Vista (n = 12).

INITIATION OF ALCOHOL AND DRUG USE

Early initiation of substance use, which is typically defined as initiation before the age of 15, is a robust predictor of substance use disorders in adulthood.^{40,41} One study found that between ages 13 and 21, the likelihood of lifetime substance use disorder decreased 4-5% each year that initiation of substance was delayed.⁴² Looking at initiation of alcohol (i.e., more than a few sips) and use of any illicit drug, the average age for the intake sample was 12.3 years old (see Figure 4). Four-fifths of adolescents in the intake sample reported early initiation of substance use (i.e., 14 years old or younger).

FIGURE 4. AGES OF INITIATION OF ALCOHOL AND/OR DRUG USE AMONG ADOLESCENTS AT INTAKE (N = 84)⁴³

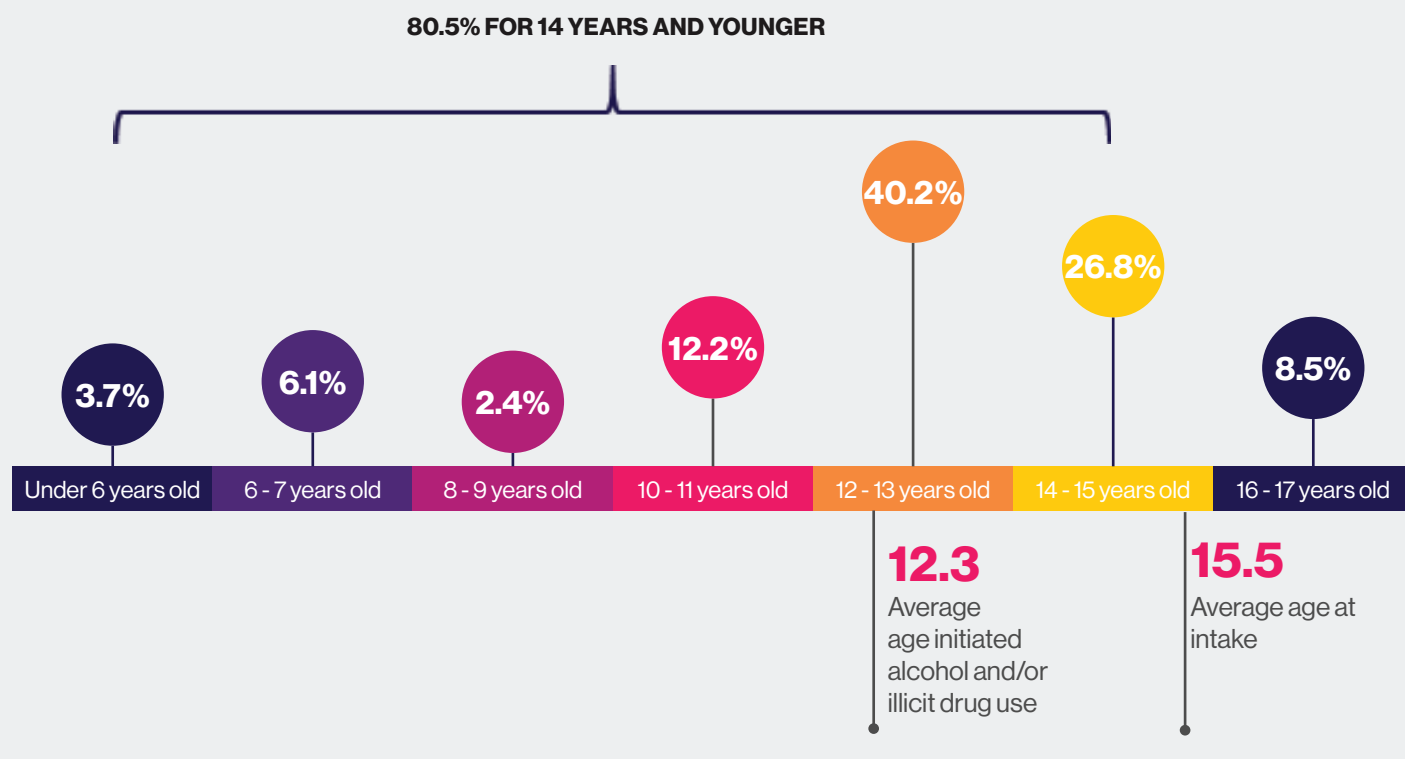


Figure 5 shows the percentage of adolescents who reported substance use in the 12 months before entering treatment. The vast majority of adolescents reported illicit drug use, and more than three-fourths reported using electronic vapor products. The majority of adolescents reported use of alcohol, about two-fifths smoked cigarettes, and only 13.5% used smokeless tobacco in the 12-month period. Use of e-cigarettes has reached epidemic proportions among youth.⁴⁴

⁴⁰ Feinstein, E.C., Richter, L., & Foster, S.E. (2012). Addressing the critical health problem of adolescent substance use through health care, research, and public policy. *Journal of Adolescent Health, 50*(5), 431-436. <https://doi.org/10.1016/j.jadohealth.2011.12.033>.

⁴¹ Moss, H.B., Chen, C.M., & Yi, H. (2014). Early adolescent patterns of alcohol, cigarettes, and marijuana polysubstance use and young adult substance use outcomes in a nationally representative sample. *Drug and Alcohol Dependence, 136*, 51-62.

⁴² Jordan, C.J., & Andersen, S.L. (2017). Sensitive periods of substance abuse: Early risk for the transition to dependence. *Developmental Cognitive Neuroscience, 25*, 29-44. <https://doi.org/10.1016/j.jdcn.2016.10.004>.

⁴³ Five adolescents had missing values for age of first use of alcohol and/or illicit drugs.

⁴⁴ Wang, T.W., Gentzke, A.S., Creamer, M.R., Cullen, K.A., Holder-Hayes, E., Sawdey, M.D., Anic, G.M., Portnoy, D.B., Hu, S., Homa, D.M., Jamal, A., & Neff, L.J. (2019). Tobacco product use and associated factors among middle and high school students—United States, 2019. *MMWR Surveillance Summary, 68* (SS-12): 1-22.

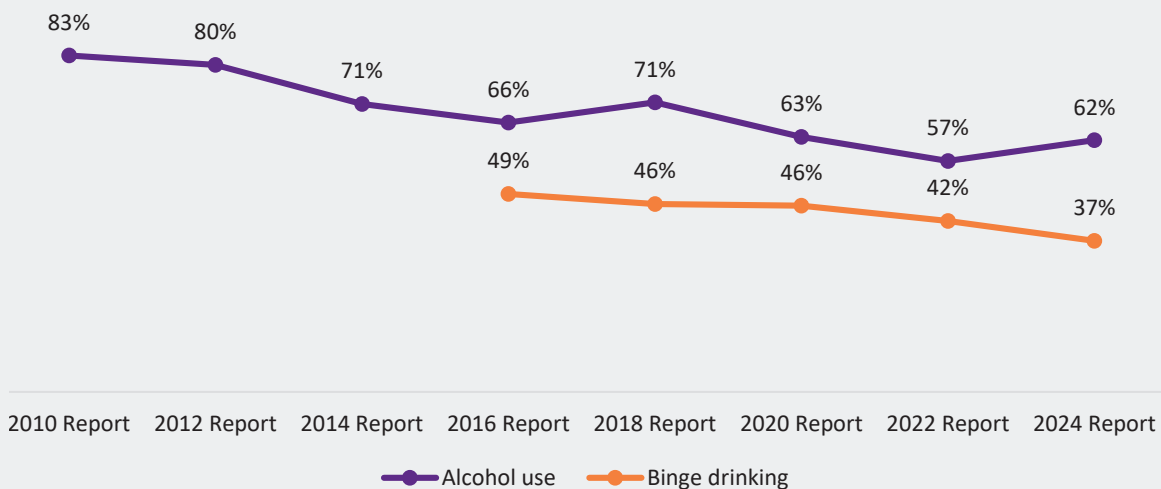
FIGURE 5. ALCOHOL, DRUG, AND NICOTINE USE AMONG ADOLESCENTS NOT IN A CONTROLLED ENVIRONMENT ALL 365 DAYS BEFORE PROGRAM ENTRY (N = 89)



TREND REPORT: ALCOHOL USE AND BINGE DRINKING AT INTAKE (N = 3,025)⁴⁵

The percent of adolescents who have reported using alcohol in the 12 months before entering treatment has decreased over time: from a high of 83% in the 2010 Report to a low of 57% in the 2022 Report. A measure of binge drinking⁴⁶ was added to the intake survey in FY 2013. Intake data for report years 2010 – 2014 did not include data on binge drinking. The percent of adolescents who have reported binge drinking alcohol has steadily decreased since the measure was first added to the intake surveys: from a high of 49% in the 2016 Report to a low of 37% in the 2024 Report.

FIGURE 6. TRENDS IN ALCOHOL USE AND BINGE DRINKING, 2010 - 2024

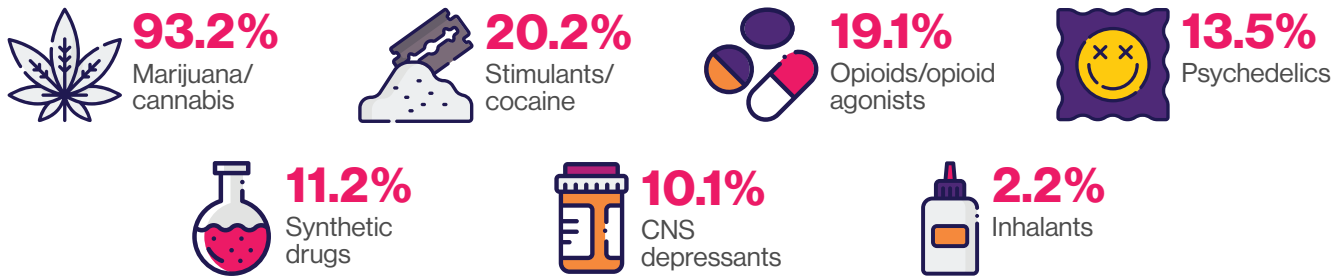


The specific classes of illicit drugs that higher percentages of adolescents reported they had used in the 12 months before entering treatment were marijuana (93.2%), stimulants/cocaine (20.2%), and opioid/opioid agonists (19.1%; including methadone, heroin, buprenorphine; see Figure 7). Smaller percentages of adolescents reported using psychedelics (13.5%), synthetic drugs (11.2%), CNS depressants (10.1%), and inhalants (2.2%). Thus, cannabis is by far the most commonly used substance in this sample. All individuals who reported using illicit drugs reported marijuana use.

⁴⁵ The sample size for binge drinking is 1,679.

⁴⁶ Binge drinking is defined as 5 or more alcoholic drinks in a 2-hr period for males or 4 or more alcoholic drinks for females in the same period. National Institute on Alcohol Abuse and Alcoholism [NIAAA]. (2004, Winter). NIAAA council approves definition of binge drinking. *NIAAA Newsletter, Winter 2004* (3). Rockville, MD: Department of Health and Human Services, National Institutes of Health, National Institute on Alcohol Abuse and Alcoholism.

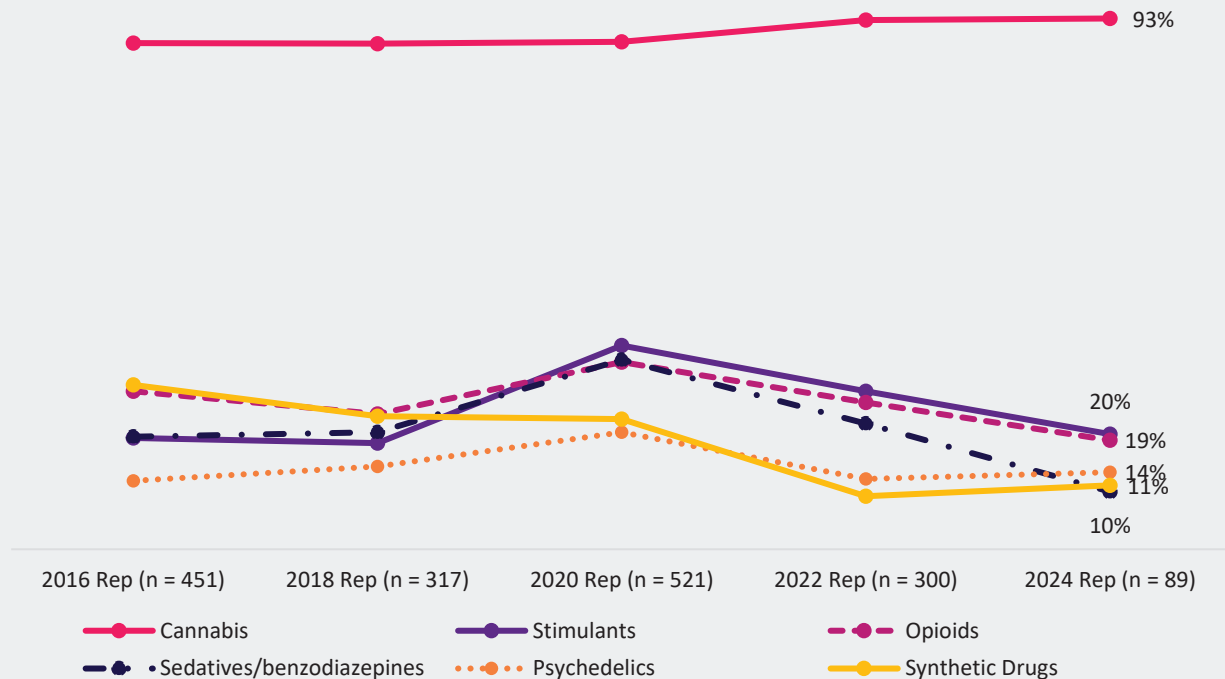
FIGURE 7. USE OF SPECIFIC CLASSES OF ILLICIT DRUGS IN THE 12 MONTHS BEFORE ENTERING THE PROGRAM (N = 89)



TREND REPORT: TRENDS IN DRUG USE

Over the years, cannabis/marijuana is, by far, the most frequently reported illegal drug adolescents report having used in the 12 months before entering treatment. Synthetic drugs was the second most frequently reported drug class in the 2016 report, and one of the least frequently reported drug class in this report. Stimulant use peaked in the 2020 report.

FIGURE 8. PERCENT OF ALL CLIENTS WITH A COMPLETED INTAKE SURVEY REPORTING CANNABIS, STIMULANT, NON-PRESCRIBED USE OF PRESCRIPTION OPIOIDS, NON-PRESCRIBED USE OF SEDATIVES/BENZODIAZEPINES, PSYCHEDELICS, AND SYNTHETIC DRUGS IN THE 12 MONTHS BEFORE ENTERING TREATMENT AT THE CMHC (N = 1,678)⁴⁷



⁴⁷ Clients who reported being in a controlled environment all 365 days before entering treatment are not included in this analysis.

