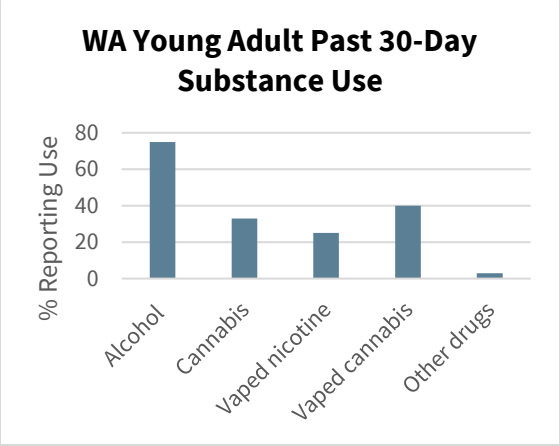
Preventing and reducing young adult substance use: Risks and protections

A critical window for prevention

Young adulthood (ages 18–26[1]) is a unique life stage marked by possibilities, instability, and identity exploration.[2] Many young adults experience major changes in living arrangements, educational pursuits, career development, and social networks. These changes bring new opportunities, but also new risks. Substance use and related harms tend to peak during young adulthood,[3,4] making this a critical window for prevention and intervention.

Young adult substance use

Recent data suggest that among young adults in Washington State, approximately 75% used alcohol in the past 30 days, 33% used cannabis, 25% vaped nicotine, 40% vaped cannabis, and 3% used other drugs.[5]



There are **serious public health consequences** for young adult substance use. For example, in the U.S., thousands of young adults are hospitalized each year due to alcohol use,[6] cannabis use has been linked to increased mental health problems,[7,8] and opioid-related deaths have reached record highs.[9] The combined economic, social, and health costs of young adult substance use affect individuals, families, communities, and healthcare systems.

Risk and protective factors

Identifying factors that increase risk (risk factors) or reduce risk (protective factors)[1,10] for young adult substance use is essential to develop and implement effective prevention policies and programs. Risk and protective factors are organized into individual, social, family, school/work, and community domains similar to the social-ecological model.[11,12]

Some risk factors linked to school and/or work may initially appear counterintuitive. For example, several studies have found that working full-time is associated with greater alcohol use among young adults. This may be due to greater disposable income or more exposure to drinking peers. Relatedly, participation in high school and college athletics tends to be associated with greater alcohol use (but not other substances). This may be due to increased pressure or peer norms around alcohol use. More research is needed to understand what may be driving these patterns.

Table 1 further summarizes a list of risk and protective factors identified in research in the past decade.

The list of **protective factors** in Table 1 is short, as it focuses on factors found in at least two long-term studies in the past decade. There is some promise, as more protective factors have been identified in individual long-term studies in the past decade. For example:

- protective behavioral strategies for alcohol (behaviors that reduce harm such as setting drink limits)[13]
- perceiving greater risk from substance use[14]
- having friends who are engaged in school[15]
- perceiving family support and care[16]
- regularly eating dinner with family[15]

- participating in community activities like volunteering[17]
- neighborhood connections[18]
- smoke-free laws[19]
- tobacco taxes at the state and local (community) levels[19]

Protective factors can also **buffer the effects of risk factors.** For example, one study found that when parents were warm, involved, and provided practical help during young adulthood, racial discrimination had less of an impact on binge drinking for Black males.[20] Another study showed that resilience and social support lessened the effects of adverse childhood experiences (e.g., childhood abuse, neglect, household dysfunction) on substance use.[21,22]

Why context matters

Risk and protective factors are not evenly distributed; young adults in marginalized communities are often exposed to more risk factors and fewer protective factors. It's critical to address broader systemic issues like racism, discriminatory policies, and neighborhood conditions to reduce these disparities.[23,24] Additionally, certain factors have a stronger impact on substance use for specific populations, highlighting the need for targeted prevention strategies. For example:

- Racial discrimination is linked to greater use, particularly for Black men.[23,25]
- Adverse childhood experiences influence substance use more for Latine young adults compared to White young adults.[26]
- Sexual minorities report higher levels of substance use than their heterosexual peers, especially in states with discriminatory policies towards LGBTQ+ individuals.[27]

Implications for policy and practice

Expanding and tailoring prevention for young adults

Most prevention research and programs focus on childhood and adolescence.[28] Further research can distinguish which factors are relevant for young adult programming versus those that are best addressed earlier in development. Adaptations of effective prevention programming for young adults, particularly those not attending 4-year colleges, should be prioritized.

A key challenge is reaching young adults outside of college settings. Much of the existing research has focused on young adults attending college because they are both more accessible to researchers and a high-risk population, leaving gaps in our understanding of the broader young adult population. **Screening, brief intervention, and referral to treatment (SBIRT)** is one effective approach that can be used to reach young adults in and out of college settings (e.g., primary care, community settings, universities)[29]. **Personalized normative feedback interventions** that aim to correct misperceptions about peer use and peer approval of use are also effective strategies for reducing substance use[30].

Strengthen supportive relationships and environments

Programming for young adults should focus on strengthening bonds to prosocial peers, family, and community. Parents and caregivers play an important role in their young adults lives; several studies show promising results for parent-based interventions with college students.[31] Further, investing in trauma-informed prevention research and programs for young adults is also needed,

particularly for those exposed to adverse childhood experiences.

Strengths-based approaches

Additional research can better understand protection for young adult use. Prioritizing protective factors already identified in research is one way to direct limited funding towards the most promising prevention strategies. Further, strengthening assets can lead to more effective, empowering, and equitable prevention strategies that build on the resilience and resources already present in communities.

