Adolescent substance use and educational attainment:
An integrative data analysis comparing cannabis and alcohol from three Australasian cohorts

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Summary

Adolescent cannabis use (weekly+) was associated with 1½ to 2-fold increases in the odds of high school non-completion, university non-enrolment, and degree non-attainment. In contrast, associations for adolescent alcohol use were inconsistent and weaker.

Adolescent cannabis use accounted for a greater proportion of the overall rate of non-progression with formal education than adolescent alcohol use.

Findings are important to the debate about the relative harms of cannabis and alcohol use.

Background

Completing high school and a university degree are critical milestones linked to better health and economic productivity. Alcohol and cannabis are commonly used by young people in the school-age years. Given the extent of exposure, the association of alcohol and cannabis use with educational attainment is of increasing interest.

Aims

We examined the extent to which adolescent cannabis or alcohol use was associated with failure to progress further in formal education. Specifically, we:

1. Investigated the association between frequency of cannabis use and frequency of alcohol use prior to age 17 and high school non-completion, university non-enrolment, and degree non-attainment by age 25;
2. Examined two other patterns of alcohol use (amount consumed and number of alcohol-related problems);
3. Adjusted associations for potential confounders; and,
4. Estimated the proportion of educational non-involvement attributable to adolescent cannabis or alcohol use if causality is assumed.

Methods

Data were integrated at the participant level from three Australasian longitudinal studies:

1. Australian Temperament Project (ATP; n=2443; 4 months to 28 years)
2. Christchurch Health and Development Study (CHDS; n=1265; birth to 35 years)
3. Victorian Adolescent Health Cohort Study (VAHCS; n=2032; 14 to 30 years)

We first examined bivariate associations by fitting a series of logistic regression models to the data. We adjusted for confounding using a generalised propensity score approach. Propensity scores were estimated from a multinomial logistic regression in which the frequency of cannabis or alcohol use was regressed on the full set of available confounders in each study. Analyses were repeated using two alternative alcohol measures. Sample size varied by analysis (n=2179-3678).

Estimates of the covariate adjusted attributable risk (AR) were derived.

Models were re-analysed using data weighting procedures to account for sample attrition and missing data. Results were consistent.

Table 1: Associations between maximum frequency of cannabis or alcohol use before age 17 and educational outcomes in combined data

OR (95% CI)	Frequency of substance use			
	Never	<Weekly	Weekly +	p
Did not complete high school				
Cannabis use	1	1·82 (1·60-2·07)	3·33 (2·57-4·30)	<·001
Alcohol use	1	1·42 (1·25-1·62)	2·03 (1·56-2·64)	<·001
Did not enrol in university[1]				
Cannabis use	1	1·48 (1·31-1·68)	2·20 (1·71-2·83)	<·001
Alcohol use	1	1·15 (1·03-1·29)	1·33 (1·06-1·66)	0·014
Did not attain university degree				
Cannabis use	1	1·97 (1·73-2·25)	3·89 (2·98-5·08)	<·001
Alcohol use	1	1·25 (1·14-1·39)	1·57 (1·29-1·92)	<·001

[1]Only assessed in CHDS and VAHCS

Table 2: Associations between maximum frequency of cannabis or alcohol use before age 17 and educational outcomes in combined data after adjustment for confounding

OR (95% CI)	Frequency of substance use			
	Never	<Weekly	Weekly +	p
Did not complete high school				
Cannabis use	1	1·27 (1·05-1·53)	1·60 (1·09-2·35)	0·016
Alcohol use	1	1·10 (0·91-1·34)	1·21 (0·83-1·78)	0·323
Did not enrol in university[1]				
Cannabis use	1	1·23 (1·03-1·46)	1·51 (1·06-2·13)	0·021
Alcohol use	1	0·94 (0·80-1·10)	0·88 (0·64-1·21)	0·420
Did not attain university degree				
Cannabis use	1	1·40 (1·17-1·68)	1·96 (1·36-2·81)	<·001
Alcohol use	1	0·95 (0·83-1·09)	0·90 (0·68-1·18)	0·470

[1]Only assessed CHDS and VAHCS

Table 3: Attributable risk for measures of cannabis or alcohol use before age 17 on educational outcomes after adjustment for confounding

Educational outcomes	Measure of cannabis or alcohol use			
	Cannabis (Max frequency)	Alcohol (Max frequency)	Alcohol (Max amount drunk)	Alcohol (Alcohol-related problems)
Did not complete high school	7·2%	6·4%	0·8%	5·2%
Did not enrol in university	4·8%	-3·7%	1·6%	-0·8%
Did not attain university degree	5·0%	-2·0%	1·4%	0·2%

Results

For cannabis there were clear (p<0·001) trends for increasing frequency of use to be associated with lower educational attainment (Table 1).

For alcohol there were significant associations between increasing frequency of use and lower educational attainment. However, these associations appeared more modest than those for cannabis (Table 1).

After adjustment for confounding, all of the associations between frequency of cannabis use and educational non-involvement across levels of exposure remained (p<0·02). For alcohol use all of the adjusted associations were non-significant (Table 2), and the pattern of results was similar for the two alternative measures of alcohol use.

Results suggest it may be cannabis use specifically, rather than substance use generally (as measured by alcohol consumption), that is associated with failure to progress with education.

For all outcomes the attributable risk estimates for cannabis use were greater than those for all measures of alcohol use (Table 3).

Conclusions

Findings strengthen the case for cannabis' harmful effects on adolescent development and are important to the debate about the relative harms of cannabis and alcohol use.

Adolescent cannabis use is a better marker of lower educational attainment than adolescent alcohol use and identifies an important target population for preventive intervention

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