POLYSUBSTANCE USE

A small percent of adolescents reported no drug use: 4.5% no alcohol or drug use, and 2.2% alcohol use only (see Figure 9). Under one-fourth reported the only substance they used was marijuana/cannabis, while 29.2% used alcohol and marijuana (no other drugs). One in 10 reported using more than one drug class without alcohol use. About 3 in 10 reported using alcohol and more than one drug class in the 12 months before entering treatment.

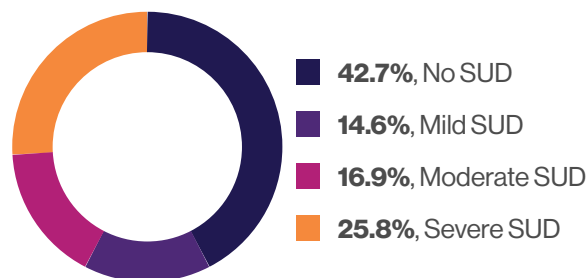
FIGURE 9. POLYSUBSTANCE USE IN THE 12 MONTHS BEFORE ENTERING THE PROGRAM (N = 89)



SEVERITY OF SUBSTANCE USE DISORDER

A sizeable minority of adolescent clients (42.7%) reported symptoms that did not meet criteria for a substance use disorder (alcohol or illicit drug) at intake (see Figure 10). Smaller percentages reported symptoms that met criteria for a mild SUD (14.6%), and moderate SUD (16.9%). About one-fourth (25.8%) were classified as having a severe SUD.

FIGURE 10. SEVERITY OF SUBSTANCE USE DISORDER IN THE 12 MONTHS BEFORE ENTERING THE PROGRAM (N = 89)

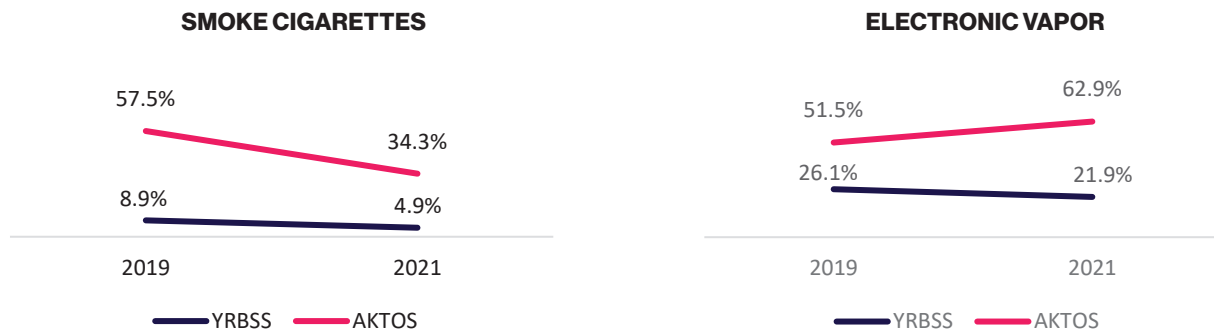


In the general population of Kentucky high school students, according to the Youth Risk Behavior Surveillance System (YRBSS), the percent who smoked cigarettes in the past 30 days has been decreasing in recent years, while the percent who used electronic vapor products has been higher than the percent who smoked cigarettes. The same pattern is evident among the adolescents in AKTOS (see Figure 11). The percent of adolescents in AKTOS reporting smoking tobacco and using electronic vapor products is much higher than the percent of adolescents in the general population of high school students in Kentucky.^{48,49}

⁴⁸ Centers for Disease Control and Prevention. (2024). *High school Youth Risk Behavior Survey: Kentucky, 2019*. Atlanta, GA: CDC. Retrieved on March 20, 2024 from <https://nccd.cdc.gov/youthonline/App/Results.aspx?LID=KY>

⁴⁹ Centers for Disease Control and Prevention. (2024). *High school Youth Risk Behavior Survey: Kentucky, 2021*. Atlanta, GA. Retrieved on March 20, 2024 from <https://nccd.cdc.gov/youthonline/App/Results.aspx?LID=KY>

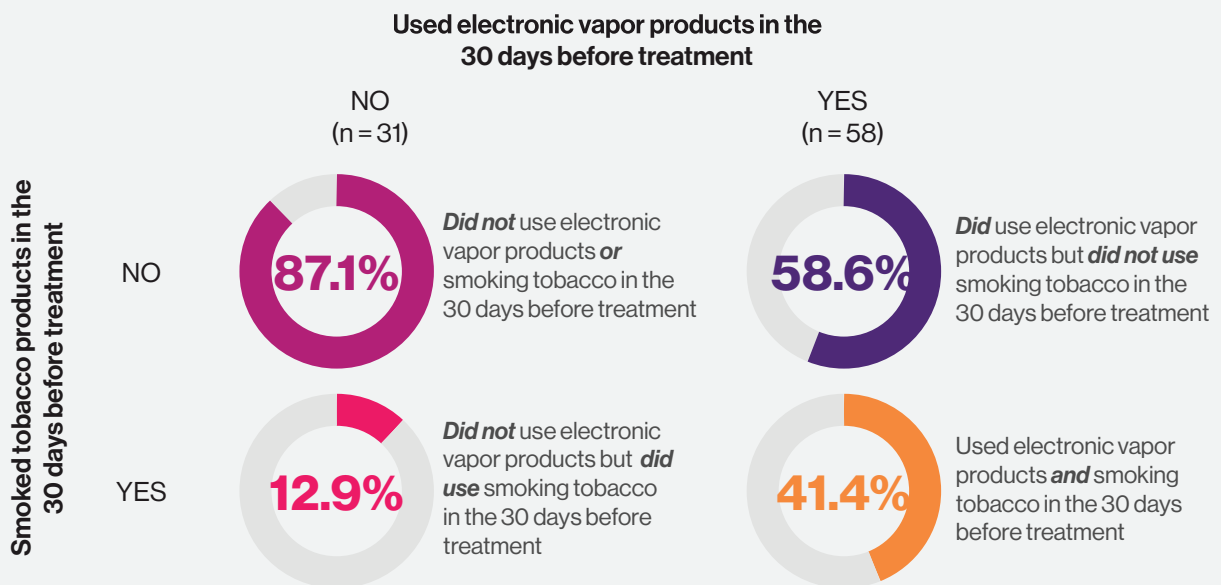
FIGURE 11. SMOKING CIGARETTES AND ELECTRONIC VAPOR USE IN THE PAST 30 DAYS FOR HIGH SCHOOL STUDENTS IN KENTUCKY AND IN AKTOS INTAKE SAMPLE⁵⁰



NICOTINE USE: SMOKING TOBACCO AND USE OF ELECTRONIC VAPOR PRODUCTS (N = 89)

A meta-analysis of nine longitudinal studies found that use of electronic vapor products was associated with a greater risk of future cigarette smoking, even after controlling for demographic, psychosocial, and behavioral risk factors.⁵¹ Over one-fourth of adolescents (27.0%, n = 24) reported smoking tobacco and use of electronic vapor products in the 30 days before entering treatment (see Figure 12). Among the 58 adolescents who reported electronic vapor use in the 30 days before treatment, 41.4% reported also smoking tobacco in the same period. Among the 31 adolescents who did not use electronic vapor products in the 30 days before treatment, 87.1% did not smoke tobacco products in those 30 days.

FIGURE 12. USE OF ELECTRONIC VAPOR AND SMOKING TOBACCO PRODUCTS IN THE 30 DAYS BEFORE TREATMENT



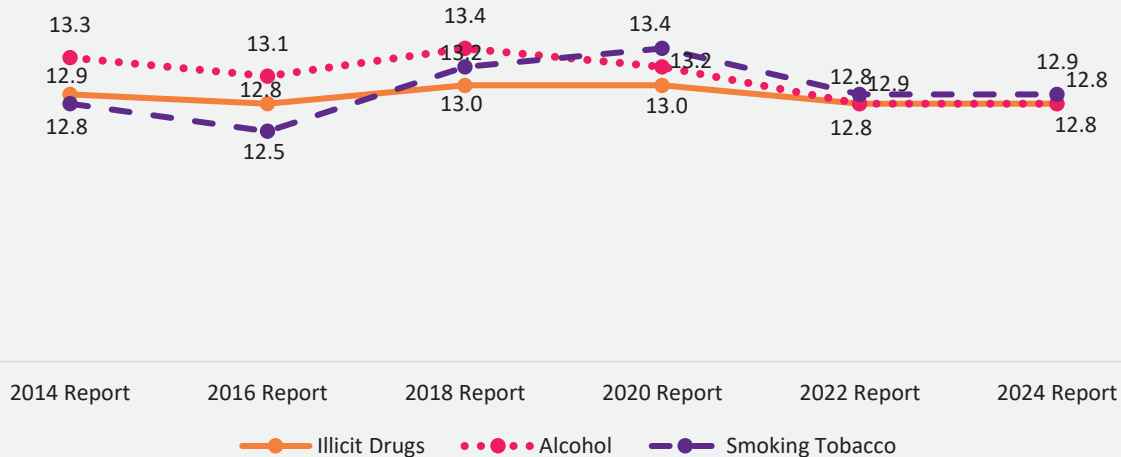
⁵⁰ The sample for AKTOS was restricted to adolescents who completed their intake survey in the corresponding calendar year (e.g., 2019 or 2021) to compare to the YRBSS data.

⁵¹ Soneji, S., Barrington-Trimis, J.L., Willis, T.A., Leventhal, A.M., Unger, J.B., Gibson, L.A., Yang, J., Primach, B.A., Andrews, J.A., Miech, R.A., Spindle, T.R., Dick, D.M., Eissenberg, T., Hornik, R.C., Dang, R., & Sargent, J.D. (2017). Association between initial use of e-cigarettes and subsequent cigarette smoking among adolescents and young adults: A systematic review and meta-analysis. *JAMA Pediatrics*, 171(8), 788-797. Doi:10.1001/jamapediatrics.2017.1488.

TREND REPORT: AGE OF INITIATION OF SUBSTANCE USE

Youth were asked, at intake, how old they were when they first began to use illicit drugs, when they had their first alcoholic drink (more than a few sips), and when they began smoking tobacco (i.e., not vaping) regularly (see Figure 13). The age of first use for illicit drugs and alcohol remained relatively steady for the first four biannual reports for individuals included in the intake sample. Average ages of first regular use of smoking tobacco, first use of alcohol and illicit drugs were similar (between 12.8 and 12.9) in report years 2022 and 2024.

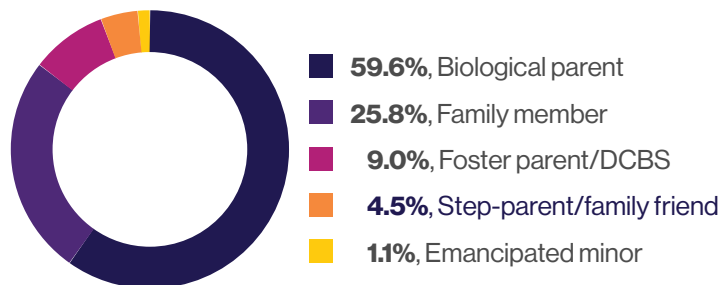
FIGURE 13. TRENDS IN AGE OF FIRST USE REPORTED AT INTAKE, 2014-2024



CAREGIVER RELATIONSHIP AND LIVING SITUATION

The majority (59.6%) reported their primary caregiver was a biological parent, about one-fourth (25.8%) reported other family members as their primary caregiver (see Figure 14). Small percentages had a foster parent/DCBS (9.0%), and (4.5%) step-parent/ex-partner of parent or family friend as their primary caregiver. One individual was an emancipated minor at intake.

FIGURE 14. PRIMARY CAREGIVER AT INTAKE



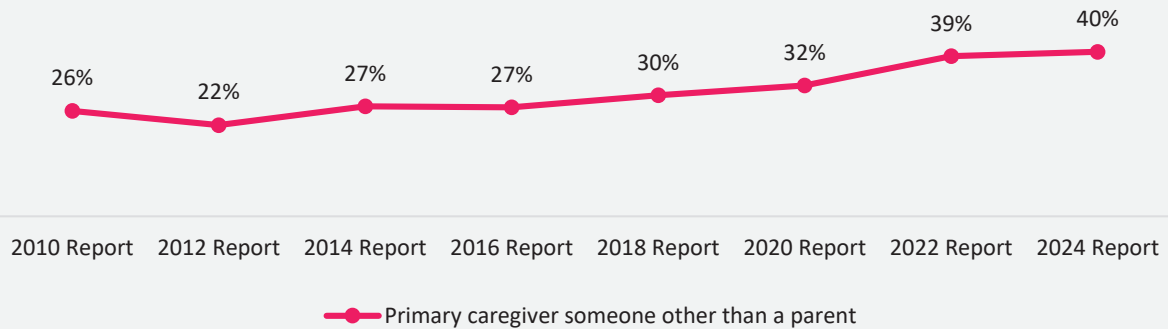
The average score on the caregiver involvement scale for the 88 adolescents who were not emancipated minors was 16.0 (Min. = 6, Max. = 24).

The majority of clients reported they had lived with their biological parents (71.9%), other family members (36.0%), in an institution (21.3%; e.g., group home, residential treatment, juvenile detention), and in foster care (11.2%) in the 12 months before entering the program.

TREND REPORT: SOMEONE OTHER THAN BIOLOGICAL PARENT IS THE ADOLESCENT'S PRIMARY CAREGIVER AT INTAKE (N = 3,025)

Since the second biannual report, in 2012, the percent of adolescents who have reported their primary caregiver was someone other than a biological parent has increased.

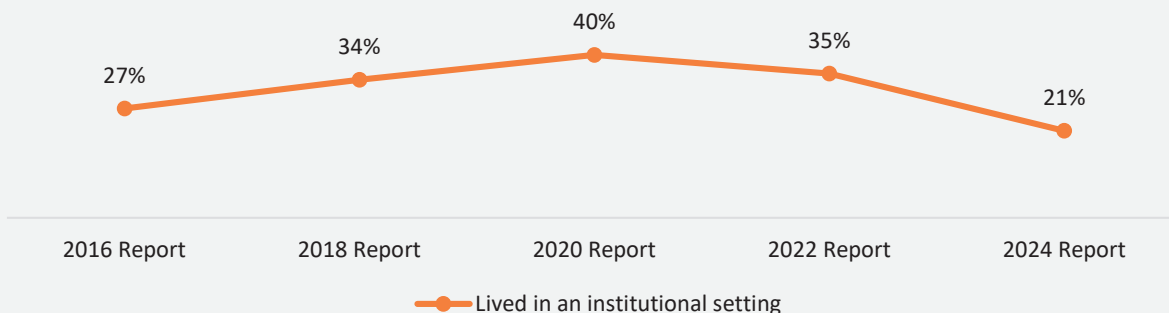
FIGURE 15. TRENDS IN SOMEONE OTHER THAN BIOLOGICAL PARENT BEING PRIMARY CAREGIVER AT INTAKE, 2010-2024



TREND REPORT: ADOLESCENT LIVED IN AN INSTITUTIONAL SETTING AT SOME POINT IN THE 12 MONTHS BEFORE ENTERING TREATMENT (N = 1,679)⁵²

The percent of adolescents who reported living in an institutional setting in the 12 months before they entered treatment has ranged from a low of 21% in the 2024 Report to a high of 40% in the 2020 Report (see Figure 16).