Harm Reduction

Given that abstinence is not a realistic or desired goal for many young adults, prevention efforts should also prioritize harm reduction strategies, such as getting to lower blood alcohol levels and using more protective behavioral strategies, alongside efforts to delay initiation and reduce overall substance use risk.[32,33]

Implement policies that reduce access and regulate marketing

Expanding public health policies like smoke-free laws and tobacco taxes show promise for reducing substance use among young adults. Regulating the marketing and advertising of substance products, which often target young people, is another important strategy.[34] This may include strategies such as improving social media age restrictions, counter-marketing campaigns, and limiting promotion of substances at events targeting young adults.[34–36]

Prioritize equity and tailored approaches

Prevention efforts should be designed to be culturally responsive and accessible to young adults across diverse identities and backgrounds. For example, across race, socioeconomic status, college attendance, gender identity, and sexual orientation. Continued support for research can identify populations most at risk for substance use and to develop effective, tailored prevention strategies.

Acknowledgements

Washington State Prevention Research Collaborative

This brief was a cooperative effort between members of the Prevention Research Collaborative, University of Washington Social Development Research Group and Center for the Study of Health and Risk Behaviors, Washington State University Elson S. Floyd College of Medicine, and the Washington State Division of Behavioral Health and Recovery.

We would like to thank Drs. Brittany Cooper, Melissa Janson, Jason Kilmer, Christine Lee, and Jaymie Vandagriff for their contributions to this research brief.

Suggested citation

Morrison, K. M., Iniguez, A., Duckworth, J. C. (2025). *Preventing and reducing young adult substance use: Risks and protections*. Washington State Health Care Authority. Olympia, WA.

Table 1. Risk and protective factors for young adult substance use

	Alcohol	Tobacco	Cannabis	Other Drugs
Individual	• Adverse childhood experiences[37] • Racial discrimination[20] • Sexual assault and victimization[38] • Anxiety[39] • ADHD[40] • Antisocial behavior[41] • Impulsivity[42,43] • Early onset of alcohol use[44] • Prior alcohol use[16,45] • Cannabis use[46] • Positive alcohol expectancies[47,48] • Coping drinking motives[49,50] • Enhancement drinking motives[51]	• Adverse childhood experiences[37,52] • Physical violence victimization[53] • Mental health symptoms[54,55] • Externalizing symptoms[56] • ADHD[57] • Impulsivity[58,59] • Adolescent tobacco use[60,61] • Adolescent substance use[62] • Tobacco use[63,64] • Substance use[65,66] • Susceptibility to tobacco use[67] • Intentions to use[68] • Higher conscientiousness[69] • Negative views about tobacco[70]	• Adverse childhood experiences[71,72] • Racial discrimination[25] • Perceived stress[73] • Depressive symptoms[15] • Externalizing symptoms[74] • ADHD symptoms[71,75] • Antisocial behavior[53] • Impulsivity[48] • Early onset of substance use[71,74] • Substance use[14,65] • Higher agreeableness[76] • Self-regulation[15]	• Adverse childhood experiences[25,77] • Racial discrimination[78] • Sexual victimization[79] • Depression[80] • Anxiety[39] • Antisocial behavior[81,82] • Impulsivity[81] • Early onset and adolescent substance use[78] • Cigarette Smoking[83] • Alcohol use[84] • Tendency to consider long-term consequences[85]
Social	• Peer alcohol use[86,87] • Affiliation with deviant peers[88] • Perceived peer drinking[89,90] • Peer approval of drinking[84] • Being in a committed relationship[91]	• Peer tobacco use[66,92] • Exposure to positive tobacco messages from friends, family, social media[34]	• Peer substance use[48,93] • Affiliation with deviant peers[94]	• Peer substance use[95] • Affiliation with deviant peers[81] • Peer approval of substance use[96]
School Work	• Participating in athletics[17] • Working full-time[97]	• Enrollment in a technical or public university vs. private university[40,60]		
Family	• Family history of substance use problems[98,99] • Parental alcohol use[100] • Parental approval of drinking[101] • Parental monitoring[46]	• Family history of substance use problems[102] • Family and household tobacco use[103,104] • Prenatal tobacco exposure[105]	• Family history of substance use problems[39] • Parental substance use[102]	• Family substance use[80]
Community			• Exposure to tobacco advertising[14] • Neighborhood disorder/violence[24] • Religious attendance[16]	

Note: Includes factors identified in 2 or more longitudinal (2 or more timepoints) studies published in the past decade. Risk factors, Protective Factors.

