Adolescent polysubstance use: Time for a new public health approach

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Ronan Fleury and Mary Cannon discuss the growing trend of polysubstance use among adolescents and highlight the need for a new public health strategy that reflects the complexities of adolescent substance use

Adolescent substance use is no longer a single-substance issue. Increasingly, young people use alcohol, nicotine, and cannabis together, a pattern that research shows is both common and harmful. In a recent Irish school survey, 7.5% of 15–16-year-olds reported using all three substances within the past month (Fleury et al., 2025). This trend challenges long-standing public health frameworks that still approach substance use in isolation, leaving us with definitions, policies, and interventions that lag behind lived reality. Clinical trials and neuroscience studies have historically excluded people who use multiple substances (Hakkararinen et al, 2019). The result is evidence that does not reflect reality. We end up with prevention strategies and clinical interventions that are not only mismatched but sometimes irrelevant to the populations most in need.

Definitional confusion

Polysubstance use seems simple to define: the use of more than one substance. Yet even here, consensus breaks down. Some studies count lifetime use of two or more substances; others focus on same-day or simultaneous use; still others restrict the term to cases of multiple substance use disorders. As Bunting and colleagues (2024) argue, the lack of clarity weakens the field: findings become difficult to compare, and prevention programmes struggle to identify what, exactly, they are targeting. This ambiguity is particularly damaging in adolescence, where patterns of use are shaped by brain development, social pressures, and cultural context. Without clarity on what we are measuring, recommendations for intervention risk become inconsistent or irrelevant.

Importance of cannabis and tobacco smoking

Evidence consistently shows that polysubstance use predicts worse outcomes than single-substance use. Crummy et al. (2020) highlight higher rates of treatment dropout, relapse, and mortality, especially where opioids are involved. Philbin and Mauro (2019) note that polysubstance use often follows life-course trajectories, with patterns that evolve or escalate over time and are shaped by social inequities. For adolescents, these trajectories are only beginning, but early patterns of combined use are strong predictors of later harms.

Cannabis use is now central to polysubstance patterns, particularly as its legal and cultural status shifts. Young people frequently perceive cannabis as harmless or even therapeutic (O'Dowd et al., 2025), yet evidence contradicts this view. Cannabis use, particularly in combination with alcohol or nicotine, is associated with unsafe behaviours, heavier overall substance use, and heightened risk of psychosis and other mental health problems (Smyth, Fleury & Cannon, 2024). Despite this, cannabis often remains backgrounded in polysubstance research or excluded entirely, leaving a gap in understanding at precisely the moment when its role is growing.

Tobacco is a frequently neglected factor. As Bunting et al. (2024) point out, nicotine is rarely counted in polysubstance frameworks, perhaps because of its legality. Yet it is one of the most common companions to other substances, with well-established potentiating effects on both intoxication and withdrawal. Omitting tobacco is not just a methodological oversight, it closes our eyes to a major driver of adolescent substance patterns.

A public health approach

To move forward, four changes are needed:

First, we need a clear and consistent definition of polysubstance use. A useful framework should capture three dimensions:

1. the number and type of substances used,
2. the timing of use (simultaneous, same-day, or sequential), and
3. the intent of use (deliberate or incidental).

These dimensions should be applied consistently across research and clinical settings.

Second, adolescents who use multiple substances must be included in research, not excluded for being 'too complex.' Their use patterns are precisely what we need to understand if we want effective interventions. This means investing in new tools to capture the heterogeneity of polysubstance use, including preclinical models that reflect combined use and longitudinal studies that track trajectories over time.

Third, cannabis and nicotine need to be treated as central components of polysubstance use, not afterthoughts. Both play distinctive roles in shaping risks and outcomes, and both are highly relevant in adolescent populations. Public health messaging and prevention campaigns should explicitly address their interaction with alcohol and other substances.

Ultimately, our understanding of harm must be broadened. Overdose remains a critical outcome, but for adolescents, academic decline, social disconnection, criminalisation, and mental health deterioration are equally pressing. Substance use in youth is strongly linked to long-term cognitive and social consequences (Brennan et al., 2024; Power et al., 2021). Ignoring these outcomes risks underestimating the true impact of polysubstance use.

The message is clear: polysubstance use is a central feature of adolescent substance use today. Continuing to approach it with outdated single-substance frameworks will leave prevention efforts one step behind. Public health policy needs to embrace the complexity, adapt its definitions, and design interventions that reflect the realities young people are actually living.

References

1. Brennan, M. M., Corrigan, C., Mongan, D., Doyle, A., Galvin, B., Nixon, E., Zgaga, L., Smyth, B., Ivers, J. H., & McCarthy, N. (2024). Predictors and outcomes of adolescent alcohol and drug use: A scoping review. European Journal of Public Health, 34. https://doi.org/10.1093/eurpub/ckae144.594
2. Bunting, A. M., Shearer, R., Linden-Carmichael, A. N., Williams, A. R., Comer, S. D., Cerda, M., & Lorvick, J. (2024). Are you thinking what I'm thinking? Defining what we mean by "polysubstance use." The American Journal of Drug and Alcohol Abuse, 50(1), 1–7. https://doi.org/10.1080/00952990.2023.2248360
3. Crummy, E. A., O'Neal, T. J., Baskin, B. M., & Ferguson, S. M. (2020). One is not enough: Understanding and modeling polysubstance use. Frontiers in Neuroscience, 14, 569. doi: https://doi.org/10.3389/fnins.2020.00569
4. Fleury, R., Dooley, N., Staines, L., Hoey, J., Healy, C., Gillan, D., O'Higgins, F., O'Dowd, T. M., Smyth, B., & Cannon, M. (2025). Adolescent polysubstance use and psychopathology: A population-based survey in schools. [submitted]
5. Green, C. (2023). Defining polysubstance use in adolescents: A letter to the editor. Journal of Substance Use, 29(4), 625. https://doi.org/10.1080/14659891.2023.2204948
6. Hakkarainen, P., O'Gorman, A., Lamy, F., & Kataja, K. (2019). (Re)conceptualizing "polydrug use": Capturing the complexity of combining substances. Contemporary Drug Problems, 46(4), 400–417. https://doi.org/10.1177/0091450919884739
7. O'Dowd, T. M., Fleury, R., Power, E., Dooley, N., Quinn, L., Petropoulos, S., … Cannon, M. (2025). Risk and protective factors for cannabis use in adolescence: a population-based survey in schools. Irish Journal of Psychological Medicine, 42(1), 6–14. doi:https://doi.org/10.1017/ipm..2024.28
8. Philbin, M. M., & Mauro, P. M. (2019). Measuring polysubstance use over the life course: Implications for multilevel interventions. The Lancet Psychiatry, 6(10), 797–798. https://doi.org/10.1016/S2215-0366(19)30328-1
9. Power, E., Sabherwal, S., Healy, C., O'Neill, A., Cotter, D., & Cannon, M. (2021). Intelligence quotient decline following frequent or dependent cannabis use in youth: A systematic review and meta-analysis of longitudinal studies. Psychological Medicine, 51(2), 194–200. doi: https://doi.org/10.1017/S0033291720005036
10. Smyth, B., Fleury, R., & Cannon, M. (2024, April 24). Cannabis use in young people: Effects on physical and mental health [eBook]. Open Access Government.

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