FIGURE 16. TRENDS IN ADOLESCENT LIVING IN AN INSTITUTIONAL SETTING AT SOME POINT IN THE 12 MONTHS BEFORE ENTERING TREATMENT, 2016-2024



⁵² Intake surveys before July 2012 asked about living situations in the 6 months before entering treatment; therefore, the period is not comparable to the report years from 2016 to 2024 that asked about living situations in the 12 months before entering treatment.

LIFETIME ADVERSE CHILDHOOD EXPERIENCES AND INTERPERSONAL VICTIMIZATION

In this sample of adolescents, a little more than 1 in 10 reported no adverse childhood experiences, with 44.9% reporting 1 to 3, 28.1% 4 to 6, and 15.7% reporting 7 or more (see Figure 17). The average number of adverse childhood experiences reported by the 89 adolescents was 3.4, with no significant difference by gender.

FIGURE 17. NUMBER OF ACE IN LIFETIME

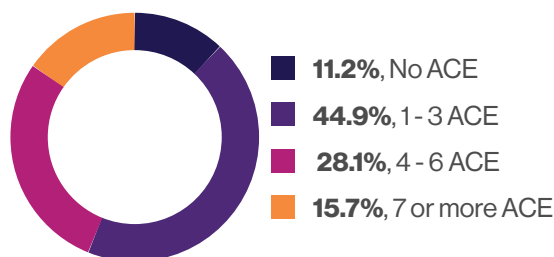
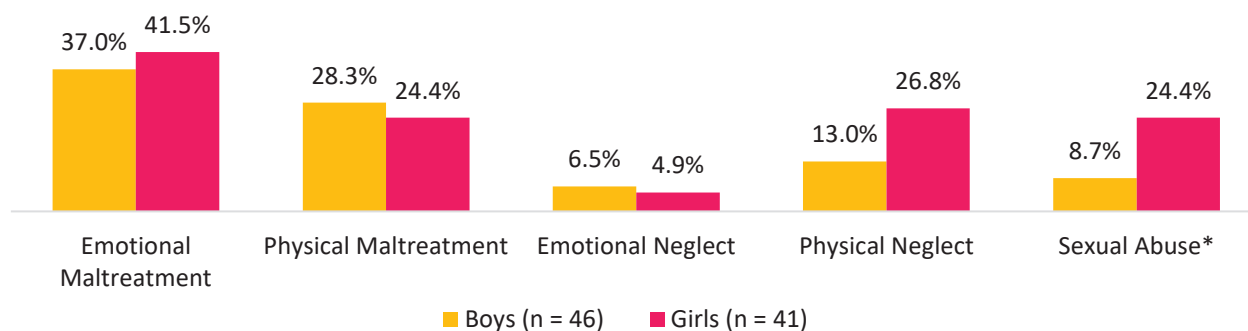


Figure 18 presents the percent of clients who reported each type of maltreatment and abuse included in the ACE study by gender. The only significant gender difference was for sexual abuse; nearly one fourth of girls (24.4%) reported sexual abuse, which was greater than the percent of boys who reported sexual abuse (8.7%). Nearly one-half of adolescents (48.3%) reported at least one of the types of maltreatment (not depicted in a figure).

FIGURE 18. ADVERSE CHILDHOOD EXPERIENCES OF MATREATMENT AND ABUSE AT INTAKE BY GENDER (N = 87)⁵³

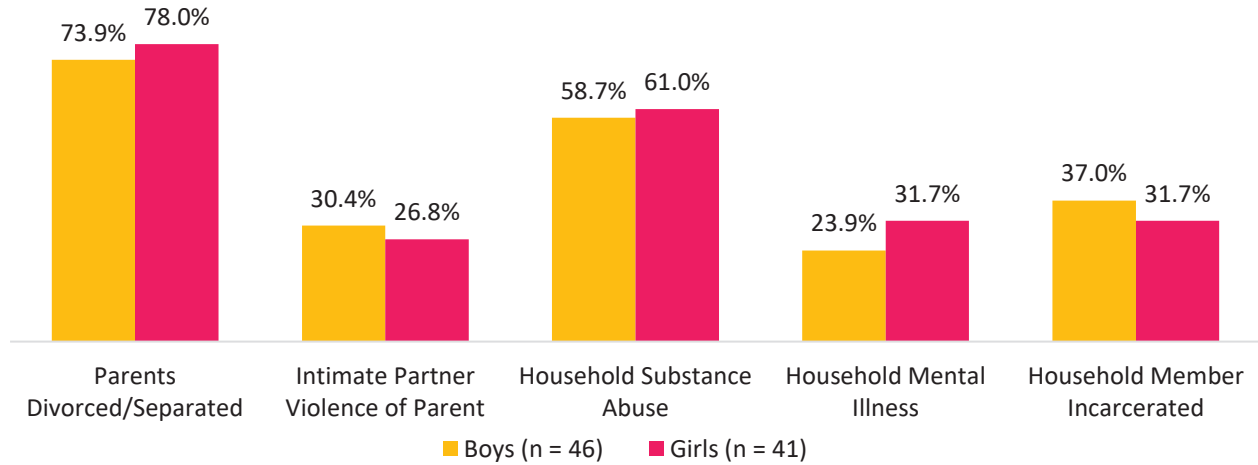


*p < .05.

The majority of male and female clients reported the following household risks: parents divorced/separated and substance abuse in the household (see Figure 19). More than one-third of clients overall reported a household member had been incarcerated and more than one-fourth of clients reported they had witnessed intimate partner violence against a parent, and a household member had mental health disorder or had attempted suicide. The majority of adolescents (86.2%) reported at least one of the types of household risks (not depicted in Figure).

⁵³ Two individuals who reported they were transgender were not included in this analysis by gender, because two cases is too few for statistical comparison.

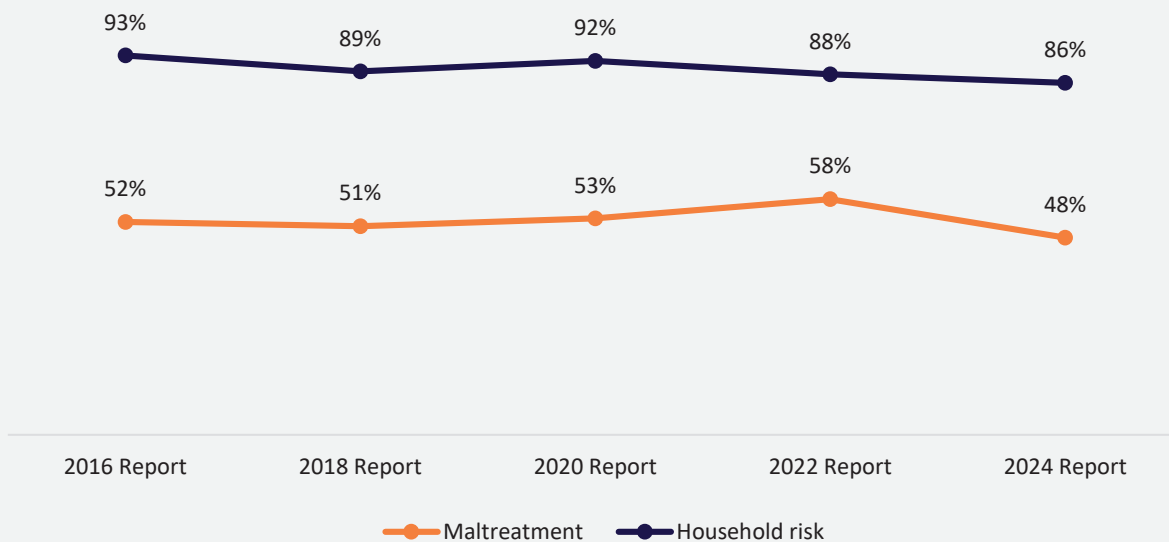
FIGURE 19. ADVERSE CHILDHOOD EXPERIENCES OF HOUSEHOLD RISK AT INTAKE BY GENDER (N = 87)⁵⁴



TREND REPORT: ADVERSE CHILDHOOD EXPERIENCES AT INTAKE (N = 1,679)

Since the 2016 report, when questions about adverse childhood experiences were incorporated into the evidence-based assessment for AKTOS, around half of adolescents reported at intake that they had experienced maltreatment/abuse in their household (including emotional neglect, physical neglect, emotional maltreatment, physical maltreatment, and sexual abuse). A higher percent of clients (58%) reported any type of maltreatment/abuse in the 2022 report data (see Figure 20). The vast majority of adolescent clients who completed an intake survey reported they had experienced at least one of the household risks included in the ACE Study: parents divorced/separated, IPV of a parent, household substance use, household mental illness, and household member incarcerated.

FIGURE 20. TRENDS IN ADVERSE CHILDHOOD EXPERIENCES AT INTAKE, 2016-2024



⁵⁴ Two individuals who reported they were transgender were not included in this analysis by gender, because two cases is too few for statistical comparison.

FIGURE 21. OTHER ADVERSE CHILDHOOD EXPERIENCES AT INTAKE BY GENDER (N = 87)⁵⁵

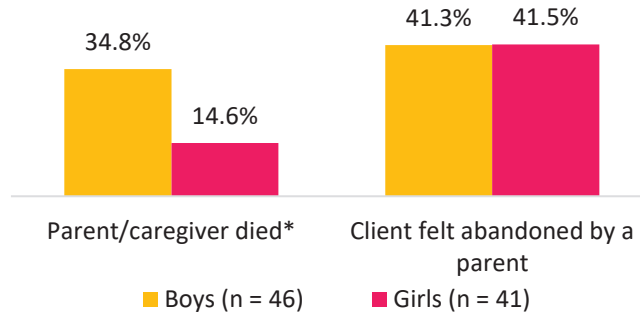
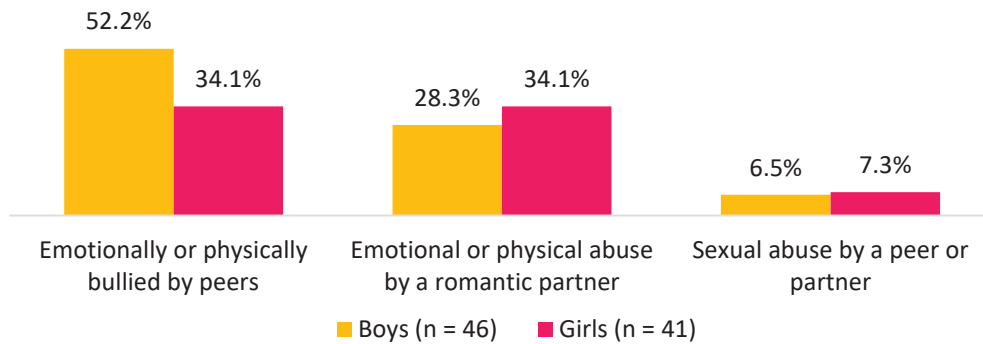


FIGURE 22. INTERPERSONAL VICTIMIZATION BY PEERS OR ROMANTIC PARTNERS AT INTAKE BY GENDER (N = 87)⁵⁶



MENTAL HEALTH AT INTAKE

About two-fifths of adolescents had scores on the Pediatric Symptom Checklist (PSC)-17 that suggested attention problems (40.4%) and internalizing problems (41.6%). About 1 in 10 had scores suggesting significant externalizing problems (11.2%).



Two-fifths of adolescents reported at least one of the symptoms of disordered eating (40.4%). Nearly one-third reported (32.6%) experiencing suicidal thoughts or attempting suicide in the 12 months before entering treatment.



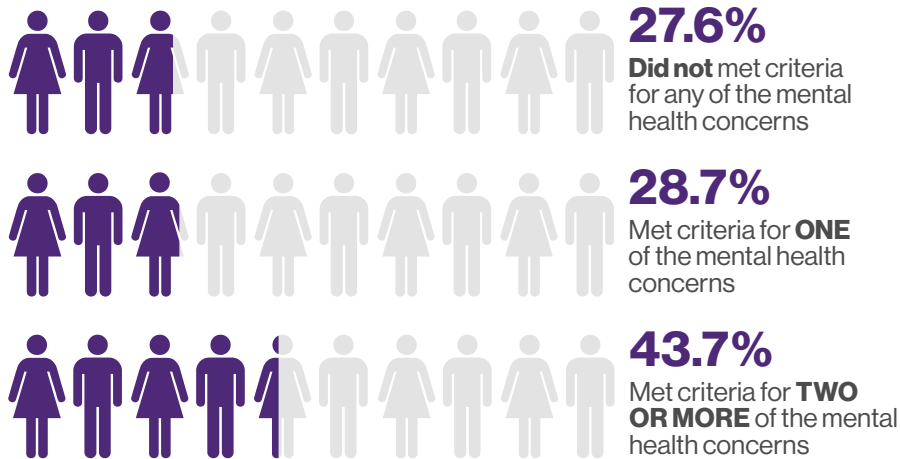
⁵⁵ Two individuals who reported they were transgender were not included in this analysis by gender, because two cases is too few for statistical comparison.

⁵⁶ Two individuals who reported they were transgender were not included in this analysis by gender, because two cases is too few for statistical comparison.

MULTIPLE MENTAL HEALTH CONCERNS

A little more than one-fourth of adolescents (27.6%) did not meet criteria for any of the mental health concerns (e.g., internalizing problems, externalizing problems, attention problems, disordered eating, and suicidality), a little more than one-fourth (28.7%) met criteria for one of the mental health concerns, and 43.7% met criteria for two or more of the mental health concerns at intake.

FIGURE 23. PERCENT OF CLIENTS REPORTING MENTAL HEALTH CONCERNS AT INTAKE (N = 89)



ADVERSE CHILDHOOD EXPERIENCES, MENTAL HEALTH, AND SEVERITY OF SUBSTANCE USE DISORDER AT INTAKE

The associations between adverse childhood experiences, mental health problems and the severity of substance use disorder reported at treatment intake are presented in Table 1. The number of ACE was significantly correlated with all the scores for the mental health problems: internalizing problems, externalizing problems, attention problems, and number of disordered eating symptoms. With the exception of one pair, all pairs of mental health measures were significantly correlated with each other; the exception is externalizing problems and number of disordered eating symptoms. All mental health measures were significantly correlated with the number of SUD symptoms. The number of ACE and number of SUD symptoms were not significantly correlated.