References

1. Stone, A. L., Becker, L. G., Huber, A. M., & Catalano, R. F. (2012). Review of risk and protective factors of substance use and problem use in emerging adulthood. *Addictive Behaviors, 37*(7), 747–775. https://doi.org/10.1016/j.addbeh.2012.02.014
2. Arnett, J. J. (2000). Emerging adulthood: A theory of development from the late teens through the twenties. *American Psychologist, 55*(5), 469–480. https://doi.org/10.1037/0003-066X.55.5.469
3. Arnett, J. J. (2005). The developmental context of substance use in emerging adulthood. *Journal of Drug Issues, 35*(2), 235–254. https://doi.org/10.1177/002204260503500202
4. Patrick, M. E., Miech, R. A., Johnston, L. D., & O'Malley, P. M. (2024). *National data on substance use among adults ages 19 to 65, 1976–2023*. Institute for Social Research, University of Michigan. https://monitoringthefuture.org/wp-content/uploads/2024/07/mtfpanel2024.pdf
5. Washington Young Adult Health Survey. (n.d.). https://sites.uw.edu/uwwyahs/
6. Hingson, R., Zha, W., & Smyth, D. (2017). Magnitude and Trends in Heavy Episodic Drinking, Alcohol-Impaired Driving, and Alcohol-Related Mortality and Overdose Hospitalizations Among Emerging Adults of College Ages 18-24 in the United States, 1998-2014. *Journal of Studies on Alcohol and Drugs, 78*(4), 540–548. https://doi.org/10.15288/jsad.2017.78.540
7. Terry-McElrath, Y. M., Patrick, M. E., O'Malley, P. M., & Johnston, L. D. (2022). Self-reported perceived negative consequences of marijuana use among U.S. young adult users, 2008–2019. *Addictive Behaviors, 124,* 107098. https://doi.org/10.1016/j.addbeh.2021.107098
8. Buckner, J. D., Ecker, A. H., & Cohen, A. S. (2010). Mental health problems and interest in marijuana treatment among marijuana-using college students. *Addictive Behaviors, 35*(9), 826–833. https://doi.org/10.1016/j.addbeh.2010.04.001
9. Pascoe, K. M., Peavy, M. K., & Haggerty, Kevin P. (2024). *Early Prevention Works to Stop Fentanyl and Other Opioid Use*. Washington State Health Care Authority. https://theathenaforum.org/sites/default/files/2024-09/prsc_policy_brief_shared_rp_factors_opioid_misuse_published_3.19.24.pdf
10. Catalano, R. F., Fagan, A. A., Gavin, L. E., Greenberg, M. T., Irwin, C. E., Ross, D. A., & Shek, D. T. L. (2012). Worldwide application of prevention science in adolescent health. *Lancet, 379*(9826), 1653–1664. https://doi.org/10.1016/S0140-6736(12)60238-4
11. Hawkins, J. D., Catalano, R. F., & Arthur, M. W. (2002). Promoting science-based prevention in communities. *Addictive Behaviors, 27*(6), 951–976. https://doi.org/10.1016/S0306-4603(02)00298-8
12. Newburg, J. A., & Cooper, B. R. (2024). *The power of prevention across domains*. Washington State Health Care Authority. https://theathenaforum.org/sites/default/files/2024-09/prc_px_impact_published_9.13.24.pdf
13. Grazioli, V. S., Lewis, M. A., Garberson, L. A., Fossos-Wong, N., Lee, C. M., & Larimer, M. E. (2015). Alcohol expectancies and alcohol outcomes: Effects of the use of protective behavioral strategies. *Journal of Studies on Alcohol and Drugs, 76*(3), 452–458. https://doi.org/10.15288/jsad.2015.76.452
14. Han, D.-H., & Seo, D.-C. (2022). Identifying risk profiles for marijuana vaping among U.S. young adults by recreational marijuana legalization status: A machine learning approach. *Drug and Alcohol Dependence, 232*, 1–8. https://doi.org/10.1016/j.drugalcdep.2022.109330

15. Foster, K. T., Arterberry, B. J., Zucker, R. A., & Hicks, B. M. (2021). Differences in child and adult biopsychosocial characteristics associated with regular cannabis use in individuals with and without cannabis use disorder. *Drug and Alcohol Dependence, 226*, 108887. https://doi.org/10.1016/j.drugalcdep.2021.108887
16. Broman, C. L., Wright, M. K., Choi, S. H., & Wang, Y. (2020). Heavy drug use in young adulthood. *Journal of Substance Use, 25*(6), 626–631. https://doi.org/10.1080/14659891.2020.1760369
17. Hsieh, T., Simpkins, S. D., & Vandell, D. L. (2023). Longitudinal associations between adolescent out-of-school time and adult substance use. *Journal of Adolescence, 95*(1), 131–146. https://doi.org/10.1002/jad.12104
18. Davis, J. P., Tucker, J. S., Dunbar, M., Seelam, R., & D'Amico, E. J. (2022). Poly-victimization and opioid use during late adolescence and young adulthood: Health behavior disparities and protective factors. *Psychology of Addictive Behaviors, 36*(5), 440–451. https://doi.org/10.1037/adb0000770
19. Apollonio, D. E., Dutra, L. M., & Glantz, S. A. (2021). Associations between smoking trajectories, smoke-free laws and cigarette taxes in a longitudinal sample of youth and young adults. *PLoS One, 16*(2), e0246321. https://doi.org/10.1371/journal.pone.0246321
20. Kogan, S. M., & Bae, D. (2020). Racial Discrimination, Protective Parenting, and Binge Drinking Among Emerging Adult Black Men. *Alcoholism: Clinical and Experimental Research, 44*(11), 2343–2349. https://doi.org/10.1111/acer.14459
21. Rogers, C. J., Forster, M., Sussman, S., Steinberg, J., Barrington-Trimis, J. L., Grigsby, T. J., & Unger, J. B. (2023). The Impact of Childhood Trauma on Problematic Alcohol and Drug Use Trajectories and the Moderating Role of Social Support. *International Journal of Environmental Research and Public Health, 20*(4), 2829. https://doi.org/10.3390/ijerph20042829
22. Romm, K. F., Patterson, B., Crawford, N. D., Posner, H., West, C. D., Wedding, D., Horn, K., & Berg, C. J. (2022). Changes in Young Adult Substance use during COVID-19 as a Function of ACEs, Depression, Prior Substance use and Resilience. *Substance Abuse, 43*(1), 212–221. https://doi.org/10.1080/08897077.2021.1930629
23. Barton, A. W., Brody, G. H., Zapolski, T. C. B., Goings, T. C., Kogan, S. M., Windle, M., & Yu, T. (2018). Trajectory classes of cannabis use and heavy drinking among rural African American adolescents: Multi-level predictors of class membership. *Addiction, 113*(8), 1439–1449. https://doi.org/10.1111/add.14200
24. Reboussin, B. A., Johnson, R. M., Green, K. M., Furr-Holden, C. D. M., Ialongo, N. S., & Milam, A. J. (2019). Neighborhood context and transitions in marijuana use among urban young adults. *Substance Use & Misuse, 54*(7), 1075–1085. https://doi.org/10.1080/10826084.2018.1528461
25. Kwon, E., Oshri, A., Zapolski, T. C. B., Zuercher, H., & Kogan, S. M. (2023). Substance use trajectories among emerging adult Black men: Risk factors and consequences. *Drug and Alcohol Review, 42*(7), 1816–1824. https://doi.org/10.1111/dar.13728
26. Zhen-Duan, J., Colombo, D., Cruz-Gonzalez, M. A., Hoyos, M., & Alvarez, K. (2023). Adverse childhood experiences and alcohol use and misuse: Testing the impact of traditional and expanded adverse childhood experiences among racially/ethnically diverse youth transitioning into adulthood. *Psychological Trauma: Theory, Research, Practice, and Policy, 15*(Suppl 1), S55–S64. https://doi.org/10.1037/tra0001458
27. Hatzenbuehler, M. L., Jun, H.-J., Corliss, H. L., & Austin, S. B. (2015). Structural stigma and sexual orientation disparities in adolescent drug use. *Addictive Behaviors, 46*, 14–18.

