Drug and Alcohol REVIEW

APSAD

Drug and Alcohol Review (May 2019), 38, 327–330
DOI: 10.1111/dar.12914

COMMENTARY

Alcohol and other drug prevention for older adolescents: It's a no brainer

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Abstract

Older adolescence represents a critical period of brain development whereby the prefrontal cortex, responsible for higher level thinking and emotional regulation, is under construction. During this period, the brain is wired to underestimate risk and overestimate pleasure, which primes young people towards risky, pleasure-oriented experiences. Substance use during this time can hinder brain maturation and lead to development related disorders. However, young people are the most likely to drink at risky quantities, use cannabis, MDMA and cocaine in the previous 12 months than any other age group. Despite this, there are no validated, age-appropriate prevention programs targeting school leavers, which leaves a group of young people to navigate a landscape where drug use is the most common, without formal support. Drug and alcohol prevention programs should be developed for this age group that combine features of universal prevention programs and targeted intervention programs to support the wider range of drug use behaviours relevant to this older audience. This article outlines potential evidence-based strategies that programs could focus on in the future. [Debenham J, Newton N, Birrell L, Askovic M. Alcohol and other drug prevention for older adolescents: It's a no brainer. *Drug Alcohol Rev* 2019;38:327–330]

Key words: alcohol and drug prevention, young people.

For years it was believed that the brain finished developing after childhood and remained static for the rest of life. However, recent advances in neural imaging have shown that this is far from true. It turns out, the brain undergoes major structural integration, especially in the prefrontal cortex, which is responsible for executive functions including behavioural and emotional self-regulation [1], long after childhood, adolescence and early adulthood, concluding around the age of 25 [1]. This is well after the average onset of drug and alcohol use around the world. What's more, the brain is continuously changing due to its plastic, malleable quality—we all have neuroplastic brains. This organisation of neural networks occurs in response to growth, experiences and damage [2] and attenuates with age. In other words, the 16-year-old brain is more pliable than the 25-year-old brain! Substance use during brain development can disrupt brain cell growth (neurogenesis) and the strengthening of neural networks (myelination and pruning) and prevent young people from developing the ability to self-regulate, manage stress and engage in goal directed behaviour—all qualities which allow alcohol and other drug (AOD) use to thrive in the first place [3]. This makes AOD prevention in the formative years up until 25 particularly important.

Globally, AOD contribute to 12.4% of all deaths and are linked to over 80 recognised disease conditions [4,5]. In Australia, the average age of first-time alcohol and illicit drug use is 16.7 years and 19.1 years respectively, which is significantly later than previous decades [6,7]. While this delayed onset represents a positive shift away from AOD use in early adolescence (12–15 years), this shift does not extend to older adolescence (16–19 years). Amongst those aged 16–19 years, the rates of high-risk alcohol consumption remain the same, and of the 43% of Australians who have tried an illicit drug, over a quarter (27%) of experimentation occurs during the age of 16–17 years [6]. In the following years this spike continues with young people (18 to 24 years) being the most likely to drink in risky

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quantities and use cannabis, MDMA and cocaine than any other age group [6–9]. Furthermore, on a national level, the illicit consumption of drugs is increasing [10], this includes the misuse of licit substances (e.g. prescription opioids, inhalants, vaping, cognitive enhancers, benzodiazepines). Hereby, if we look beyond the span of short-term intoxication, Australia faces insidious long-term health consequences that accompany early onset AOD use. For example, the initiation of AOD use during adolescence compared to adulthood increases the likelihood of addiction and comorbid mental illness [11]. Additionally, even frequent drinkers who abstain from binge drinking have increased risk of substance use problems in later life [12]. Corroborating this prevalence data is an increase in mortality, morbidity and mental illness in young populations over the past few years [7].

The good news is, prevention programs targeted at younger adolescents are effective [13–15]. Young people are waiting longer than ever before to drink or take drugs [6]. These trends are multi-faceted, possibly in-part due to the up-take of evidence-based prevention programs that align with the school curriculum. However, in terms of long term effectiveness, a recent study suggests that the positive impact of early drug interventions (i.e. those received up until Grade 10) can diminish or even disappear by late secondary school unless they are supplemented by additional program input [17]. Moreover, within programs of established effectiveness, sub-groups remain resistant to the program [13].