TABLE 1. BIVARIATE CORRELATIONS OF NUMBER OF ACE, SCORES ON MENTAL HEALTH SCALES, AND NUMBER OF SUD SYMPTOMS AT INTAKE (N = 89)

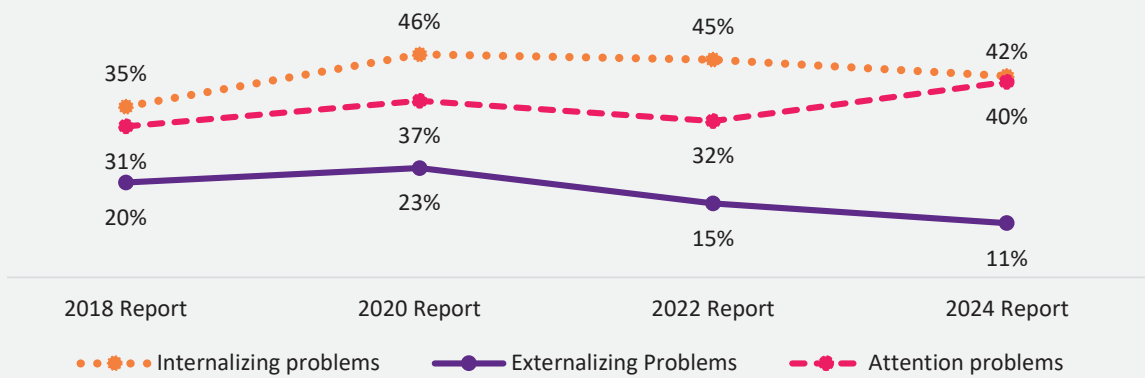
	Number of ACE	Score on PSC-17 Internalizing Problems	Score on PSC-17 Externalizing Problems	Score on PSC-17 Attention Problems	Number of disordered eating symptoms	Number of SUD symptoms
Number of ACE	1					
Score on PSC-17 Internalizing Problems.....	.442***	1				
Score on PSC-17 Externalizing Problems.....	.213*	.504***	1			
Score on PSC-17 Attention Problems.....	.294**	.538***	.545***	1		
Number of disordered eating symptoms.....	.291**	.389***	.176	.247*	1	
Number of SUD symptoms173	.358***	.372***	.335***	.439***	1

*p < .05, **p < .01, ***p < .001.

TREND REPORT: MEETING SCREENING CRITERIA FOR MENTAL HEALTH CONCERNS AT INTAKE (N = 1,228)

Since the 2018 report, when questions from the Pediatric Screening Checklist (PSC-17) were incorporated into the evidence-based assessment for AKTOS, between 35% and 46% of adolescents have met screening criteria for internalizing problems at intake. The percent of adolescents who have met screening criteria for attention problems has increased from 31% in the 2018 Report to 40% in the 2024 Report. The percent of adolescents meeting criteria for externalizing problems has decreased over time.

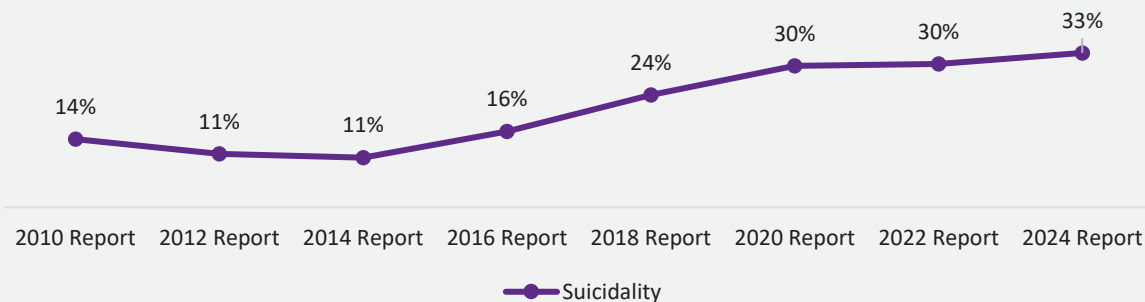
FIGURE 24. TRENDS IN MEETING SCREENING CRITERIA FOR MENTAL HEALTH CONCERNS AT INTAKE, 2018-2024



TREND REPORT: REPORTED SUICIDAL IDEATION OR SUICIDE ATTEMPTS AT INTAKE (N = 3,025)

Over time, the percent of adolescents who have reported having suicidal ideation and/or attempted suicide in the 12 months before entering treatment has increased. In the first four biannual reports, the percentages ranged from 11% to 16%. Then from 2018 to the 2024 Reports, the percent has increased from 24% to 33%.

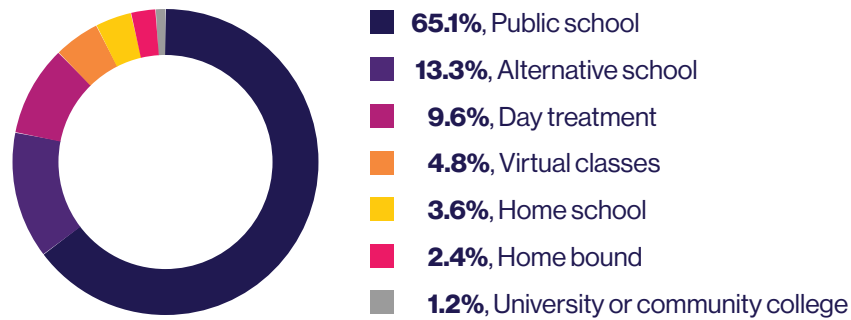
FIGURE 25. TRENDS IN REPORTED SUICIDAL IDEATION OR SUICIDE ATTEMPTS AT INTAKE, 2010-2024



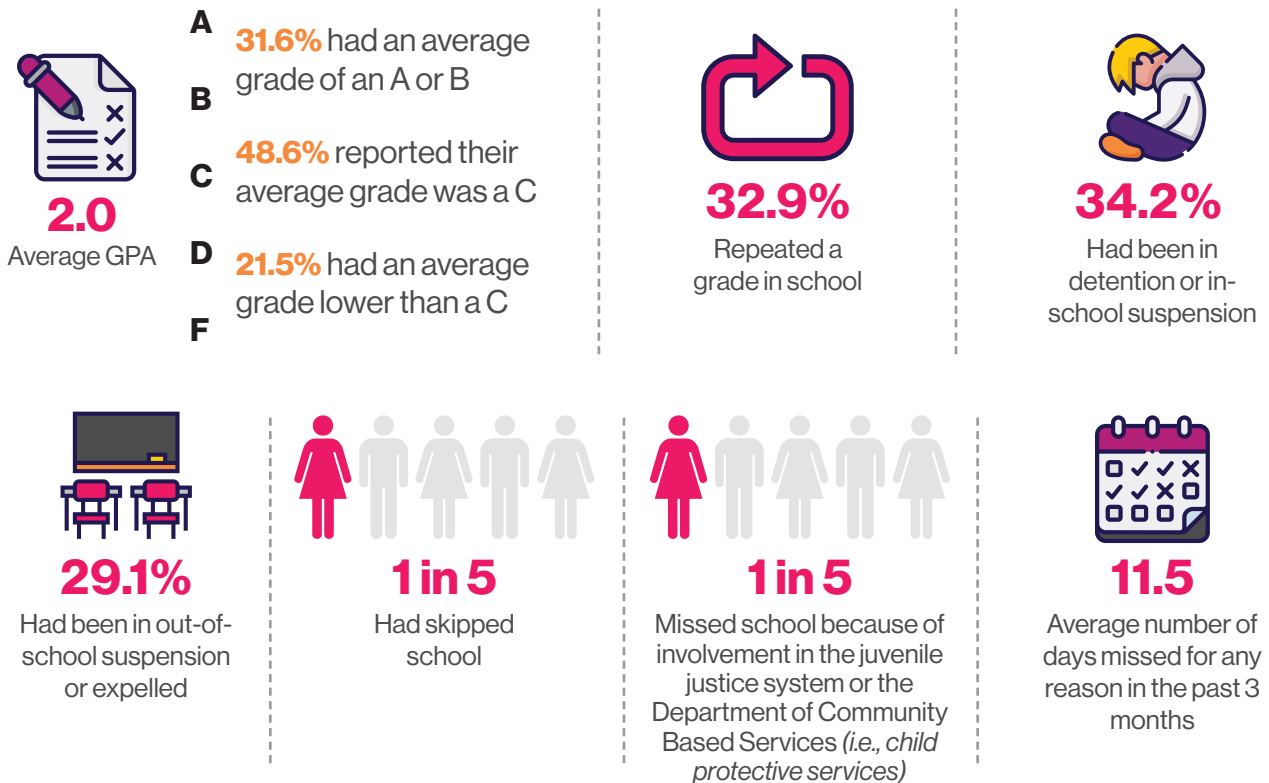
SCHOOL ATTENDANCE AND PERFORMANCE

At intake, 92.1% (n = 82) adolescents were enrolled in school and had not completed secondary school, 6.7% (n = 6) had a high school diploma, and 1.1% (n = 1) had dropped out of school before graduation. Among the 83 adolescents who did not have a high school diploma at intake, the majority was enrolled in public school (65.1%) and 13.3% in alternative school and 9.6% in day treatment (see Figure 26).

FIGURE 26. TYPE OF SCHOOL ATTENDING AT INTAKE (N = 83)



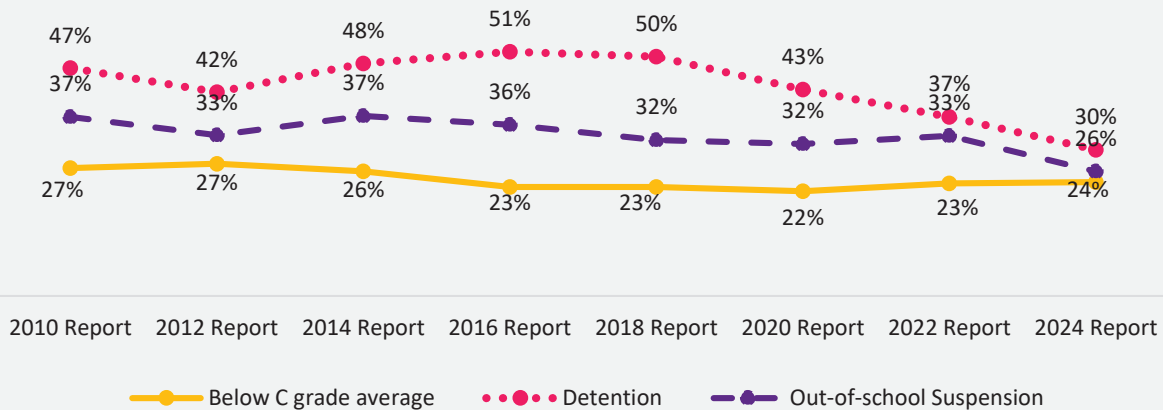
Among adolescents who attended school in the last 3 months that school was in session (n = 79):



TREND REPORT: HAD AN AVERAGE GRADE LESS THAN A C, HAD BEEN IN DETENTION OR IN-SCHOOL SUSPENSION, OR OUT-OF-SCHOOL SUSPENSION AT INTAKE (N = 2,051)

Among the adolescents who were enrolled in school in the last 3 months school was in session, the percentage of adolescents who reported they had an average grade less than a C at intake was between 22% to 27% over the 8 reports (see Figure 27). Detention or in-school suspensions were reported by between 37% to 51% of adolescents and out-of-school suspensions were reported by 32% to 37% of adolescents enrolled in school for the first seven reports (i.e., 2010 – 2022 reports). Adolescents who completed intake surveys for the 2024 report were reporting on school during the pandemic shutdown period. School systems in Kentucky had varying periods that students received instruction virtually and did not attend school in person. Students who attended school virtually would necessarily report lower rates of in-school suspension/detention or out-of-school suspension.

FIGURE 27. TRENDS IN HAVING AN AVERAGE GRADE LESS THAN A C, HAVING BEEN IN DETENTION OR IN-SCHOOL SUSPENSION, OR OUT OF SCHOOL SUSPENSION AT INTAKE, 2010-2024



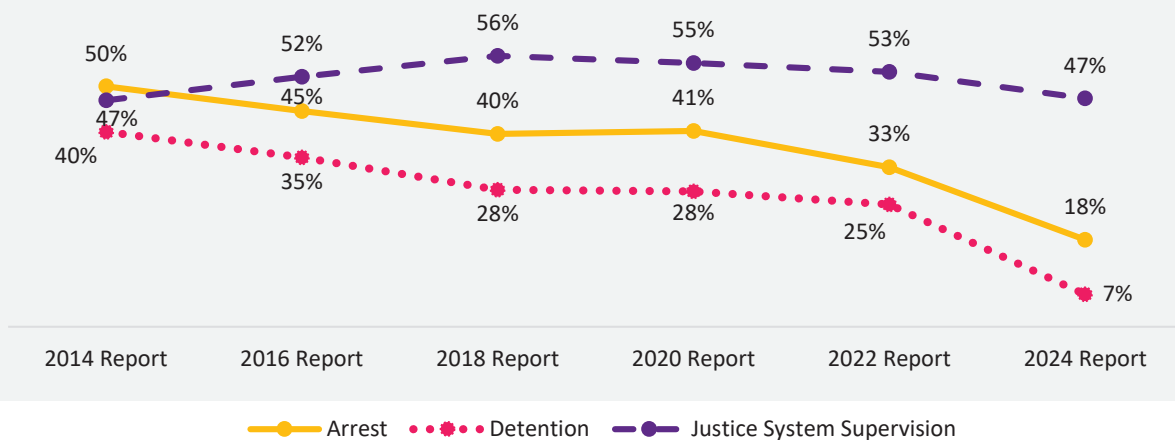
JUSTICE SYSTEM INVOLVEMENT

Nearly half of adolescents (47.2%) were under supervision by the justice system (e.g., court diversion, probation). A minority had been arrested and charged with an offense (18.0%) and a smaller minority (6.7%) had been detained in the 12 months before entering treatment. Among the 16 adolescents who had been arrested, 75.0% reported being charged with a public offense and 31.3% were charged with a status offense.

TREND REPORT: REPORTED BEING ARRESTED, DETAINED AND UNDER THE SUPERVISION OF THE JUSTICE SYSTEM AT INTAKE (N = 2,051)

The percentage of adolescents who reported they had been under supervision by the justice system (e.g., diversion, probation, drug court) in the 12 months before entering treatment was relatively stable: from a low of 47% in the 2014 Report to a high of 56% in the 2018 Report. The percentage of adolescents who have reported they were arrested and charged with an offense (public or status) and the percentage that had been detained in jail or a juvenile justice facility in the 12 months before entering treatment has decreased over time.