https://doi.org/10.1016/j.addbeh.2015.02.017
28. Hill, L. G. (2019). Expanding Our Horizons: Risk, Protection, and Intervention in Emerging Adulthood. *Prevention Science, 20*(3), 385–389. https://doi.org/10.1007/s11121-019-00996-5
29. Babor, T. F., McRee, B. G., Kassebaum, P. A., Grimaldi, P. L., Ahmed, K., & Bray, J. (2011). Screening, Brief Intervention, and Referral to Treatment (SBIRT): Toward a Public Health Approach to the Management of Substance Abuse. *Substance Abuse, 28*(3), 7–30. https://doi.org/10.1300/J465v28n03_03
30. Lewis, M. A., & Neighbors, C. (2006). Social Norms Approaches Using Descriptive Drinking Norms Education: A Review of the Research on Personalized Normative Feedback. *Journal of American College Health, 54*(4), 213–218. https://doi.org/10.3200/JACH.54.4.213-218
31. Hill, L. G., Bumpus, M., Haggerty, K. P., Catalano, R. F., Cooper, B. R., & Skinner, M. L. (2023). "Letting Go and Staying Connected": Substance Use Outcomes from a Developmentally Targeted Intervention for Parents of College Students. *Prevention Science, 24*(6), 1174–1186. https://doi.org/10.1007/s11121-023-01520-6
32. Logan, D. E., & Marlatt, G. A. (2010). Harm Reduction Therapy: A Practice-Friendly Review of Research. *Journal of Clinical Psychology, 66*(2), 201–214. https://doi.org/10.1002/jclp.20669
33. Mackey, C. D., Wyatt, J. G., Kilmer, J. R., & Clifasefi, S. L. (2024). *Bridging Prevention and Harm Reduction Strategies for Adolescent and Young Adult Substance Use.* Washington State Health Care Authority. https://theathenaforum.org/sites/default/files/2024-09/prsc_brief_harm_reduction_and_prevention_published_5.10.24.pdf
34. Clendennen, S. L., Loukas, A., Vandewater, E. A., Perry, C. L., & Wilkinson, A. V. (2020). Exposure and engagement with tobacco-related social media and associations with subsequent tobacco use among young adults: A longitudinal analysis. *Drug and Alcohol Dependence, 213*, 108072. https://doi.org/10.1016/j.drugalcdep.2020.108072
35. Kong, G., Laestadius, L., Vassey, J., Majmundar, A., Stroup, A. M., Meissner, H. I., Ben Taleb, Z., Cruz, T. B., Emery, S. L., & Romer, D. (2024). Tobacco promotion restriction policies on social media. *Tobacco Control, 33*(3), 398–403. https://doi.org/10.1136/tc-2022-057348
36. Donaldson, S. I., Dormanesh, A., Perez, C., Majmundar, A., & Allem, J.-P. (2022). Association Between Exposure to Tobacco Content on Social Media and Tobacco Use: A Systematic Review and Meta-analysis. *JAMA Pediatrics, 176*(9), 878–885. https://doi.org/10.1001/jamapediatrics.2022.2223
37. Rogers, C. J., Forster, M., Grigsby, T. J., Albers, L., Morales, C., & Unger, J. B. (2021). The impact of childhood trauma on substance use trajectories from adolescence to adulthood: Findings from a longitudinal Hispanic cohort study. *Child Abuse & Neglect, 120*, 105200. https://doi.org/10.1016/j.chiabu.2021.105200
38. Rhew, I. C., Stappenbeck, C. A., Bedard-Gilligan, M., Hughes, T., & Kaysen, D. (2017). Effects of sexual assault on alcohol use and consequences among young adult sexual minority women. *Journal of Consulting and Clinical Psychology, 85*(5), 424–433. https://doi.org/10.1037/ccp0000202
39. Khoddam, R., Worley, M., Browne, K. C., Doran, N., & Brown, S. A. (2015). Family history density predicts long term substance use outcomes in an adolescent treatment sample. *Drug and Alcohol Dependence, 147*, 235–242. https://doi.org/10.1016/j.drugalcdep.2014.11.009
40. Bierhoff, J., Haardörfer, R., Windle, M., & Berg, C. J. (2019). Psychological risk factors for alcohol, cannabis, and various tobacco

use among young adults: A longitudinal analysis. *Substance Use & Misuse, 54*(8), 1365–1375. https://doi.org/10.1080/10826084.2019.1581220

