

REVIEW

The effects of adolescent cannabis use on educational attainment: a review

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Abstract

This paper reviews research examining the link between cannabis use and educational attainment among youth. Cross-sectional studies have revealed significant associations between cannabis use and a range of measures of educational performance including lower grade point average, less satisfaction with school, negative attitudes to school, increased rates of school absenteeism and poor school performance. However, results of cross-sectional studies cannot be used to determine whether cannabis use causes poor educational performance, poor educational performance is a cause of cannabis use or whether both outcomes are a reflection of common risk factors. Nonetheless, a number of prospective longitudinal studies have indicated that early cannabis use may significantly increase risks of subsequent poor school performance and, in particular, early school leaving. This association has remained after control for a wide range of prospectively assessed covariates. Possible mechanisms underlying an association between early cannabis use and educational attainment include the possibility that cannabis use induces an 'amotivational syndrome' or that cannabis use causes cognitive impairment. However, there appears to be relatively little empirical support for these hypotheses. It is proposed that the link between early cannabis use and educational attainment arises because of the social context within which cannabis is used. In particular, early cannabis use appears to be associated with the adoption of an anti-conventional lifestyle characterized by affiliations with delinquent and substance using peers, and the precocious adoption of adult roles including early school leaving, leaving the parental home and early parenthood.

Introduction

Cannabis is widely used by young people in most developed countries including Australia,¹ New Zealand,² the United States³ and Canada⁴ (see Hall *et al.*⁵ for a review of the epidemiology of cannabis use). Cannabis use is typically initiated during adolescence,⁶ an important time of transition between childhood and adulthood. High

school education is an important determinant of how well this transition is negotiated; its outcomes affect an individual's educational and career opportunities and ultimately an individual's life chances throughout adulthood. Given the widespread use of cannabis by adolescents and the fact that its intoxicating effects include cognitive and psychomotor impairment,^{7,8} there have

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been increasing concerns about its potentially adverse effects on educational performance.

Given these concerns, there has been substantial research on adolescent cannabis use. This includes research on patterns of cannabis use, the reasons why young people use cannabis, and the social and psychological consequences of adolescent use on early adult life. This paper summarizes research on the possible effects of cannabis use on educational attainment. Its specific aims are to:

1. Summarize research on relationships between cannabis use and school performance.
2. Outline research on the most plausible explanations of the relationships between cannabis use and school performance.

Adolescent cannabis use and educational performance

A number of cross-sectional surveys have examined associations between cannabis use and a variety of measures of educational attainment and commitment among school children and youth. Increasing levels of cannabis use have been associated with lower grade point average,⁹ less satisfaction with school,¹⁰ negative attitudes to school¹¹ and poor school performance.¹² Further studies have shown that rates of cannabis and other illicit drug use are higher among young people who no longer attend school¹³ or who are absent from school on any given day.^{1, 14}

Using retrospective reports of cannabis use, Mensch & Kandel¹⁵ found that high school graduates reported significantly more use of cannabis during adolescence than college graduates, even after controlling for socio-demographic factors, academic ability, self-esteem and delinquency. However, the value of the study was compromised by a reliance on retrospective reports of cannabis use, the reliability and validity of which have been questioned.¹⁶

Longitudinal studies of cannabis use and educational outcomes

The cross-sectional studies cited above show that young people who use cannabis are at increased risk of poor educational performance. However, cross-sectional data can not generally be used to elucidate the causal mechanisms underlying an

observed association. General explanations for the co-occurrence of two or more outcomes have been discussed by Caron & Rutter¹⁷ and include the following.

Cannabis use causes educational difficulties

The first and simplest explanation of the association is that early cannabis use causes poor educational outcomes. This explanation has been clearly articulated by Kandel *et al.*¹⁸ who argue that: early cannabis use encourages continued use of the drug and that it encourages anti-conventional behaviours including delinquency, employment problems and difficulties in interpersonal relationships.