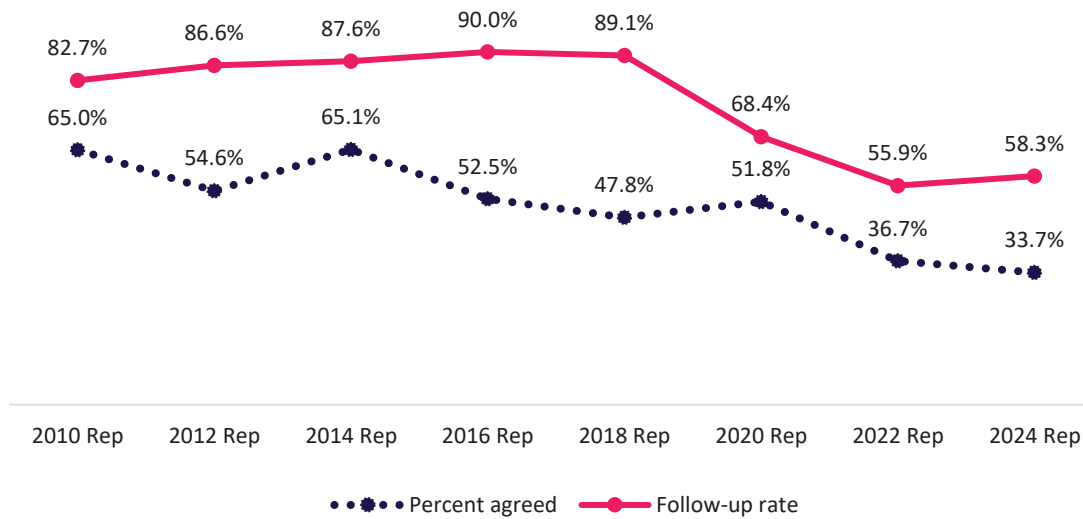
FIGURE 28. TRENDS IN BEING ARRESTED, DETAINED, AND UNDER THE SUPERVISION OF THE JUSTICE SYSTEM AT INTAKE, 2010-2024



DESCRIPTION OF CLIENTS WHO COMPLETED A FOLLOW-UP SURVEY

Follow-up interviews are conducted with a selected sample of clients about 12 months after intake surveys are completed. All adolescents who agree to be contacted for the follow-up interview and have given a minimum amount of locator information, are pulled into the follow-up sample. In the first six biannual AKTOS reports, the percentage of adolescents who agreed to be contacted for the follow-up survey ranged from a high of 65.1% to a low of 47.8% (see Figure 29). The percentage decreased dramatically beginning in FY 2019-FY 2020, which corresponds to the COVID-19 pandemic. However, the rate of agreement to be contacted for the follow-up survey has not rebounded to pre-pandemic levels. Agreement rates below 50% diminish the representativeness of the follow-up sample, which undermines the credibility of the outcome evaluation. The importance of clinicians presenting information about the follow-up study and using the one-page description of the follow-up study that is embedded in the intake survey is critical to increasing the agreement rate in future outcome reports. As the number of completed intake surveys decrease and the percent of clients who give consent to be contacted for the follow-up survey, the number of completed follow-up surveys necessarily decreases. Furthermore, the follow-up rate has also decreased beginning for the 2020 Report.

FIGURE 29. PERCENT OF ADOLESCENTS WHO COMPLETED INTAKE SURVEYS THAT GAVE CONSENT TO BE CONTACTED FOR THE FOLLOW-UP SURVEY AND THE FOLLOW-UP RATE AMONG ELIGIBLE CLIENTS PER REPORT YEAR



The follow-up interviews are conducted over the telephone by an interviewer at UK CDAR. Clients' responses to the follow-up interviews are kept confidential to help facilitate the honest evaluation of client outcomes and satisfaction with program services. When interviewers contacted clients to complete the follow-up survey, individuals who are not eligible to participate in the follow-up survey (e.g., residential treatment, incarcerated, military service) are removed from the sample of eligible participants).

Of the 30 adolescents who agreed to be contacted for the follow-up survey, 25 were selected into the follow-up sample. Individuals had to provide a minimum amount of locator information to be included in the follow-up sample: one phone number and one mailing address, or two unique phone numbers. Of the 25 adolescents selected into the follow-up sample, 1 was ineligible at the time of the follow-up period (e.g., no longer in parents' custody). Of the 24 eligible individuals, one (14.3%) adolescent declined to participate, 9 (37.5%) were not successfully contacted to complete the follow-up survey, and 14 completed the follow-up survey. The follow-up rate for eligible individuals selected into the follow-up sample was 58.3%.⁵⁷ (see Appendix A for more details on the study method).

Of the 14 adolescents who completed an intake survey in FY 2020 and FY 2021 and then completed a follow-up survey in FY 2021 and FY 2022:

- The average age was 15.4 years old, with 57.1% being 16 or 17 years old.
- Half (50.0%) were male, and 50.0% were female.
- The majority (71.4%) reported they were White, 7.1% were Black, 14.3% were Hispanic, and 7.1% were multiracial.
- The majority (57.1%) reported their primary caregiver was a biological parent, about one-fourth

⁵⁷ The follow-up rate is calculated by (dividing the number of completed follow-up surveys and dividing by the number of clients included in the follow-up sample who are still eligible for participation at the time of the follow-up) and multiplying by 100 to get a percent. To be included in the sample to be followed up, individuals must give consent to be contacted for the follow-up survey and give a minimal amount of locator information (i.e., two phone numbers OR one phone number and one mailing address). Once follow-up interviewers begin working to contact individuals for the follow-up survey, individuals who are in controlled setting, deceased, out of the country, etc. are classified as ineligible to complete the follow-up survey.

(35.7%) reported other family members, and 7.1% reported a foster parent/DCBS as their primary caregiver.

- The majority of clients reported they had lived with their biological parents (71.4%), other family members (28.6%), in an institution (14.3%; e.g., group home, residential treatment, juvenile detention), and in foster care (7.1%) in the 12 months before entering the program.
- The agency that referred the highest percent of adolescents to the program was the court (35.7%; e.g., court designated worker, judge), followed by school (14.3%), decided on their own (21.4%), the Department for Community Based Services (7.1%). About 21% reported that none of the offered agencies or categories referred them to the program.

HOW DO THE FOLLOWED-UP CLIENTS COMPARE TO THE CLIENTS WHO DID NOT COMPLETE A FOLLOW-UP SURVEY?

Comparison of adolescents who completed a follow-up survey and adolescents who did not (for any reason) showed only a few statistically significant differences at $p < .10$ (see Appendix B for detailed analysis). Specifically, a significantly higher proportion of adolescents who completed a follow-up survey reported past-12-month and past-30-day use of synthetic drugs at intake (see Table 2). Also, a significantly higher proportion of adolescents who completed a follow-up survey reported disordered eating relative to adolescents who did not complete a follow-up survey.

TABLE 2. FOLLOWED-UP VERSUS NOT FOLLOWED-UP (N = 89)

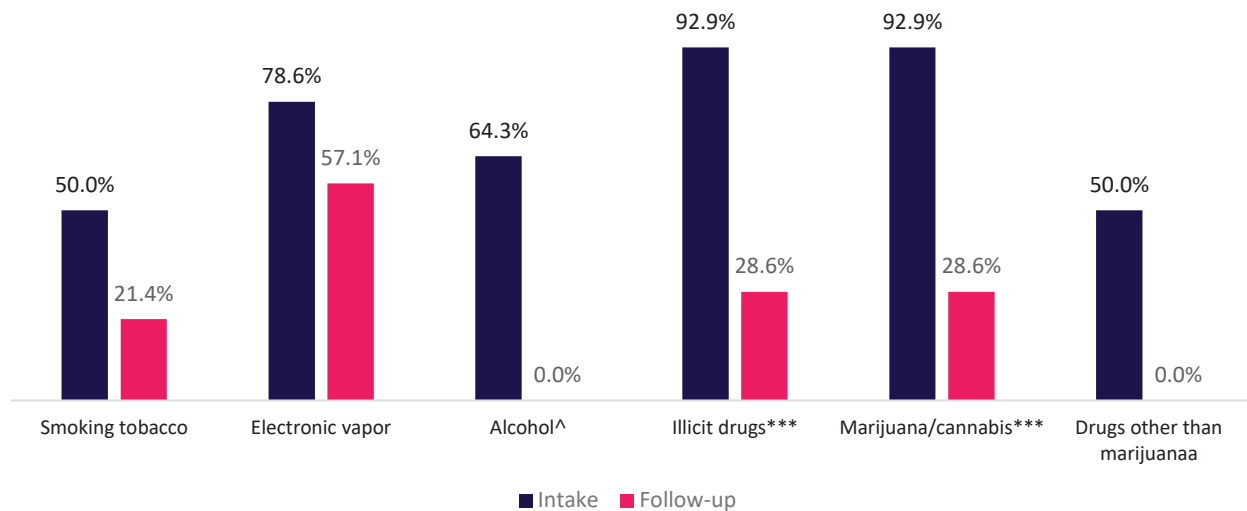
	No (n = 75)	Followed up Yes (n = 14)
Demographic.....	—	—
Substance use, severity of alcohol and drug use.....	—	More reported using synthetic drugs in the 12 months before entering treatment
Mental health.....	—	More reported using synthetic drugs in the 30 days before entering treatment
School.....	—	More reported disordered eating
Caregiver involvement and living situation.....	—	—
Justice system involvement.....	—	—
Recovery support.....	—	—

CHANGE IN TARGETED FACTORS FROM INTAKE TO FOLLOW-UP

PAST-12-MONTH SUBSTANCE USE

Half of clients reported smoking tobacco products at intake, with a non-significant decrease to 21.4% at follow-up (see Figure 30). More than three-fourths of adolescents reported at intake that they had used electronic vapor products. The decrease in use of electronic vapor products was not significant. The majority of adolescents reported alcohol use in the 12 months entering treatment; however, none reported alcohol use in the 12 months before follow-up. The decrease in illicit drug use, overall, and marijuana/cannabis were statistically significant. Half of adolescents reported using illicit drugs other than marijuana/cannabis in the 12 months before entering treatment. None of them reported using illicit drugs other than marijuana/cannabis in the 12 months before follow-up.

FIGURE 30. CHANGE IN SUBSTANCE USE FROM INTAKE TO FOLLOW-UP (N = 14)



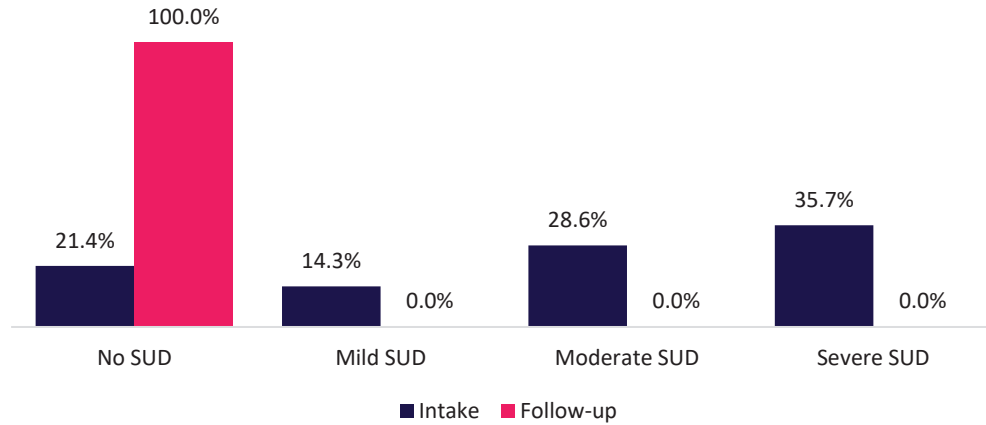
[^] - McNemar statistic could not be calculated because at least one cell had a zero value.

^{***} $p < .01$

SEVERITY OF SUBSTANCE USE DISORDER

At intake, about 1 in 5 adolescents met criteria for no substance use disorder, 14.3% for mild SUD, 28.6% for moderate SUD, and 35.7% for severe SUD (see Figure 31). At follow-up, all adolescents met criteria for no SUD ($p < .05$).

FIGURE 31. CHANGE IN SEVERITY OF SUBSTANCE USE DISORDER FROM INTAKE TO FOLLOW-UP (N = 14)



**p < .05. Stuart-Maxwell test

PAST-12-MONTH MENTAL HEALTH SYMPTOMS (N = 14)

At intake, minorities of adolescents had scores on the attention problems and externalizing problems subscales of the PSC-17 that were equal to or higher than the threshold score indicating significant problems. The majority of adolescents had a score on the internalizing problems subscale indicating significant problems at intake. At follow-up, a significantly smaller percent of adolescents had a score indicative of internalizing problem.

The majority of adolescents reported at least one of the disordered eating symptoms, including all of the girls. At follow-up, a little more than one-fourth of adolescents reported at least one of the disordered eating symptoms. More than one-fourth of adolescents reported suicidal ideation or attempts in the 12 months before entering treatment and 7.1% reported suicidality at follow-up.



ATTENTION PROBLEMS

35.7% | **28.6%**
at intake | at follow-up



INTERNALIZING PROBLEMS*

64.3% | **21.4%**
at intake | at follow-up



EXTERNALIZING PROBLEMS

7.1% | **0.0%**
at intake | at follow-up



DISORDERED EATING

64.3% | **28.6%**
at intake | at follow-up



SUICIDALITY

28.6% | **7.1%**
at intake | at follow-up

*p < .10.

SCHOOL PARTICIPATION AND PERFORMANCE (N = 10)⁵⁸



HIGH SCHOOL DIPLOMA (N = 14)

7.1% | **21.4%**
at intake | at follow-up



AVERAGE GPA**

2.2 | **3.4**
at intake | at follow-up



AVERAGE NUMBER OF DAYS MISSED SCHOOL*

7.8 | **3.6**
at intake | at follow-up



SUSPENDED OR EXPELLED IN THE LAST 3 MONTHS SCHOOL WAS IN SESSION

30.0% | **10.0%**
at intake | at follow-up



SATISFACTION WITH SCHOOL SITUATION (SATISFIED OR VERY SATISFIED)

36.4% | **63.6%**
at intake | at follow-up

At follow-up, 4 adolescents were 18 or 19 years old, 3 of them had completed 12th grade and the adolescent who had not yet completed 12th grade was enrolled in public school at follow-up.

* $p < .10$, ** $p < .05$.