41. Salvatore, J. E., Thomas, N. S., Cho, S. B., Adkins, A., Kendler, K. S., & Dick, D. M. (2016). The role of romantic relationship status in pathways of risk for emerging adult alcohol use. *Psychology of Addictive Behaviors, 30*(3), 335–344. https://doi.org/10.1037/adb0000145
42. Carroll, H. A., Rhew, I., & Larimer, M. E. (2020). Moderation of relation between psychological risk factors and alcohol use by sex. *Women & Health, 60*(3), 300–313. https://doi.org/10.1080/03630242.2019.1635559
43. McNamara, I. A., King, S. E., Corbin, W. R., & Fromme, K. (2022). A longitudinal examination of relations between competitive athletic participation, drinking norms, impulsivity, and sensation seeking and binge drinking throughout college. *Psychology of Addictive Behaviors, 36*(7), 837–848. https://doi.org/10.1037/adb0000849
44. Terry-McElrath, Y. M., & Patrick, M. E. (2016). Intoxication and binge and high-intensity drinking among US young adults in their mid-20s. *Substance Abuse, 37*(4), 597–605. https://doi.org/10.1080/08897077.2016.1178681
45. Patock-Peckham, J. A., & Corbin, W. R. (2023). Impaired control over drinking predicts changes in alcohol-related consequences over and above alcohol use and facets of impulsivity. *Addictive Behaviors, 137,* 107534. https://doi.org/10.1016/j.addbeh.2022.107534
46. Geisner, I. M., Koopmann, J., Bamberger, P. A., Wang, M., Larimer, M. E., Nahum-Shani, I., & Bacharach, S. B. (2018). When the party continues: Impulsivity and the effect of employment on young adults' post-college alcohol use. *Addictive Behaviors, 77*, 114–120. https://doi.org/10.1016/j.addbeh.2017.09.014
47. Hultgren, B. A., Turrisi, R., Cleveland, M. J., Mallett, K. A., Reavy, R., Larimer, M. E., Geisner, I. M., & Hospital, M. M. (2019). Transitions in drinking behaviors across the college years: A latent transition analysis. *Addictive Behaviors, 92,* 108–114. https://doi.org/10.1016/j.addbeh.2018.12.021
48. Brumback, T., Thompson, W. K., Cummins, K., Brown, S. A., & Tapert, S. F. (2021). Psychosocial predictors of substance use in adolescents and young adults: Longitudinal risk and protective factors. *Addictive Behaviors, 121*, 106985. https://doi.org/10.1016/j.addbeh.2021.106985
49. Taylor, N. L., Su, J., The Spit for Science Working Group, & Dick, D. M. (2022). Depressive Symptoms and Drinking to Cope in Relation to Alcohol Use Outcomes among White and Black/African American College Students. *Substance Use & Misuse, 57*(5), 708–718. https://doi.org/10.1080/10826084.2022.2034871
50. Zaso, M. J., Read, J. P., & Colder, C. R. (2023). Coping-motivated escalations in adolescent alcohol problems following early adversity. *Psychology of Addictive Behaviors, 37*(2), 331–340. https://doi.org/10.1037/adb0000788
51. Kenney, S., Jones, R. N., & Barnett, N. P. (2015). Gender differences in the effect of depressive symptoms on prospective alcohol expectancies, coping motives, and alcohol outcomes in the first year of college. *Journal of Youth and Adolescence, 44*(10), 1884–1897. https://doi.org/10.1007/s10964-015-0311-3
52. Romm, K. F., Cohn, A. M., Wang, Y., & Berg, C. J. (2023). Psychosocial predictors of trajectories of dual cigarette and e-cigarette use among young adults in the US. *Addictive Behaviors, 141*, 107658.