The obvious question arises, what is happening in the senior years of secondary school and why are the programs not working then? In short, there is little impact in the older years because there are no mandatory, age-appropriate programs targeting this age group (16–19 years) [15]. This leaves a group of school leavers who have not been exposed to drug education in years, having to navigate a landscape where drug use has now become statistically normal. Students want 'real information on actual situations' and do not want to feel 'like there is no coming back' indicating current prevention messages are not credible or relevant to this older age group [18]. When many do not consider cannabis to be a drug and when young people are happy to declare one batch of ecstasy pills safe to use because their friends have taken it—it is clear that students in the new inoculation period are no longer listening to the evidence [14,16].

What makes the older adolescents different?

The older adolescent brain (16–19 years) is defined by an underactive prefrontal cortex and overactive limbic system [19,20], which effectively makes it wired to underestimate risk and overestimate pleasure [21]. This wiring offers both opportunity and risk. On one hand, older adolescents have a tendency towards exploration and a necessary breaking away from the family unit towards self-sufficiency. On the other hand, it makes older adolescents primed to be attracted towards powerful pleasure-giving substances, while feeling immune from consequence. This coupled with adolescents becoming more liberal in their attitudes can see them reassess their relationship with drugs and alcohol. It is time that prevention programs employ health messages that resonate with older adolescents, so they are supported and can continue to thrive post-school.

Will we ever be water tight?

When patterns of use vary, and adolescents develop diverse reasons for engaging or not engaging in AOD the next hurdle appears; how do we deliver *relevant* content that will remain *memorable* for everyone up until final brain maturation and beyond?

Social influence theory suggests that in heterogeneous cohorts of both high- and low-risk students, sub-groups will emerge to create prevailing local 'norms' [22]. Peer role modelling becomes a major determinant of AOD use, so for sustained impact, programs must address the unanimous local norms and provide the latest scientific data to legitimise the message.

Reversing the stigma: Delivering targeted programs universally

Typically, drug prevention programs take a universal, selected or indicated approach, aimed at entire populations, at risk groups or groups already experiencing problems, respectively. The latter two are targeted approaches that address the complex needs of high-risk students and tend to have larger impacts than population approaches [16,18]. They tend to involve profound explorations around the 'why' behind risky AOD use and provide tools for behaviour change. However, the practical limitations of delivering targeted approaches in schools, including stigmatising certain groups reduce scale and feasibility [23,24].

What if we create a new era for drug prevention that brings together the strengths of the targeted approach and implements it within a universal context? This nexus program would leverage the evidence base to prevent drug use (being normative, knowledge-based

and psychosocial skills) while inserting recovery tools commonly used in primary interventions. The reality is that curiosity, experimentation, and the definition of personal boundaries are all part of the psychosocial development of young people. Programs need to acknowledge why AOD use is attractive to young people, and address the outcomes that drugs are seen to deliver. After all, drugs such as alcohol are tried commonly enough in young people that minor experimentation could be deemed normative.

There are age-associated differences in drug sensitivity. For students in the senior years of school, when the use of recreational drugs is becoming more highly prevalent, there may be an opportunity to build a credible and relevant evidence base that promotes abstinence while including relevant harm reduction strategies for common recreational drugs. Such programs would leverage both prevention and primary intervention features so to engage more students in an issue that permeates our culture.