Cannabis use is a consequence of educational problems

An alternative explanation is that cannabis use is a *consequence* of poor educational attainment. There is some support for this hypothesis in that poor educational performance is a risk factor for cannabis use and misuse.¹⁹ It should be noted that these two hypotheses, that cannabis use is a cause of poor school performance and that poor school performance is a cause of cannabis use, are not mutually exclusive. Both processes can potentially operate concurrently, as has been noted by Krohn *et al.*²⁰

A common syndrome of problem behaviour

A third alternative explanation is that cannabis use and poor educational attainment are reflections of a common syndrome of problem behaviour. According to Jessor & Jessor's²¹ problem behaviour theory, a wide range of problem behaviors occurring in adolescence are manifestations of a common syndrome or proclivity to problem behaviours. This common syndrome, which Donovan & Jessor²² subsequently suggested reflected unconventionality, is assumed to be the result of common personal and environmental influences which increase risks of norm violating and problem behaviour in general.

Most research on this theory has focused on the extent to which correlations between problem behaviours can be explained by a single common factor. Such a factor has been described as problem behaviour or general deviance,²³ a syndrome of problem behaviour²² or

simply as a common factor.²⁴ The results of these studies have been mixed. Some have reported a single factor²²⁻²⁵ while other studies have not.^{26, 27} These studies have only tested whether or not the correlations between a set of problem behaviours reflect a common factor. They have not explored the extent to which risk factors predict variations in this syndrome. The results of these studies are also at risk of being circular, as they argue that the correlation between problem behaviours can be explained by a common factor which, in turn, is defined on the basis of those correlations.

Common or correlated causes

The final possibility is that the observed associations between early cannabis use and poor educational outcomes are not causal but are the result of common or correlated risk factors that increase the likelihood of both early cannabis use and poor educational performance. There is considerable indirect evidence to support this hypothesis because the risk factors and life pathways for early cannabis use overlap considerably with those for poor educational performance. These risk factors include: the extent to which norms and attitudes encourage drug use; social disadvantage and family dysfunction; individual factors including personality and an individual's propensity to violate norms; and the extent to which an individual affiliates with delinquent and drug-using peers.^{19, 28, 29}

In order to distinguish between these explanations it is necessary to have data from prospective longitudinal studies. Such studies have a number of major advantages over cross-sectional studies.³⁰ First, they enable researchers to specify which comes first, cannabis use or poor educational performance. Secondly, they reduce the effects of recall bias arising from retrospective reports of cannabis use and behaviour. Thirdly, they permit researchers to examine causal pathways between cannabis use and educational outcomes by statistical adjustment for the contribution of confounding variables.

A number of recent prospective longitudinal designs have examined the associations between cannabis use and educational attainment. A key aim of many of these studies has been to determine whether or not early cannabis use is a risk factor which increases individuals' risks of early school leaving and other adverse educational

outcomes. These studies have made multiple assessments over time of cannabis use, educational performance and potentially confounding covariates, such as socio-demographic factors, family and peer substance use behaviours and delinquency. They have used statistical methods (typically regression or related models) to assess the extent to which prior cannabis use is associated with subsequent educational performance after the effects of potentially confounding covariates have been taken into account.

A description and review of longitudinal studies that have examined the associations between cannabis use and educational attainment is provided below. The articles reviewed below were identified through extensive computer searches of the medical, psychological, educational and economic literatures. These searches were supplemented by referring back to literature cited by the identified articles and by citation searches of key early articles. Perhaps the most striking outcome of this search procedure, given the high public and policy interest in this topic, was the relatively small number of studies identified. Given the relatively few studies that have examined the influence of cannabis use on subsequent educational attainment, no efforts were made to exclude research based on an evaluation of methodological rigor. Additionally, it was deemed necessary to include a number of studies that have looked more broadly at the effects of substance use in general rather than the specific effects of cannabis use.

Major longitudinal studies of cannabis use and educational outcomes

One of the few studies to focus specifically on the effects of early cannabis use was reported by Fergusson *et al.*,³¹ who examined whether cannabis use before age 15 years predicted subsequent regular drug use, criminal offending, poor mental health and reduced life opportunities, after adjusting for a range of potentially confounding factors. The sample consisted of nearly 1000 young people who had been followed from birth to age 16 years. They were assessed on cannabis use at age 15 and on cannabis use and a wide range of other health and psychological outcomes at age 16. By the age of 16 the 10% of the sample who had used cannabis by the age of 15 had elevated risks of substance abuse, delinquency, school problems

and poor mental health. Of particular interest, 22.5% of those who reported cannabis use before the age of 15 years had left school before age 16 (the minimum school leaving age in New Zealand) compared with only 3.5% of those who had not used cannabis. Frequent truancy between 15 and 16 years was also more common among those who had used cannabis before the age of 15 years (31.5%) than among those who had not used it (4.7%). Fergusson *et al.*³¹ found that young people who reported early cannabis use differed from those who had not *prior* to using cannabis. They showed early tendencies to delinquency, poorer mental health and educational achievement, more affiliations with delinquent or substance-using peers and more family dysfunction. Regression analyses controlling for potentially confounding covariates indicated that, after the effects of these factors had been taken into account, the associations between early onset cannabis use and the *majority* of the outcomes were no longer statistically significant. This suggested that early cannabis use did not causally influence risks of alcohol abuse, daily tobacco use, conduct disorder, self-report offending, anxiety disorders, depression and suicidal ideation.