https://doi.org/10.1016/j.addbeh.2023.107658

53. Hicks, T. A., Chartier, K. G., Buckley, T. D., Reese, D., The Spit for Science Working Group, Vassileva, J., Dick, D. M., Amstadter, A. B., Peterson, R. E., & Moreno, O. (2022). Divergent changes: Abstinence and higher-frequency substance use increase among racial/ethnic minority young adults during the COVID-19 global pandemic. *The American Journal of Drug and Alcohol Abuse, 48*(1), 88–99. https://doi.org/10.1080/00952990.2021.1995401
54. Bataineh, B. S., Wilkinson, A. V., Case, K. R., Clendennen, S. L., Sumbe, A., Chen, B., & Harrell, M. B. (2021). Emotional symptoms and sensation seeking: Implications for tobacco interventions for youth and young adults. *Tobacco Prevention & Cessation, 7,* 37. https://doi.org/10.18332/tpc/133571
55. Jester, J. M., Glass, J. M., Bohnert, K. M., Nigg, J. T., Wong, M. M., & Zucker, R. A. (2019). Child and adolescent predictors of smoking involvement in emerging adulthood. *Health Psychology, 38*(2), 133–142. https://doi.org/10.1037/hea0000703
56. Stanton, C. A., Tang, Z., Sharma, E., Seaman, E., Gardner, L. D., Silveira, M. L., Hatsukami, D., Day, H. R., Cummings, K. M., Goniewicz, M. L., Limpert, J., Everard, C., Bansal-Travers, M., Ambrose, B., Kimmel, H. L., Borek, N., Compton, W. M., Hyland, A. J., & Pearson, J. L. (2023). Predictors of e-cigarette and cigarette use trajectory classes from early adolescence to emerging adulthood across four years (2013–2017) of the PATH Study. *Nicotine & Tobacco Research, 25*(3), 421–429. https://doi.org/10.1093/ntr/ntac119
57. Dodge, N. C., Jacobson, J. L., Lundahl, L. H., & Jacobson, S. W. (2023). Prenatal alcohol exposure and attention-deficit/hyperactivity disorder independently predict greater substance use in young adulthood. *Alcohol: Clinical and Experimental Research, 47*(6), 1143–1155. https://doi.org/10.1111/acer.15076
58. Doran, N., & Tully, L. (2018). Impulsivity and tobacco product use over time. *Addictive Behaviors, 85,* 153–157. https://doi.org/10.1016/j.addbeh.2018.06.007
59. Mittal, A., Du, A., Merz, W., Myers, M. G., Crotty Alexander, L. E., & Doran, N. (2022). Impulsivity-Related Personality Traits as Predictors of E-Cigarette Use among Young Adults over Time. *Substance Use & Misuse, 57*(7), 1007–1013. https://doi.org/10.1080/10826084.2022.2046101
60. Berg, C. J., Haardörfer, R., Lanier, A., Childs, D., Foster, B., Getachew, B., & Windle, M. (2020). Tobacco use trajectories in young adults: Analyses of predictors across systems levels. *Nicotine & Tobacco Research, 22*(11), 2075–2084. https://doi.org/10.1093/ntr/ntaa048
61. Villanti, A. C., Cobb, C. O., Cohn, A. M., Williams, V. F., & Rath, J. M. (2015). Correlates of hookah use and predictors of hookah trial in U.S. young adults. American *Journal of Preventive Medicine, 48*(6), 742–746. https://doi.org/10.1016/j.amepre.2015.01.010
62. Broun, A., Haynie, D., & Choi, K. (2021). Parental anti-smoking encouragement as a longitudinal predictor of young adult cigarette and e-cigarette use in a US national study. *Nicotine & Tobacco Research, 23*(9), 1468–1474. https://doi.org/10.1093/ntr/ntab026
63. Case, K. R., Creamer, M. R., Cooper, M. R., Loukas, A., & Perry, C. L. (2018). Hookah use as a predictor of other tobacco product use: A longitudinal analysis of Texas college students. *Addictive Behaviors, 87*, 131–137. https://doi.org/10.1016/j.addbeh.2018.06.028
64. Epstein, M., Bailey, J. A., Kosterman, R., Rhew, I. C., Furlong, M., Oesterle, S., & McCabe, S. E. (2021). E-cigarette use is associated with subsequent cigarette use among young adult non-smokers, over and above a range

of antecedent risk factors: A propensity score analysis. *Addiction, 116*(5), 1224–1232. https://doi.org/10.1111/add.15317

65. Fleming, C. B., Delawalla, M. L. M., Rhew, I. C., Kilmer, J. R., Larimer, M., & Guttmannova, K. (2024). Cross-Substance Associations With Transitions in Cannabis and Nicotine Use in a Statewide Sample of Young Adults in Washington State. *Journal of Studies on Alcohol and Drugs, 85*(2), 272–282. https://doi.org/10.15288/jsad.23-00055
66. Creamer, M. R., Loukas, A., Clendennen, S., Mantey, D., Pasch, K. E., Marti, C. N., & Perry, C. L. (2018). Longitudinal predictors of cigarette use among students from 24 Texas colleges. *Journal of American College Health, 66*(7), 617–624. https://doi.org/10.1080/07448481.2018.1431907
67. Atuegwu, N. C., Mortensen, E. M., Krishnan-Sarin, S., Laubenbacher, R. C., & Litt, M. D. (2023). Prospective predictors of electronic nicotine delivery system initiation in tobacco naive young adults: A machine learning approach. *Preventative Medicine Reports, 32,* 102148. https://doi.org/10.1016/j.pmedr.2023.102148
68. Hampson, S. E., Andrews, J. A., Severson, H. H., & Barckley, M. (2015). Prospective predictors of novel tobacco and nicotine product use in emerging adulthood. *Journal of Adolescent Health, 57*(2), 186–191. https://doi.org/10.1016/j.jadohealth.2015.04.015
69. Wang, Y., Romm, K. F., Edberg, M. C., Bingenheimer, J. B., LoParco, C. R., Cui, Y., & Berg, C. J. (2024). Two-part models identifying predictors of cigarette, e-cigarette, and cannabis use and change in use over time among young adults in the US. *American Journal on Addictions, 335*(5), 559-568. https://doi.org/10.1111/ajad.13569
70. Tan, A. S. L., Lee, C., & Chae, J. (2015). Exposure to health (mis)information: Lagged effects on young adults' health behaviors and potential pathways. *Journal of Communication, 65*(4), 674–698. https://doi.org/10.1111/jcom.12163
71. Berg, C. J., Windle, M., Dodge, T., Cavazos-Rehg, P., Yang, Y. T., Ma, Y., & Haardoerfer, R. (2022). Marijuana Use and Increases in Use over Time among Young Adult College Students in the State of Georgia: Analyses of Sociocontexual Predictors. *Substance Use & Misuse, 57*(3), 350–359. https://doi.org/10.1080/10826084.2021.2012691
72. Grant, J. D., Agrawal, A., Werner, K. B., McCutcheon, V. V., Nelson, E. C., Madden, P. A. F., Bucholz, K. K., Heath, A. C., & Sartor, C. E. (2017). Phenotypic and familial associations between childhood maltreatment and cannabis initiation and problems in young adult European-American and African-American women. *Drug and Alcohol Dependence, 179*, 146–152. https://doi.org/10.1016/j.drugalcdep.2017.06.038
73. Cappelli, C., Miller, K. A., Ritt-Olson, A., Pentz, M. A., Salahpour, S., & Milam, J. E. (2021). Binge drinking, tobacco, and marijuana use among young adult childhood cancer survivors: A longitudinal study. *Journal of Pediatric Oncology Nursing, 38*(5), 285–294. https://doi.org/10.1177/10434542211011036
74. Goldschmidt, L., Richardson, G. A., Day, N. L., & De Genna, N. M. (2023). Change in marijuana use from adolescence to young adulthood and its relation to gestational alcohol and marijuana exposure. *Neurotoxicology and Teratology, 99*, 107287. https://doi.org/10.1016/j.ntt.2023.107287
75. Howard, A. L., Kennedy, T. M., Mitchell, J. T., Sibley, M. H., Hinshaw, S. P., Arnold, L. E., Roy, A., Stehli, A., Swanson, J. M., & Molina, B. S. G. (2020). Early substance use in the pathway from childhood attention-deficit/hyperactivity disorder (ADHD) to young adult substance use: Evidence of statistical mediation and substance specificity. *Psychology of Addictive Behaviors, 34*(2), 281–292. https://doi.org/10.1037/adb0000542