The following strategies have not been widely validated in the school environment but could provide promising results for AOD prevention in older adolescents:

1. There is compelling evidence to support the seductive allure of neuroscience explanations in providing credible information about psychological issues in young people [25–29]. There is potential to leverage brain imaging and neuroscience findings, in the education of AOD harms.
2. While programs contend to adopt a harm minimisation approach, few universal programs adopt a harm reduction approach for illicit substances, one of the three pillars of harm minimisation [30–32]. This includes reducing harm over the short term for drugs such as cannabis, MDMA, cocaine, inhalants etc. to prevent known harms from the way people take drugs.
3. Programs should balance content on the negative consequences of AOD with a move towards promoting positive behaviour, such as a focus on ways to 'grow the brain' instead of singularly 'preventing harm'. One potential way is through meditation and mindfulness training [33–35]. Another way is through mobile phone applications that leverage positive psychology [36].
4. A key factor that determines successful recovery for high-risk people, is establishing a positive social network [37,38]. This means, young people are more likely to internalise health information when they feel connected to their peers, adults, and the school [39]. Thus, programs should be genuinely interactive to unite a group under a common goal in a nonjudgmental context.

Further research needs to be conducted to incorporate impactful drug education practice for older adolescents and these findings provide a basis for exploring targeted programs implemented universally. A first step in reducing the significant harm that results from AOD among the next generation.

References

[1] Giedd JN, Blumenthal J, Jeffries NO *et al*. Brain development during childhood and adolescence: a longitudinal MRI study. Nat Neurosci 1999;2:861–3.

[2] Pokhrel P, Herzog T, Black D, Zaman A, Riggs N, Sussman S. Adolescent neurocognitive development, self-regulation, and school-based drug use prevention. Prev Sci 2013;14:218–28.

[3] Johnson S, Blum R, Giedd J. Adolescent maturity and the brain: the promise and pitfalls of neuroscience research in adolescent health policy. J Adolesc Health 2009;45:216–21.

[4] Popova S, Rehm J, Patra J. Illegal drug-attributable mortality and potential years of life lost in Canada 2002: conclusions for prevention and policy. Contemp Drug Probl 2005;27:3.

[5] Rehm J, Patra J, Popova S. Alcohol-attributable mortality and potential years of life lost in Canada 2001: implications for prevention and policy. Addiction 2006;101:373–84.

[6] Australian Institute of Health and Welfare. National Drug Strategy Household Survey 2016: detailed findings. Drug statistics series no. 31. Cat. no. PHE 214. Canberra: AIHW, 2017.

[7] Australian Institute of Health and Welfare. Australia's health 2016. Australia's health series no. 15. Cat. No. AUS 199. Canberra: AIHW Australia's health 2016 Australia's health, 2016:2016.

[8] Depression and Other Common Mental Disorders: Global Health Estimates. Geneva: World Health Organization; 2017. Licence: CC BY-NC-SA 3.0 IGO.

[9] United Nations Office on Drugs and Crime, World Drug Report 2015 (United Nations publication, Sales No. E15XI.6).

[10] AIHW. Australia's health, illicit substances, p.211, cat. No. AUS 211. Canberra: AIHW, 2018.

[11] Clark DB, Kirisci L, Tarter RE. Adolescent versus adult onset and the development of substance use disorders in males. Drug Alcohol Depend 1998;49:115–21.

[12] Silins E, Horwood LJ, Najman JM *et al*. Adverse adult consequences of different alcohol use patterns in adolescence: an integrative analysis of data to age 30 years from four Australasian cohorts. Addiction 2018;113:1811–25.

[13] Mewton L, Visontay R, Chapman C *et al*. Universal prevention of alcohol and drug use: an overview of reviews in an Australian context. Drug Alcohol Rev 2018;37:S435–S69.

[14] Stockings E, Hall W, Lynskey M *et al*. Prevention, early intervention, harm reduction, and treatment of substance use in young people. Lancet Psychiatry 2016;3:280–96.

[15] Newton N, Conrod P, Slade T *et al*. The long-term effectiveness of a selective, personality-targeted prevention program in reducing alcohol use and related harms: a cluster randomized controlled trial. J Child Psychol Psychiatry 2016;57:1056–65.

[16] Teesson M, Newton N, Barrett E. Australian school-based prevention programs for alcohol and other drugs: a systematic review. Drug Alcohol Rev 2012;31:731–6.

[17] National Centre for Education and National Centre for Education and Training on Addiction Training on Addiction. Peer education: from evidence to practice. Adelaide: National Centre for Education and Training on Addiction (NCETA) Flinders University of South Australia, 2003.