CAREGIVER INVOLVEMENT AND LIVING SITUATION (N = 14)



REPORTED PRIMARY CAREGIVER IS BIOLOGICAL PARENT

57.1% | **71.4%**
at intake | at follow-up



AVERAGE RATING OF CAREGIVER INVOLVEMENT (MIN. SCORE = 5, MAX. SCORE = 17)

12.8 | **13.1**
at intake | at follow-up



LIVED IN AN INSTITUTIONAL SETTING AT SOME POINT IN THE PAST 12 MONTHS

14.3% | **0.0%**
at intake | at follow-up

JUSTICE SYSTEM INVOLVEMENT (N = 14)



REPORTED ANY ARREST

21.4% | **14.3%**
at intake | at follow-up



REPORTED INCARCERATION

7.1% | **14.3%**
at intake | at follow-up



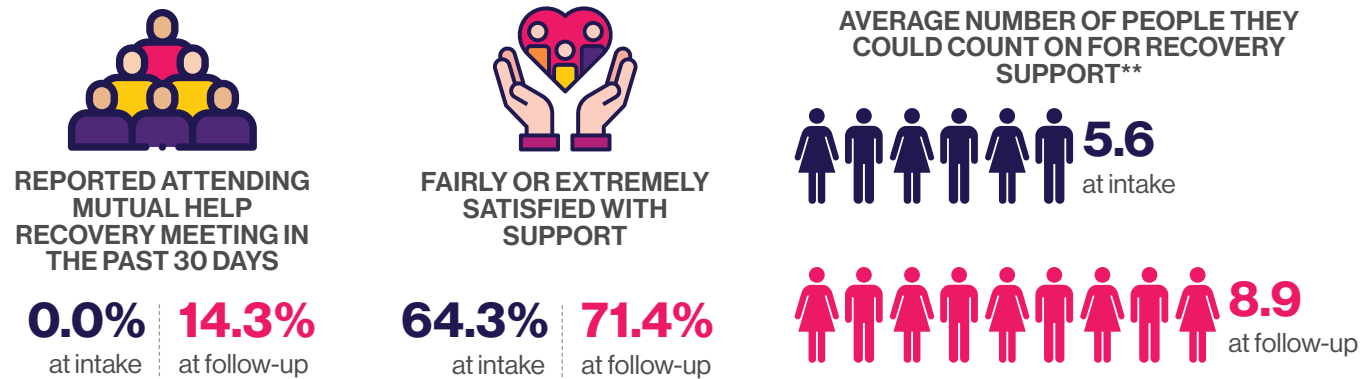
REPORTED BEING UNDER CRIMINAL JUSTICE SUPERVISION

50.0% | **21.4%**
at intake | at follow-up

⁵⁸ The school variables pertain to the 10 adolescents who were in school the last 3 months school was in session, with the exception of High School Diploma, which is out of the 14 who completed a follow-up survey.

RECOVERY SUPPORT (N = 14)

Formal recovery supports for adolescents are even less available than for adults.



**p < .05.

SUD PROGRAM SATISFACTION (N = 14)

In the follow-up interview, adolescents were asked about their experience in the SUD program.⁵⁹

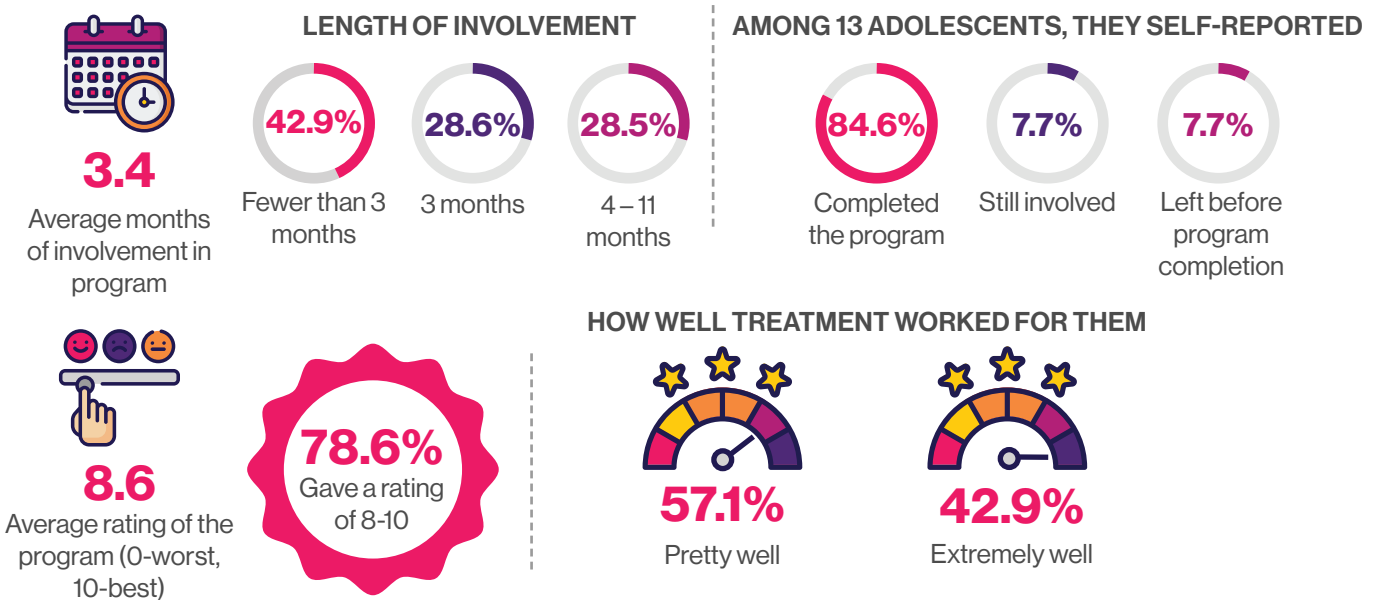


Figure 32 shows that the majority of adolescent clients rated several aspects of their experiences in SUD program favorably. The aspects of treatment that the highest percentages of adolescents rated favorably were that: treatment met their expectations and hopes; they believed that staff cared about them and their progress; they had input into their treatment goals, plans, and how they were progressing over time; and program staff believed in them and believed that treatment would work for them. The aspects of the program the lowest percentage of adolescents rated favorably were that they felt a connection with a counselor or staff person, and they fully discussed or talked about everything with their counselor.

⁵⁹ One adolescent did not answer the question about how their involvement with the SUD program ended.

FIGURE 32. RATINGS OF 8, 9, OR 10 OF SPECIFIC TREATMENT PROGRAM EXPERIENCES (N = 14)



All 14 adolescents reported they would refer a close friend/family member to the program. The majority (57.1%) also said they would warn their friend/family member about specific things or tell them who to work with in the program.

SUMMARY AND CONCLUSION

Adolescent substance use is best understood within the context of several interrelated problems such as childhood adversity and victimization, comorbid psychiatric disorders, and problem behaviors (e.g., delinquency).^{60, 61} The majority of the sample of 89 adolescents who completed an intake survey in AKTOS in FY 2020 and FY 2021 initiated substance use before age 14, reported a household risk per ACE, reported polysubstance use,⁶² reported marijuana/cannabis use, alcohol use, and use of electronic vapor products in the 12 months before treatment, had a substance use disorder (mild, moderate, or severe), were referred to SUD treatment by court or the Department for Community-Based Services, met criteria for at least one mental health concern, had an average grade of a C or lower, and were White/Caucasian. Nearly half of the adolescents were under supervision by the justice system at treatment intake. Therefore, the sample of adolescents who completed an intake survey in AKTOS reported multiple interrelated adversities and risks for SUD.

Kentucky is in the fortunate position of having a data infrastructure to collect client-level outcome data for adolescents entering SUD treatment in the state's community mental health centers. However, the value of client-level outcome data is only as good as SUD programs' level of participation in data collection efforts. The outcome data in the 2024 report is limited because of the small sample size of adolescents who completed a follow-up survey for this biannual period (n = 14). Data presented for all AKTOS reports shows that the decreasing number of adolescents in the follow-up sample, beginning in the 2022 report is driven by the decreasing number of intake surveys and decreasing percentage of adolescents who give consent to be contacted for the follow-up survey. With decreasing participation in AKTOS over the past several fiscal years, beginning in 2019 – 2020, the utility of the data collected decreases. High staff turnover and the burdens on staff and programs that the COVID-19 pandemic put on programs may have led to the dramatic decrease in participation in AKTOS. However, as business has returned to normal, participation in AKTOS has not increased. Efforts to reengage SUD programs in AKTOS would be beneficial.

Because of the dramatic decrease in the number of completed intake surveys in AKTOS since March 2020 and the decrease in the percent of adolescents who give consent to be contacted for the follow-up survey, the number of completed follow-up surveys for this report is small (n = 14). Therefore, the findings of change from intake to follow-up are for descriptive purposes, and should be interpreted with caution.

OUTCOMES

All adolescents who reported using illicit drugs in the 12 months before entering treatment had used cannabis in the same period. Intake survey data shows that cannabis has been the most commonly used substance over the years of AKTOS: about 9 in 10 adolescents in the intake samples reported using cannabis in the 12 months before treatment. This is consistent with other research that has shown that cannabis is the most commonly reported illicit psychoactive substance used

⁶⁰ Jessor, R. & Jessor, S.L. (1997). *Problem behavior and psychosocial development: A longitudinal study of youth*. New York: Academic Press.

⁶¹ Teplin, L., Abram, K., McClelland, G., Dulcan, M., & Mericle, A. (2002). Psychiatric disorders in youth in juvenile detention. *Archives of General Psychiatry*, 6(3), 1133-1143.

⁶² Reported using alcohol and at least one class of drugs, or two or more classes of drugs without alcohol use.

by adolescents in the U.S.⁶³ The types of cannabis products and methods of administration have changed among US youth in the past two decades.⁶⁴ Even though combustible products are still the most commonly used, use of oils in delivery systems has increased. In a systematic review and meta-analysis of 17 studies in the US and Canada, prevalence of cannabis vaping increased: two-fold for lifetime (6.1% to 13.6%) from 2013 to 2020; two-fold for past-12-month (7.2% to 13.2%) from 2017 to 2020; and 7-fold for past-30-day (1.6% to 8.4%) from 2013 to 2020.⁶⁵ Moreover, there is evidence that cannabis potency in oils used for vaping are substantially higher than the potency of herbal cannabis. Regular cannabis use is associated with a greater risk of psychiatric comorbidities, cognitive problems,⁶⁶ and greater risk of cannabis use disorder. Even recreational, non-disordered use of cannabis is associated with major depression, suicidal ideation, slower thinking, difficulty concentrating, lower GPA, truancy, fighting, and arrest among a nationally representative sample of adolescents.⁶⁷ Thus, the significant decrease in cannabis use each year in AKTOS is a positive finding. In this year's report, the percent of adolescents who reported using marijuana/cannabis decreased significantly from intake to follow-up.

In this year's report, not only did substance use decrease significantly, but severity of substance use also decreased, as measured by the number of DSM-5 criteria for substance use disorder (SUD) clients self-reported. At intake, only 21.4% met criteria for no SUD, with 14.3% meeting criteria for mild SUD, 28.6% for moderate SUD, and 35.7% for severe SUD. At follow-up, the number of individuals who met criteria for no SUD increased significantly to 100%. The American Society of Addiction Medicine (ASAM) has recommended that treatment outcome studies take into account that individuals with substance use disorders are not a uniform group, differing in terms of severity of substance use.⁶⁸

Adolescents who use substances at a level above experimentation are at higher risk of dropout or non-completion of a degree.⁶⁹ Poor grades or school performance can be an indication of dropout risk. Keeping youth in school until high school graduation has substantial impacts on their future earning capability. In fact, the rate of return is higher for completing a high school diploma than for completing college.⁷⁰ Individuals who complete a high school degree or obtain some college

⁶³ Hammond, C.J., Chaney, A., Hendrickson, B., & Sharma, P. (2020). Cannabis use among U.S. adolescents in the era of marijuana legalization: a review of changing use patterns, comorbidity, and health correlates. *International Review of Psychiatry*, 4194. <http://dx.doi.org/10.1080/09540261.2020.1713056>

⁶⁴ Hammond, C.J., Chaney, A., Hendrickson, B., & Sharma, P. (2020). Cannabis use among US adolescents in the Era of Marijuana Legalization: A review of changing use patterns, comorbidity, and health correlates. *International Review of Psychiatry*, 32(3), 221-234. Doi:10.1080/09540261.2020.1713056.

⁶⁵ Lim, C.C.W., Sun, T., Leung, J., Chung, J.Y.C., Gartner, C., Connor, J., Hall, W., Chiu, V., Stjepanovic, D., & Chan, G.C.K. (2022). Prevalence of adolescent cannabis vaping: A systematic review and meta-analysis of US and Canadian studies. *JAMA Pediatrics*, 176(1), 1-10. Doi: 10.1001/jamapediatrics.2021.4102.

⁶⁶ Cyrus, E., Coudray, M.S., Kiplagat, S., Mariano, Y., Noel, I., Galea, G.T., Hadley, D., Dévieux, J.G., & Wagner, E. (2020). A review investigating the relationship between cannabis use and adolescent cognitive functioning. *Current Opinion in Psychology*, 38, 38-48. <https://doi.org/10.1016/j.copsyc.2020.07.006>.

⁶⁷ Sultan, R.S., Zhang, A.W., Olfson, M., Kwizera, M.H., & Levin, F.R. (2023). Nondisordered cannabis use among US adolescents. *JAMA Network Open*, 6(5), e2311294. Doi:10.1001/jamanetworkopen.2023.11294.

⁶⁸ American Society of Addiction Medicine. (2005). *Principles for outcome evaluation: AMBHA-ASAM joint statement*. Chevy Chase, MD: American Society of Addiction Medicine.

⁶⁹ DuPont, R. L., Campbell, M. D., Campbell, T. G., Shea, C. L., & DuPont, H. S. (2013). Self-reported drug and alcohol use and attitudes toward drug testing in high schools with random student drug testing. *Journal of Child & Adolescent Substance Abuse*, 22(2), 104-119.

⁷⁰ Heckman, J., Lochner, P., & Todd, P. (2008). Earnings functions and rates of return. *Journal of Human Capital*, 2(1), 1-31.

education have exponentially higher income than those who do not advance their education.^{71, 72} Because of this, it is important to examine education in a SUD treatment outcome study. In the AKTOS follow-up sample, all 11 individuals who had not yet obtained a high school diploma at follow-up were still enrolled in school at follow-up. Additionally, there was a significant increase in GPA from intake (2.2) to follow-up (3.4) and a significant decrease in the number of school absences for any reason. Another positive finding is that when individuals who had reached the age that most individuals typically graduate from high school (18 years old) by follow-up were examined (n = 4), all were either still enrolled in secondary school (25.0%), or had obtained a high school diploma or GED (75.0%). None of the individuals who were 18 years old at follow-up had dropped out of school.