76. Romm, K. F., Wang, Y., Duan, Z., Bennett, B., Fuss, C., Ma, Y., Blank, M. D., Bray, B. C., Ahluwalia, J. S., & Berg, C. J. (2022). Psychosocial predictors of longitudinal changes in tobacco and cannabis use among young adults. *Addictive Behaviors, 129,* 107264. https://doi.org/10.1016/j.addbeh.2022.107264
77. VanBronkhorst, S. B., Abraham, E., Dambreville, R., Ramos-Olazagasti, M. A., Wall, M., Saunders, D. C., Monk, C., Alegría, M., Canino, G. J., Bird, H., & Duarte, C. S. (2024). Sociocultural Risk and Resilience in the Context of Adverse Childhood Experiences. *JAMA Psychiatry, 81*(4), 406–413. https://doi.org/10.1001/jamapsychiatry.2023.4900
78. Paat, Y.-F., Hope, T. L., & Dominguez, S. (2023). Substance use behavior among Hispanic emerging adults in Los Angeles, California. *Journal of Ethnicity in Substance Abuse, 22*(2), 453–476. https://doi.org/10.1080/15332640.2021.1952131
79. Blayney, J. A., Scalco, M., Radomski, S., Colder, C., & Read, J. P. (2019). Sexual victimization histories and substance use trajectories during the transition out of college. *Psychology of Addictive Behaviors, 33*(6), 529–539. https://doi.org/10.1037/adb0000489
80. Fuss, C., Romm, K. F., Crawford, N. D., Harrington, K. R. V., Wang, Y., Ma, Y., Taggart, T., Ruiz, M. S., & Berg, C. J. (2023). Psychosocial correlates of opioid use profiles among young adults in a Longitudinal Study across 6 US metropolitan areas. *Substance Use & Misuse, 58*(8), 981–988. https://doi.org/10.1080/10826084.2023.2201839
81. Cho, S. B., Llaneza, D. C., Adkins, A. E., Cooke, M., Kendler, K. S., Clark, S. L., & Dick, D. M. (2015). Patterns of substance use across the first year of college and associated risk factors. *Frontiers in Psychiatry, 6*, 152. https://doi.org/10.3389%2Ffpsyt.2015.00152
82. Olson, A., Shenk, C. E., Noll, J. G., & Allen, B. (2022). Child Maltreatment and Substance Use in Emerging Adulthood: Internalizing and Externalizing Behaviors at the Transition to Adolescence as Indirect Pathways. *Child Maltreatment, 27*(3), 490–500. https://doi.org/10.1177/10775595211010965
83. Martin, C. E., Ksinan, A. J., Moeller, F. G., Dick, D., & Spit for Science Working Group. (2021). Sex-specific risk profiles for substance use among college students. *Brain and Behavior, 11*(2), e01959. https://doi.org/10.1002/brb3.1959
84. Trager, B. M., Linden-Carmichael, A. N., Morgan, R. M., Mallett, K. A., Turrisi, R., & LaBrie, J. (2021). The prospective effects of parents' and friends' approval of drinking on simultaneous alcohol and marijuana use during college. *Substance Use & Misuse, 56*(14), 2269–2274. https://doi.org/10.1080/10826084.2021.1981390
85. Meshesha, L. Z., Pickover, A. M., Teeters, J. B., & Murphy, J. G. (2017). A longitudinal behavioral economic analysis of non-medical prescription opioid use among college students. *The Psychological Record, 67*(2), 241–251. https://doi.org/10.1007/s40732-017-0235-2
86. Goldstick, J. E., Walton, M. A., Bohnert, A. S. B., Heinze, J. E., & Cunningham, R. M. (2019). Predictors of alcohol use transitions among drug-using youth presenting to an urban emergency department. *PLoS One, 14*(12), e0227140. https://doi.org/10.1371/journal.pone.0227140
87. Luk, J. W., Yu, J., Haynie, D. L., Goldstein, R. B., Simons-Morton, B. G., & Gilman, S. E. (2023). A nationally representative study of sexual orientation and high-risk drinking from adolescence to young adulthood. *Journal of Adolescent Health, 72*(2), 222–229. https://doi.org/10.1016/j.jadohealth.2022.09.030

88. Su, J., Kuo, S. I.-C., Meyers, J. L., Guy, M. C., & Dick, D. M. (2018). Examining interactions between genetic risk for alcohol problems, peer deviance, and interpersonal traumatic events on trajectories of alcohol use disorder symptoms among African American college students. *Development and Psychopathology, 30*(5), 1749–1761. https://doi.org/10.1017/S0954579418000962

89. LaBrie, J. W., Boyle, S. C., Young, S. H., & Tan, C. N. (2021). Prospective relationships between objectively assessed social media use, drinking norms, and alcohol consumption among first-year students. *Journal of Studies on Alcohol and Drugs, 82*(3), 339–350. https://doi.org/10.15288/jsad.2021.82.339