However, the relationship between early cannabis use and early school leaving did persist after statistical adjustment. Even after the effects of confounding covariates had been statistically controlled, young people who used cannabis before the age of 15 years were 3.1 (95% CI = 1.2–7.9) times more likely than peers who had not to have left school before age 16. There was also a marginally significant association ($p < 0.10$) between early cannabis use and frequent truancy: after control for confounding covariates young people who had used cannabis by the age of 15 years were 2.0 (95% CI = 1.0–4.2) times more likely to report frequent truancy between 15 and 16 years. In a subsequent follow-up of the same birth cohort, Fergusson & Horwood³² reported that cannabis use occurring before the age of 16 years was associated with an increased risk of leaving school without formal qualifications. Again, this relationship persisted after control for a wide range of potentially confounding covariates: 35.6% of those who had used cannabis on ten or more occasions during the interval 15–16 years left school without formal qualifications compared with 17.1% of those who had not used cannabis.

Similar findings have been reported in a recent study by Brook *et al.*³³ in which a sample of 1182 Puerto Rican and African American students from New York were followed over a 5-year period from 1990 to 1995. Results indicated that young people who reported cannabis once a month or more often at age 14 were significantly more likely to leave high school before completing 12th grade, even after control for a range of factors assessed at age 14. Additionally, young people who used cannabis at least monthly at age 14 years were significantly more likely to report delinquency, other drug-related problems, sexual risk-taking and to have more friends who exhibited deviant behaviour.

Ellickson *et al.*³⁴ conducted a prospective longitudinal study in which they assessed cannabis use and a range of other factors in a sample of 7th-graders from Oregon and California in 1985. The sample was then followed-up 5 years later in 1990, by which time they should have completed 12th grade. The results of logistic regression analyses indicated that cannabis use was a predictor of early school leaving among Latino students, even after controlling for demographic variables, family structure, academic orientation and early deviance. Young Latinos who were one standard deviation above the mean on a measure of cannabis use were 38% more likely to leave school before graduating. However, after controlling for these confounding factors, cannabis use did not predict leaving school early for Asians, blacks or whites.

As discussed above, given the relatively small number of studies that have examined the specific effects of cannabis use on educational attainment, it was necessary to include a number of longitudinal studies which have looked more generally at the effects of substance use on educational attainment. For example, Newcomb & Bentler³⁵ used data collected over 8 years on a sample of 654 high school students to examine the impact of early substance use on a range of outcomes at ages 19–24 years. Recruitment for the study occurred in 1976 when subjects were in the 7th–9th grades of 11 schools in Los Angeles County. These subjects were recontacted on four separate occasions. Outcomes assessed 8 years after subject recruitment included interpersonal relationships, family formation and stability, criminality, educational attainment, employment and mental health. Newcomb & Bentler³⁵ used structural equation modelling to

examine the extent to which substance use (assessed by reports of cannabis, alcohol and hard drug use) was associated with adverse outcomes in young adulthood, after taking account of the effects of antecedent confounding factors. Their analyses indicated that early substance use made significant independent contributions to several outcomes assessed in young adulthood, including a measure of college involvement. The authors concluded (p. 205) that adolescent substance use:

leads to problems in several areas of life including livelihood, emotional functioning, criminal involvement, and an abandonment of traditional pursuits, such as a college education.