Psychiatric comorbidity is common in adolescents with substance use disorders.^{73, 74} Because adolescents with substance use disorders and comorbid psychiatric disorders have poorer SUD treatment outcomes than those with only substance use disorders, there is growing evidence that integrated treatment of comorbid psychiatric disorders in SUD treatment may improve treatment engagement and treatment completion as well as treatment outcomes.^{75, 76, 77} In this study, the percent of adolescents who met criteria for internalizing problems at follow-up was significantly lower than the percent at intake. Even though the percent of adolescents who met criteria for attention problems, externalizing problems, and the percent that reported any disordered eating symptoms and suicidality decreased, these changes were not statistically significant.

A number of studies on interpersonal victimization have found an association of interpersonal victimization, trauma exposure, and substance use/substance use disorders.^{78, 79, 80} In this sample of adolescent clients of SUD treatment in Kentucky, interpersonal victimization and childhood adversities were relatively common experiences. High percentages of clients had experienced interpersonal victimization in their lives and had exposure to multiple household adversities, such as divorced parents/parents living apart and someone in their household abusing alcohol or using illicit drugs. Importantly, significant associations were found between the number of adverse childhood experiences individuals reported experiencing in their lifetime and number of symptoms of substance use disorder and mental health problems. Specifically, individuals with more types of

⁷¹ Autor, D. H., Katz, L. F. & Kearney, M. S. (2005). *Rising Wage Inequality: The Role of Composition and Prices*. NBER technical working paper 11627.

⁷² Heckman, J. J., & LaFontaine, P. A. (2010). The American high school graduation rate: Trends and levels. *The Review of Economics and Statistics*, 92 (2), 244-262.

⁷³ Armstrong, T. D., & Costello, E. J. (2002). Community studies on adolescent substance use, abuse, or dependence and psychiatric comorbidity. *Journal of Consulting and Clinical Psychology*, 70, 1224-1239.

⁷⁴ Turner, W. C., Muck, R. D., Muck, R. J., Stephens, R. L., & Sukumar, B. (2004). Co-occurring disorders in the adolescent mental health and substance abuse treatment systems. *Journal of Psychoactive Drugs*, 36, 455-462.

⁷⁵ Grella, C. E., Hser, Y. I., Joshi, V., & Rounds-Bryant, J. (2001). Drug treatment outcomes for adolescents with comorbid mental and substance use disorders. *Journal of Nervous & Mental Disease*, 189(6), 384-392.

⁷⁶ Wise, B. K., Cuffe, S. P., Fischer, T. (2001). Dual diagnosis and successful participation of adolescents in substance abuse treatment. *Journal of Substance Abuse Treatment*, 21(3), 161-165.

⁷⁷ Cornelius, J. R., Maisto, S. A., Martin, C. S., Bukstein, O. G., Salloum, I. M., Daley, D. C., Wood, D. S., & Clark, D. B. (2004). Major depression associated with earlier alcohol relapse in treated teens with AUD. *Addictive Behavior*, 29, 1035-1038.

⁷⁸ Kilpatrick, D. G., Saunders, B. E., & Smith, D. W. (2003). *Youth victimization: Prevalence and implications*. Research in brief. Washington, DC: US Department of Justice, Office of Justice Programs.

⁷⁹ McCart, M. R., Zajac, K., Danielson, C. K., Strachan, M., Ruggiero, K. J., Smith, D. W., Saunders, B. E., & Kilpatrick, D. G. (2011). Interpersonal victimization, posttraumatic stress disorder, and change in adolescent substance use prevalence over a ten-year period. *Journal of Clinical Child and Adolescent Psychology*, 40, 136-143. Doi:10.1080/15374416.2011.533411.

⁸⁰ Vermeiren, R., Schwab-Stone, M., Deboutte, D., Leckman, P. E., & Ruchkin, V. (2003). Violence exposure and substance use in adolescents: Findings from three countries. *Pediatrics*, 111, 535-540. doi: 10.1542/peds.111.3.535

adverse childhood experiences had more symptoms of SUD. Individuals with more adverse childhood experiences had more attention problem symptoms, internalizing symptoms, and externalizing symptoms.

Early identification of those who experience adverse childhood experiences and intervention to address the trauma symptomatology, emotion regulation deficits, and cognitive effects could prevent a number of negative consequences. SUD treatment could address these experiences, which may have profound and lasting effects on youth's emotion regulation, cognitive capacities, and interpersonal relationships. Assessment of a range of victimization experiences should be explored with youth entering SUD treatment, and because prior research has shown that youth may not disclose victimization experiences at intake, the Center for Substance Abuse Treatment (CSAT) TIP on child abuse and neglect issues recommends that properly trained SUD treatment providers' assessment for victimization should be carried out at intervals during the course of treatment.⁸¹ Moreover, assessment of adverse childhood experiences and traumatic events should also be followed with trauma-integrated SUD treatment. Prior research shows that youth with trauma exposure and symptomatology do not do well in treatment that focuses only on substance use and does not also address trauma symptoms.^{82, 83}

Youth reported high satisfaction with treatment providers, which is important because higher levels of satisfaction with treatment are associated with positive treatment outcomes.⁸⁴ Specifically, the majority of youth gave a highly positive rating of 8 to 10 for their treatment experience on a scale of 1 to 10, with 10 representing the best experience. Additionally, the majority of clients agreed with the following statements about their treatment episode: they had input into their treatment goals, plans, how their progress; their expectations and hopes for treatment and recovery were met; they felt the program staff cared about them and their treatment progress; the program staff believed in them and believed that treatment would work for them; when clients told staff personal things they felt listened to and heard by their counselor/program staff; they worked on and talked about things that were most important to the clients; they had a connection with a counselor or staff person during treatment; the treatment approach and method was a good fit for the client; and the length of the program was just right.

AREAS OF CONCERN

TOBACCO/NICOTINE USE. Nicotine has negative impacts on the neurodevelopment of adolescents including greater sensitivity of the brain to other drugs, which primes it for future substance use disorders.⁸⁵ Tobacco smoking among adolescents increases the risk of other drug use and the risk of nicotine addiction.⁸⁶ In fact, of all substance use disorders, nicotine use disorder is the one most likely

⁸¹ Center for Substance Abuse Treatment. (2000). *Substance abuse treatment for persons with child abuse and neglect issues*. Treatment Improvement Protocol (TIP) Series, No. 36. Rockville, MD: Substance Abuse and mental Health Services Administration.

⁸² Funk, R. R., McDermeit, M., Godley, S. H., & Adams, L. (2003). Maltreatment issues by level of adolescent substance abuse treatment: The extent of the problem at intake and relationship to early outcomes. *Child Maltreatment*, 8(1), 36-45.

⁸³ Grella, C. E., & Joshi, V. (2003). Treatment processes and outcomes among adolescents with a history of abuse who are in drug treatment. *Child Maltreatment*, 8(1), 7-18.

⁸⁴ Waxman, H.M. (1996). *Using outcomes assessment for quality improvement*. In L.I. Sederer & B. Dickey (Eds.), *Outcomes assessment in clinical practice*, (pp. 25-33), Boston, Massachusetts: Williams and Wilkins.

⁸⁵ Yuan, M., Cross, S.J., Loughlin, S.E., & Leslie, F.M. (2015). Nicotine and the adolescent brain. *Journal of Physiology*, 593 (16), 3397-3412.

⁸⁶ Centers for Disease Control & Prevention (CDC). (1994). *Preventing tobacco use among young people: A report of the Surgeon General*. Atlanta, GA: U.S. Department of Health and Human Services.

to occur in adolescence.⁸⁷ The AKTOS intake sample of treatment clients had a significantly higher rate for smoking tobacco in the 30 days before treatment intake compared to the general population of high school students in Kentucky in 2019 (57.5% vs. 8.9%) and 2021 (34.3% vs. 4.9%).

Use of e-cigarettes has become the most common form of tobacco use among youth.⁸⁸ Use of electronic vapor products among the general population of adolescents and the AKTOS intake sample has increased over time. The percent of AKTOS clients who report using electronic vapor products in the past 30 days is much higher than the percent of high school students in Kentucky (51.5% vs. 26.1% in 2019 and 62.9% vs. 21.9% in 2021).

Dual use of smoking tobacco and electronic vapor is a serious health concern. In a meta-analysis of 107 population-based epidemiological studies, the odds of disease associated with dual use were higher than for smoking for all health outcomes.⁸⁹ Current dual use was associated with 20 to 40% higher odds of disease than smoking. Over one-fourth of adolescents (27.0%) in the AKTOS intake sample reported dual use of smoking tobacco and electronic vapor products in the 30 days before entering treatment.

RECOVERY SUPPORTS. In this sample of adolescents, small percentages of individuals reported that they had attended mutual help recovery meetings at intake and/or follow-up. Participation in mutual help recovery meetings is an important recovery support that is associated with abstinence and lower risk of relapse among adults.⁹⁰ Nonetheless, limited research has examined the role of AA and NA meeting attendance among adolescents.⁹¹ The few studies that have been conducted suggest that adolescents who attend AA/NA meetings after residential SUD treatment are more likely to remain abstinent.^{92, 93, 94} Yet, adolescents' attendance at group meetings that are predominately composed of adults may not be helpful and may even be harmful.^{95, 96} Many communities, including many if not most in Kentucky, may not have mutual help group meetings specifically for adolescents. Other forms of recovery support may be crucial to helping adolescents maintain their recovery, such as peer support, particularly in communities that lack mutual help group meetings that are specific for

⁸⁷ Centers for Disease Control & Prevention (CDC). (1994). *Preventing tobacco use among young people: A report of the Surgeon General*. Atlanta, GA: U.S. Department of Health and Human Services.

⁸⁸ Arrazola, R. A., Singh, T., Corey, C. G., Husten, C. G., Neff, L. J., Apelberg, B. J., Bunnell, R. E., Choiniere, C. J., King, B. A., Cox, S., McAfee, T., Caraballo, R. S., & Centers for Disease Control and Prevention (CDC) (2015). Tobacco use among middle and high school students - United States, 2011-2014. *MMWR. Morbidity and Mortality Weekly Report*, 64(14), 381-385.

⁸⁹ Glantz, S.A., Nguyen, N., & Oliveira da Silva, A.L. (2024). Population-based disease odds for e-cigarettes and dual use versus cigarettes. *NEJM Evidence*, 3(3). Doi:10.1056/EVIDoa2300229.

⁹⁰ Gossop, M., Stewart, D., & Marsden, J. (2008). Attendance at Narcotics Anonymous and Alcoholics Anonymous meetings, frequency of attendance and substance use outcomes after residential treatment for drug dependence: a 5-year follow-up study. *Addiction*, 103(1), 119-125.

⁹¹ Kelly, J., Brown, S., Abrantes, A., Kahler, C., & Myers, M. (2008). Social recovery model: An 8-year investigation of adolescent 12-step group involvement following inpatient treatment. *Alcohol Clinical & Experimental Research*, 32(8), 1468-1478.

⁹² Hsieh, S., Hoffman, N., & Hollister, D. (1998). The relationship between pre-, during-, and post-treatment factors, and adolescent substance abuse behaviors. *Addictive Behaviors*, 23, 477-488.

⁹³ Kelly, J., Myers, M., & Brown, S. (2000). A multivariate process model of adolescent 12-step attendance and substance use outcome following inpatient treatment. *Psychology of Addictive Behavior*, 14, 376-389.

⁹⁴ Kelly, J., Myers, M., & Brown, S. (2002). Do adolescents affiliate with 12-step groups? A multivariate process model of effects. *Journal of Studies on Alcohol*, 63, 293-304.

⁹⁵ Kelly, J., & Myers, M. (1997). Adolescent treatment outcome in relation to 12-step group attendance. Abstracted in *Alcoholism: Clinical and Experimental Research*, 21, 27A.

⁹⁶ Kelly, J., Myers, M., & Brown, S. (2005). The effects of age composition of 12-step groups on adolescent 12-step participation and substance use outcomes. *Journal of Child and Adolescent Substance Abuse*, 15(1), 63-72.

adolescents. Research shows that adolescents benefit from continuing care following treatment,⁹⁷ such as drug use monitoring, follow-up visits at home, and linking to other family services. However, the research on recovery supports for adolescents is more limited than it is for adults.

LIMITATIONS OF THE STUDY

There are several study limitations. First, this study examined adolescents who received SUD treatment in fiscal years 2021-2022, but did not examine a comparison group of similar adolescents who did not receive treatment, which prevents us from inferring that changes from intake to follow-up are due solely to treatment. Because adolescents may still be experimenting with substances, it is difficult to tease apart developmental and peer influences from the effects of treatment when examining outcomes for this age group. Second, as the number of intake surveys submitted for AKTOS and the percent of adolescents who gave consent to be contacted for follow-up has decreased since the emergence of the pandemic in March 2020, the number of adolescents eligible for the follow-up surveys has decreased. The small number of adolescents who participated in the follow-up study for this report limits our ability to examine treatment outcomes. Examination of CMHCs' barriers to participating in AKTOS and how the follow-up study option is being presented (if it is being presented) to adolescents would improve participation and ultimately increase the robustness and credibility of AKTOS data. Third, both the intake data and the follow-up data were self-reported. While self-reports have been shown to be valid in comparison to urinalyses,⁹⁸ reliance on self-reports in this study may be an important limitation. Fourth unlike many outcome studies, this study does not focus on a single treatment modality or a set of pre-selected treatment modalities such as residential treatment, or any one approach like social skills training. Likewise, this treatment outcome study is not a clinical trial that tests the efficacy of interventions. AKTOS examined treatment outcomes from everyday clinical practice among Kentucky's community mental health centers (CMHCs), which includes clients who have participated in many different treatment modalities including residential, intensive outpatient, and outpatient. Fifth, clinicians have varying interview skills and this might impact the reliability and validity of the data they collected for the intake. Fifth, even though the expectation was that clinicians would enter data into the AKTOS Client Information System for all adolescents clients receiving SUD treatment in the community mental health centers, we have no way of determining what percent of clients served were not included in the data set.

CONCLUSION

Findings from the AKTOS 2024 report indicate successful treatment experiences for many adolescents, with significant reductions in cannabis use and severity, decrease in internalizing problems, improved academic performance, and increased recovery support at follow-up. Slowing down or stopping youth's substance use trajectories may lead to substantial increases in education, lower psychiatric comorbidities, and lower juvenile behavior and involvement in the justice system—all of which may have significant positive effects on the youth's long-term development.

⁹⁷ Godley, M. D., Godley, S. H., Dennis, M. L., Funk, R. R., & Passetti, L. L. (2007). The effect of assertive continuing care on continuing care linkage, adherence and abstinence following residential treatment for adolescents with substance use disorders. *Addiction, 102*(1), 81-93.