90. Litt, D. M., Lewis, M. A., Rhew, I. C., Hodge, K. A., & Kaysen, D. L. (2015). Reciprocal relationships over time between descriptive norms and alcohol use in young adult sexual minority women. *Psychology of Addictive Behaviors, 29*(4), 885–893. https://doi.org/10.1037/adb0000122

91. Whitton, S. W., Dyar, C., Godfrey, L. M., & Newcomb, M. E. (2021). Within-person associations between romantic involvement and mental health among sexual and gender minorities assigned female-at-birth. *Journal of Family Psychology, 35*(5), 606–617. https://doi.org/10.1037/fam0000835

92. Musci, R. J., Uhl, G., Maher, B., & Ialongo, N. S. (2015). Testing gene × environment moderation of tobacco and marijuana use trajectories in adolescence and young adulthood. *Journal of Consulting and Clinical Psychology, 83*(5), 866–874. https://doi.org/10.1037/a0039537

93. Pollard, M. S., Tucker, J. S., Green, H. D., de la Haye, K., & Espelage, D. L. (2018). Adolescent peer networks and the moderating role of depressive symptoms on developmental trajectories of cannabis use. *Addictive Behaviors, 76*, 34–40. https://doi.org/10.1016/j.addbeh.2017.07.019

94. Reboussin, B. A., Rabinowitz, J. A., Thrul, J., Maher, B., Green, K. M., & Ialongo, N. S. (2020). Trajectories of cannabis use and risk for opioid misuse in a young adult urban cohort. *Drug and Alcohol Dependence, 215,* 108182. https://doi.org/10.1016/j.drugalcdep.2020.108182

95. Kennedy, T. M., Howard, A. L., Mitchell, J. T., Hoza, B., Arnold, L. E., Hechtman, L. T., Swanson, J. M., Stehli, A., & Molina, B. S. G. (2019). Adult substance use as a function of growth in peer use across adolescence and young adulthood in the context of ADHD: Findings from the MTA. *Addictive Behaviors, 99,* 106106. https://doi.org/10.1016/j.addbeh.2019.106106

96. Tucker, J. S., Davis, J. P., Seelam, R., Stein, B. D., & D'Amico, E. J. (2020). Predictors of opioid misuse during emerging adulthood: An examination of adolescent individual, family and peer factors. *Drug and Alcohol Dependence, 214*, 108188. https://doi.org/10.1016/j.drugalcdep.2020.108188

97. Caamano-Isorna, F., Adkins, A., Aliev, F., Moure-Rodríguez, L., & Dick, D. M. (2020). Population Attributable Fraction of Early Age of Onset of Alcohol Use in Alcohol Abuse and Dependence: A 3-Year Follow-Up Study in University Students. *International Journal of Environmental Research and Public Health, 17*(6), 2159. https://doi.org/10.3390/ijerph17062159

98. Kendler, K. S., Edwards, A., Myers, J., Cho, S. B., Adkins, A., & Dick, D. (2015). The predictive power of family history measures of alcohol and drug problems and internalizing disorders in a college population. *American Journal of Medical Genetics Part B: Neuropsychiatric Genetics, 168*(5), 337–346. https://doi.org/10.1002/ajmg.b.32320

99. Bountress, K. E., Hawn, S. E., Dick, D. M., Spit for Science Working Group, & Amstadter, A. B. (2021). Latent profiles of alcohol

consumption among college students exposed to trauma. *Journal of Addictions Nursing, 32*(1), 3–13. https://doi.org/10.1097/JAN.0000000000000379

100. Cleveland, M. J., Turrisi, R., Gibbons, F. X., Gerrard, M., & Marzell, M. (2018). The effects of mothers' protective parenting and alcohol use on emerging adults' alcohol use: Testing indirect effects through prototype favorability among African American youth. *Alcoholism: Clinical and Experimental Research, 42*(7), 1291–1303. https://doi.org/10.1111/acer.13775
101. Waldron, K. A., Turrisi, R. J., Mallett, K. A., & Romano, E. (2021). Examining parental permissiveness toward drinking and perceived ethnic discrimination as risk factors for drinking outcomes among Latinx college students. *Addictive Behaviors, 118,* 106900. https://doi.org/10.1016/j.addbeh.2021.106900
102. De Genna, N. M., Goldschmidt, L., Richardson, G. A., & Day, N. L. (2022). Maternal trajectories of cannabis use and young adult cannabis and nicotine dependence. *Addictive Behaviors, 126*, 107212. https://doi.org/10.1016/j.addbeh.2021.107212
103. Kim, S., Selya, A., Wakschlag, L. S., Dierker, L., Rose, J. S., Hedeker, D., & Mermelstein, R. J. (2021). Estimating causal and time-varying effects of maternal smoking on youth smoking. *Addictive Behaviors, 120*, 106982. https://doi.org/10.1016/j.addbeh.2021.106982
104. Loukas, A., Marti, C. N., Cooper, M., Pasch, K. E., & Perry, C. L. (2018). Exclusive e-cigarette use predicts cigarette initiation among college students. *Addictive Behaviors, 76*, 343–347. https://doi.org/10.1016/j.addbeh.2017.08.023
105. Weber, T. L., Selya, A., Wakschlag, L. S., Dierker, L., Rose, J. S., Hedeker, D., & Mermelstein, R. J. (2021). The Effect of Maternal Smoking on Offspring Smoking Is Unrelated to Heritable Personality Traits or Initial Subjective Experiences. *Nicotine & Tobacco Research, 23*(10), 1754–1762. https://doi.org/10.1093/ntr/ntab081