While Newcomb & Bentler examined the effects of substance use in general, cannabis use was very highly correlated with the substance use factor ($r = 0.98$) and so the effects of the general substance use factor are likely to be similar to the effects of cannabis use. Similarly, Krohn *et al.*²⁰ reported that the use of cannabis and other drugs during adolescence increased the risks of precocious transitions to a range of adult roles, including leaving school early. They used prospective longitudinal data from a sample of 775 high-risk adolescents studied from age 13 to 20 years. Results indicated that early substance use, measured on the basis of the self-reported frequency of alcohol, cannabis and other illicit drug use, was a significant predictor of early school leaving for males, but not for females. Duncan *et al.*³⁶ examined substance use over time and the factors that predicted escalation of substance use in a sample of 664 adolescents assessed at three time-points. Their results indicated that academic failure predicted higher levels of substance use (including cannabis use) at the initial time period. Deteriorating academic performance over the course of the study was also associated with an escalation of substance use. The authors acknowledged that substance use might have contributed to academic failure, but argued that academic failure was more likely to be a cause of escalating substance use. They suggested that much of the apparent effect of cannabis use on academic performance occurred through affiliations with delinquent or substance-using peers.

Tanner *et al.*³⁷ used data from the US National

Longitudinal Study of Youth to examine the influence of drug use (assessed in 1979 when subjects were aged 14–17 years) on social outcomes assessed when subjects were aged 25–30 (in 1990–92). The outcomes that were examined included educational outcomes (highest grade completed, graduation from high school, college degree) and employment variables (occupational status, unemployment). Their analyses indicated that, after controlling for socio-demographic background, cognitive skill and educational expectations, early drug use was a significant predictor of early school dropout, failure to graduate from high school and failure to obtain a college degree in both males and females. Among males early drug use was also related to lower occupational status and unemployment.

In summary, there have now been a number of longitudinal research studies that have examined the influence of cannabis use on a variety of different measures of subsequent educational performance. These have shown that early cannabis use is a risk factor for poor educational outcomes and, in particular, early school leaving^{31–34}. Although there have been relatively few studies examining the specific effects of later cannabis use on educational attainment, this conclusion has been supported further by findings that early substance use places young people at heightened risks for reduced educational attainment.^{20, 35, 37} A causal interpretation of the link between early cannabis use and subsequent educational performance has been supported by the fact that many of these studies have statistically controlled for a wide range of prospectively measured confounding covariates. In these studies the finding that early cannabis use predicts an increased risk of early school leaving has been paralleled by findings that it also predicts precocious transitions to adult roles including precocious sexual activity,³⁸ unplanned parenthood during adolescence,^{15, 20} unemployment³² and leaving the family home early.^{20, 32}

Explanations of the association between cannabis use and school leaving

These prospective studies indicate that young people who begin the use of cannabis (and other drugs) at an early age have an increased risk of poor school performance and early school leaving. A number of explanations have been proposed to explain this association.

The association arises from the effects of uncontrolled confounding

The extent to which the relationship between early cannabis use and early school leaving arises because cannabis use causes early school leaving is open to debate. The longitudinal studies have the advantages that cannabis use has been assessed prior to school leaving and many have been able to control statistically for a wide range of potentially confounding covariates in examining the association between cannabis use and early school leaving. Perhaps the most extensive control for confounding was achieved in the study by Fergusson *et al.*³¹ Their results, and those of other studies, indicate that, even though statistical control reduces the associations between cannabis use and early school leaving, a significant association remains. Nonetheless, it is possible that the observed association between cannabis use and early school leaving arises from the effects of confounding factors that were not included in the analyses. This possibility has been highlighted by authors who have suggested that neighbourhood effects³⁹ and genetic effects⁴⁰ may influence drug use and other outcomes.

A related issue centres on the reliability and validity with which the included covariates have been assessed. Specifically, any substantial limitations in the reliability and validity of observed measures is likely to reduce the power of a study to control for the effects of those variables. Thus, for example, if the association between two variables can be explained by the influence of third or confounding factors but these factors have been assessed only imperfectly, than a study which includes all of these variables may still conclude that there is a residual association between the two main variables of interest which cannot be explained by the influence of confounding covariates. The reliability and validity of the assessed covariates in the studies described above have been variable. Nonetheless, it is probable that all studies have had only imperfect measures of potentially confounding covariates. Thus, it is probable that these studies provide a lower limit estimate of the extent to which the association between cannabis use and educational attainment can be explained by the effects of common or correlated risk factors.

Difficulties in drawing causal inferences from observational studies are not peculiar to the studies of the relationship between cannabis use

and early school leaving. A number of studies, for example, have found a significant relationship between cigarette smoking and early school leaving which remains after extensive statistical control for confounding factors.^{32, 34} No one has argued that this relationship is causal as there is no obvious biological hypothesis to explain it. It is more likely to reflect uncontrolled confounding factors that are associated with increased risks of tobacco use and increased risks of early school leaving. Although a similar possibility cannot be excluded for the relationship between cannabis use and early school leaving, there are a number of potential explanatory mechanisms for the relationship between cannabis use and early school leaving.