⁹⁸ Rutherford, M.J., Cacciola, J.S., Alterman, A.I., McKay, J.R. & Cook, T.G. (2000). Contrasts between admitters and deniers of drug use. *Journal of Substance Abuse Treatment, 18*(4), 343-8.

APPENDIX A. STUDY METHOD

The intake and follow-up interview instruments are based on the Adolescent Kentucky Treatment Outcome Study (AKTOS) assessment, which is based on theory and research about substance use-related comorbidities relevant to substance use among adolescents. The assessment has five core components (e.g., substance use, mental health, school attendance and performance, justice system involvement, and adverse childhood experiences and victimization) and two supplemental components (e.g., caregiver involvement and recovery supports) have demonstrated validity and reliability.⁹⁹ The assessments are brief, self-report instruments that document dynamic and changeable factors including substance use patterns as well as psychosocial symptoms, behavior, and events that have been identified in the literature as relevant to substance use disorder. Additionally, the instruments have been developed in collaboration with key stakeholders to consider the context of Kentucky's SUD treatment programs.

Intake interviews were conducted by a clinician or staff person at the treatment center using a web-based survey tool, in which the identifying data were encrypted and submitted to the master database on the UK CDAR secure server. After intake interview data were collected, clients were asked if they would like to volunteer to participate in the 12-month follow-up study (i.e., the follow-up interview). Clients who were interested in participating in the follow-up study gave consent to be contacted by UK CDAR BHOS staff members approximately 12 months later to be given the opportunity to participate in the follow-up interview. Follow-up interviews were conducted via telephone using web-based survey tool with items and questions similar to the ones used in the intake interview.

The target month for the follow-up interview was 12 months after the intake interview was completed. In other words, if a client completed an intake interview in May 2022, the target month for the follow-up interview was May 2023. The window for completing a follow-up interview with an individual selected into the follow-up sample began two months before the target month and spanned until two months after the target month. For example, if the target month for the follow-up survey was May 2023 and interviewers began working to locate and contact the individual in March 2023 and could work on the file until the end of July, 2023.

A total of 89 (unduplicated) adolescents completed an intake interview between July 1, 2020 and June 30, 2022. Of these 89 individuals, 30 (33.7%) agreed to be contacted for the follow-up interview. Five individuals were not included in the follow-up sample because they did not have the minimum amount of contact information submitted with their locator data (i.e., two unique phone numbers or one phone number and one mailing address).

UK CDAR BHOS faculty conducted monthly meetings with follow-up interviewers to monitor progress with locating participants and completing follow-up surveys to ensure consistent application of locating strategies and interview techniques. Of the 25 adolescents who were included in the sample of individuals to be followed up, 1 was ineligible to complete the follow-up interview when they were contacted because the adolescent was no longer in their parents' custody (see Table AA.1). Of the remaining 24 adolescents, interviewers completed follow-up surveys with 14 individuals, representing a follow-up rate of 58.3%. Of the eligible individuals, 9 were never successfully contacted or if they were contacted, interviewers were not able to complete a follow-up interview with them during the

⁹⁹ Cole, J., Logan, T., Miller, J., Scriver, A., & Walker, R. (2020). *Evidence Base for the Adolescent Kentucky Treatment Outcome Study (AKTOS) Assessment and Methods*. Lexington, KY: University of Kentucky, Center on Drug and Alcohol Research.

follow-up period: these cases are classified as expired (37.5%). One individual declined to complete the follow-up interview when the interviewer contacted him/her; thus, the refusal rate was 4.2%. The project interviewers' efforts accounted for 64.0% of the individuals (n = 16) included in the follow-up sample. The only cases not considered accounted for are those individuals who are classified as expired.

TABLE AA.1. FINAL CASE OUTCOMES FOR FOLLOW-UP EFFORTS

	Number of Records (n = 25)	Percent
Ineligible for follow-up survey	1	4.0%
	Number of cases eligible for follow-up (n = 24)	
Completed follow-up interviews	14	
Follow-up rate is calculated by dividing the number of completed surveys by the number of eligible cases and multiplying by 100		58.3%
Expired cases (i.e., never contacted, did not complete the interview during the follow-up period).....	9	
Expired rate ((the number of expired cases/eligible cases)*100)		37.5%
Refusal	1	
Refusal rate ((the number of refusal cases/eligible cases)*100)		4.2%
Cases accounted for (i.e., records ineligible for follow-up + completed interviews + refusals).....	16	
Percent of cases accounted for ((# of cases accounted for/total number of records in the follow-up sample)*100).....		64.0%

Appendix B compares adolescents who completed a follow-up interview with those who did not complete a follow-up interview. Few differences were found between the two groups.

REPORT DATA ANALYSIS

This report examines adolescents' self-reported changes from intake to follow-up in outcomes for SUD treatment such as substance use, mental health, justice system involvement, and recovery supports. To assess whether the change in a factor (e.g., tobacco use) was statistically significant, paired t-tests were run for continuous variables and McNemar non-parametric test for pre- to post-test dichotomous variables. McNemar is "a 2 X 2 cross classification of paired (or matched) responses to a dichotomous variable" (Adedokun & Burgess, 2012, p. 125).¹⁰⁰ Additionally, all analyses presented in the main text of the report examined gender differences using t-test for continuous variables and chi square test of independence for categorical variables. Because of the small sample size in this year's report, the alpha for statistical significance was set at $p < .10$. All statistically significant ($p < .10$) differences by gender are reported when they were found.

¹⁰⁰ Because the McNemar test is designed for use with large samples, the Yates correction is automatically calculated in SPSS. However, because the sample size is large, a macro was run to calculate the McNemar statistic without the Yates correction. The macro was retrieved from <http://www.how2stats.net/2011/09/two-proportions-test-related-spss.html>

APPENDIX B. CLIENT CHARACTERISTICS AT INTAKE FOR THOSE WITH COMPLETED FOLLOW-UP INTERVIEWS AND THOSE WITHOUT COMPLETED FOLLOW-UP INTERVIEWS

Adolescents who completed a follow-up interview are compared in this section with adolescents who did not complete a follow-up interview for any reason¹⁰¹ (e.g., client did not give consent to be contacted for the follow-up interview, client was ineligible for follow-up, and interviewers were unable to locate the client for the follow-up survey).

DEMOGRAPHIC CHARACTERISTICS

There were no significant differences in sociodemographics by follow-up status (see Table AB.1).

TABLE AB.1. COMPARISON OF DEMOGRAPHICS FOR CLIENTS WHO WERE FOLLOWED UP AND CLIENTS WHO WERE NOT FOLLOWED UP

	FOLLOWED UP	
	NO n = 75	YES n = 14
Age	15.5 years	15.4 years
Gender		
Male	52.0%	50.0%
Female	45.3%	50.0%
Transgender	2.7%	0.0%
Race		
White	82.7%	71.4%
Black/African American	4.0%	7.1%
Other or multiracial	13.3%	21.4%

SUBSTANCE USE

Use of illegal drugs, alcohol, and nicotine in the 12 months before entering treatment by follow-up status is presented in Table AB.2. Most adolescents reported using any illegal drug in the 12 months before entering the program. The drug class used by the greatest percentage of clients was cannabis/marijuana. The next most reported drug used by individuals who were not followed up was stimulants and opioids by individuals who were followed up. The only statistically significant difference between the two groups was that more adolescents who completed a follow-up survey reported they had used synthetic drugs in the 12 months before entering treatment compared to adolescents who did not complete a follow-up survey. The majority reported using alcohol and electronic vapor in the 12 months before intake.

¹⁰¹ Significance is reported for $p < .10$.

TABLE AB.2. PERCENT OF INDIVIDUALS REPORTING SUBSTANCE USE IN THE 12 MONTHS BEFORE ENTERING TREATMENT

	FOLLOWED UP	
	NO n = 75	YES n = 14
Substances		
Any illegal drug.....	93.3%	92.9%
Cannabis/marijuana.....	93.3%	92.9%
Stimulants including cocaine	18.7%	28.6%
Opioids/opioid agonists (other than heroin)	17.3%	21.4%
Psychedelics (e.g., LSD, psilocybin)	12.0%	21.4%
Synthetic drugs (synthetic marijuana, bath salts)* ...	8.0%	28.6%
CNS depressants	10.7%	7.1%
Heroin	4.0%	7.1%
Alcohol	61.3%	64.3%
Binge drank alcohol	37.3%	35.7%
Electronic vapor products (e.g., e-cigarettes)	77.3%	78.6%
Smoking tobacco.....	41.3%	50.0%
Smokeless tobacco.....	14.7%	7.1%

* $p < .05$.

Similar patterns were found in the past-30-day substance use measures with fewer individuals reporting use of each substance (not depicted in a Table or Figure). More clients who were followed-up reported using synthetic drugs in the past 30 days than those clients who did not complete a follow-up interview (21.4% vs. 1.3%). There were no other differences in past-30-day reports of other substances by follow-up status.

Table AB.3 displays the percent of adolescents in each SUD severity classification, based on self-reported criteria for the preceding 12 months, by follow-up status. There was no significant difference by follow-up status. A sizeable minority—nearly one-fourth of the adolescents who did not complete a follow-up survey and more than one-third of adolescents who did complete a follow-up survey met criteria for severe substance use disorder. At the other extreme, about 1 in 5 adolescents who completed a follow-up interview and more than 2 in 5 adolescents who did not complete a follow-up interview were classified as having no substance use disorder.

TABLE AB.3. SEVERITY OF SUBSTANCE USE DISORDER AT INTAKE

	FOLLOWED UP	
	NO n = 75	YES n = 14
No substance use disorder	46.7%	21.4%
Mild substance use disorder	14.7%	14.3%
Moderate substance use disorder	14.7%	28.6%
Severe substance use disorder.....	24.0%	35.7%

MENTAL HEALTH

Significantly higher proportion of adolescents who completed a follow-up survey met criteria for internalizing problems and reported any disordered eating compared to the proportions of adolescents who did not complete a follow-up survey. There were no significant differences in the other mental health concerns assessed at intake (see Table AB.4).

TABLE AB.4. MET CRITERIA FOR MENTAL HEALTH CONCERNS AT INTAKE

	FOLLOWED UP	
	NO n = 75	YES n = 14
Internalizing Problems (score of 5 or greater)*	37.3%	64.3%
Externalizing Problems (score of 7 or greater)	12.0%	7.1%
Attention Problems	41.3%	35.7%
Disordered Eating*	36.0%	64.3%
Suicidal Ideation/Attempted Suicide.....	33.3%	28.6%

* $p < .10$.

EDUCATION

Table AB.5 describes clients' school involvement and academic performance when entering treatment. There were no statistically significant differences by follow-up status. The vast majority were enrolled in school when they entered treatment and reported they had attended school the last 3 months school was in session. The average GPA was equivalent to a C. Among those who attended school in the last 3 months school was in session, individuals in both groups reported similar average number of absences from school. There was no difference by follow-up status in the percent of adolescents who reported they were suspended, in detention, or expelled in the last 3 months school was in session.

TABLE AB.5. CLIENTS' SCHOOL INVOLVEMENT AND ACADEMIC PERFORMANCE AT INTAKE

	FOLLOWED UP	
	NO n = 75	YES n = 14
Enrolled in school (e.g., public, private, home school, alternative, GED classes).....	98.6%	100%
Average GPA (Min. = 0.0, Max. = 4.0)	1.9	2.4
Ever repeated a grade in school (Yes)	28.0%	42.9%
Attended school in the last 3 months school was in session (Yes)	86.7%	100%
Among those who attended school in the last 3 months school was in session:	n = 65	n = 14
Average number of days missed school for any reason in the last 3 months school was in session.....	11.7	10.5
Client was in detention, suspended, or expelled in the last 3 months school was in session (Yes)	50.8%	35.7%

CAREGIVER RELATIONSHIP AND LIVING SITUATION

There were no significant differences in primary caregiver or living situation by follow-up status. The majority reported their primary caregiver was a biological parent (see Table AB.6). The scores on the caregiver involvement scale was similar for clients who were followed up and those who were not followed up. Clients were asked to report with whom or where they had lived in the 12 months before entering treatment. They could report as many places as were applicable in the 12-month period, thus the percentages sum to greater than 100%. The majority reported they had lived with their biological parents, sizeable minorities of both groups stated they had lived with other family members, and smaller percentages reported they had lived in institutional settings. A small percentage of the sample reported they had been in foster care and none reported they had lived independently in the past 12 months.

TABLE AB.6 CLIENTS' RELATIONSHIP WITH PRIMARY CAREGIVER AND LIVING SITUATION BEFORE ENTERING TREATMENT

	FOLLOWED UP	
	NO n = 75	YES n = 14
Current primary caregiver		
Biological parent.....	60.0%	57.1%
Other family including adoptive family.....	24.0%	35.7%
Foster parent or DCBS.....	9.3%	7.1%
Other caregiver (e.g., boyfriend's father, family friends).....	5.3%	0.0%
No caregiver--emancipated minor.....	1.3%	0.0%
Average score on caregiver involvement scale.....	16.0	15.6
Where the client lived in the 12 months before entering the program		
Home with biological parent.....	72.0%	71.4%
With other family (including adoptive family).....	37.3%	28.6%
In an institutional facility (e.g., group home, residential treatment, juvenile detention).....	22.7%	14.3%
Foster care.....	12.0%	7.1%
Lived independently (including in a school dormitory).....	0.0%	0.0%

JUSTICE SYSTEM INVOLVEMENT

A minority of adolescents reported they had been arrested and smaller percentages of adolescents in both groups reported they had been in juvenile detention in the 12 months before entering treatment (see Table AB.7). Nearly one-half of clients were under supervision by the justice system (e.g., in Drug Court, probation, or court diversion) when they entered treatment, with no difference by follow-up status.

TABLE AB.7. JUSTICE SYSTEM INVOLVEMENT WHEN ENTERING TREATMENT

	FOLLOWED UP	
	NO n = 75	YES n = 14
Arrested for any charge in the 12 months before entering treatment.....	17.3%	21.4%
In juvenile detention at least one day	6.7%	7.1%
Currently under supervision by the justice system	46.7%	50.0%

RECOVERY SUPPORTS

Attending mutual help recovery meeting in the 30 days before intake was reported by one adolescent in the group of adolescents who did not complete a follow-up survey and none of the adolescents who completed a follow-up survey (see Table AB.8). Adolescents reported between 4.9 and 5.6 people, on average, they could count on for recovery support. Individuals in the two groups had the same average rating of satisfaction with the level of recovery support at intake.

TABLE AB.8. RECOVERY SUPPORTS WHEN ENTERING TREATMENT

	FOLLOWED UP	
	NO n = 75	YES n = 14
Attended a mutual help recovery meeting in the past 30 days	1.3%	0.0%
Average number of people youth can count on for recovery support.....	4.9	5.6
Average rating of satisfaction with level of recovery support in life (Min. = 1, Max. = 6).....	4.9	4.7