[18] Lancaster K, Ritter A, Metthew-Simmons F. Young people's opinions on alcohol and other drugs issues, National Drug and Alcohol Research Centre (Australia). Aust Natl Council Drugs 2013;362:2920994.

[19] Sowell E, Thompson P, Holmes C, Jernigan T, Toga A. In vivo evidence for post-adolescent brain maturation in frontal and striatal regions. Nat Neurosci 1999;2:859–61.

[20] Sowell E, Thompson P, Tessner K *et al.* Mapping continued brain growth and gray matter density reduction in dorsal frontal cortex: inverse relationships during post adolescent brain maturation. J Neurosci 2001; 21:8819–29.
[21] Witt E. Research on alcohol and adolescent brain development: opportunities and future directions. Alcohol 2010;44:119–24.
[22] Huba G, Bentler P. The role of peer and adult models for drug taking at different stages in adolescence. J Youth Adolesc 1980;9:449–65.
[23] Hamilton M, King T, Ritter A. Drug use in Australia. South Melbourne: Oxford University Press, 2016.
[24] Offord D. Selection of levels of prevention. Addict Behav 2000;25: 833–42.
[25] Weisberg D, Keil F, Goodstein J, Rawson E, Gray J. The Seductive Allure of Neuroscience Explanations. Journal of Cognitive Neuroscience. 2008;20:470-477.
[26] Ballonoff Suleiman A, Brindis C. Adolescent school-based sex education: using developmental neuroscience to guide new directions for policy and practice. Sex Res Soc Policy 2014;11:137–52.
[27] Hoffman E. Introducing children to their amazing brains. Middlewich: Learn to Learn; 2002.
[28] McCabe D, Castel A. Seeing is believing: the effect of brain images on judgments of scientific reasoning. Cognition 2008;107:343–52.
[29] Im S, Varma K, Varma S. Extending the seductive allure of neuroscience explanations effect to popular articles about educational topics. Br J Educ Psychol 2017;87:518–34.
[30] Spooner C, Hall W. Preventing drug misuse by young people: we need to do more than 'just say no'. Addiction 2002;97:478–81.
[31] Midford R, Lester L, Williams T, White V. The relationship between Australian harm minimisation alcohol education and student uptake, consumption and harm. Int J Drug Policy 2018;52:25–31.
[32] McBride N, Farringdon F, Midford R, Meuleners L, Phillips M. Harm minimization in school drug education: final results of the school health and alcohol harm reduction project (SHAHRP). Addiction 2004;99:278–91.
[33] Mahone M, Travis F, Gevirtz R, Hubbard D. fMRI during transcendental meditation practice. Brain Cogn 2018;123:30–3.
[34] Newberg A, Iversen J. The neural basis of the complex mental task of meditation: neurotransmitter and neurochemical considerations. Med Hypotheses 2003;61:282–91.
[35] Newton N, Teesson M, Vogl L, Andrews G. Internet-based prevention for alcohol and cannabis use: final results of the climate schools course. Addiction 2010;105:749–59.
[36] Haug S, Paz Castro R, Meyer C, Filler A, Kowatsch T, Schaub M. A mobile phone-based life skills training program for substance use prevention among adolescents: pre-post study on the acceptance and potential effectiveness of the program, Ready4life. JMIR Mhealth Uhealth 2017;5:e143.
[37] Kelly J, Stout R, Greene M, Slaymaker V. Young adults, social networks, and addiction recovery: post treatment changes in social ties and their role as a mediator of 12-step participation. PLoS One 2014;9:e100121.
[38] Bathish R, Best D, Savic M, Beckwith M, Mackenzie J, Lubman D. "Is it me or should my friends take the credit?" the role of social networks and social identity in recovery from addiction. J Appl Soc Psychol 2017;47:35–46.
[39] Hawkins J, Catalano R, Miller J. Risk and protective factors for alcohol and other drug problems in adolescence and early adulthood: implications for substance abuse prevention. Psychol Bull 1992;112:64–105.