Cannabis use produces an 'amotivational' syndrome

First, it has been proposed that cannabis use can reduce motivation as chronic heavy cannabis use has been reported to impair motivation and social performance in societies with a long history of use.⁴¹ Increasing cannabis use in the early 1970s produced clinical reports of a similar syndrome occurring among heavy cannabis users in the United States.⁴²⁻⁴⁴ These reports typically described a state in which the users' focus of interest narrowed, they became apathetic, withdrawn, lethargic, unmotivated and showed evidence of impaired memory, concentration and judgement.^{41, 45} This constellation of symptoms has been described as an 'amotivational syndrome'.^{45, 46} However, these studies were uncontrolled so it has not been possible to disentangle the effects of chronic cannabis use from those of poverty and low socio-economic status, or pre-existing personality and other psychiatric disorders.^{7, 43, 47}

Further, the existence of an amotivational syndrome among chronic heavy cannabis users has not been supported by the results of field studies conducted in societies where heavy cannabis use is widespread.^{48, 49} For example, Rubin & Comitas⁴⁸ used videotapes to assess movement and biochemical measures of caloric expenditure before and after ganja smoking in a group of Jamaican farmers who regularly smoked ganja. Contrary to expectations, the workers engaged in more intense and concentrated labour after smoking ganja. Similarly unresponsive results were reported by Carter *et al.*,⁴⁹ who compared groups of cannabis users and non-users in Costa

Rica. While non-users were more likely to have a stable employment history than users, those who were employed and had steady jobs smoked considerably more cannabis than those who had an unstable employment history or were unemployed. Other evidence suggests that, if an amotivational syndrome exists, it is rare. For example, Halikas *et al.*⁵⁰ followed 100 regular cannabis users over 6–8 years and asked about symptoms of an amotivational syndrome. They found only three individuals who had experienced such a cluster of symptoms in the absence of significant depression. They were not distinguished from the other sample members by their extent of cannabis use. Nor were these symptoms related to changes in pattern of cannabis use; rather they seemed to come and go independently of continued cannabis use.

There have been a number of laboratory studies of long-term heavy cannabis use which have also failed to provide evidence of impaired motivation.⁵¹ One study using standardized measures of performance failed to observe any effects on motivation.⁵² Subjects in this study were given access to as much cannabis as they earned by performing a simple task. Results showed that output was unaffected by cannabis use. This was in sharp contrast to the effects of alcohol: when the same study design was used with heavy drinkers performance was profoundly disrupted.

The research literature on the amotivational syndrome has been reviewed by Hall *et al.*,⁷ who conclude (p. 105) that:

The evidence for an amotivational syndrome among adults is, at best equivocal. The positive evidence largely consists of case histories, and observational reports. The small number of controlled field and laboratory studies have not found compelling evidence for such a syndrome... It nonetheless is reasonable to conclude that if there is such a syndrome, it is a relatively rare occurrence, even among heavy, chronic cannabis users.

Cannabis use may produce cognitive deficits

A third explanation is that cannabis use causes cognitive impairments, which in turn impair school performance and increase the likelihood of leaving school early. In a recent review of this issue, Solowij⁵³ concluded that long-term cannabis use did not produce gross cognitive

deficits. This has recently been supported by the results of a prospective study in a large representative sample of the population.⁵⁴ However, Solowij⁵³ also concluded that there was evidence that long-term cannabis use (daily or near daily use for 10 years or more) was associated with impairment of selective attention.

Solowij⁵³ noted that it was difficult to predict how these subtle impairments would affect adolescent functioning in school. Highly sophisticated methods of testing were necessary to detect these effects in adults and few adolescent cannabis users would have used cannabis intensively or long enough to produce the effects found in adults. The adults in the study reported by Solowij *et al.*,⁵⁵ for example, had on average used cannabis 5 days a week for 11 years. By contrast, the studies of educational performance among youth, described above, have typically examined less frequent levels of cannabis use. For example, in the study reported by Fergusson & Horwood³² the 'heavy' cannabis use group included those who had smoked cannabis on at least 10 occasions. There is no evidence in the scientific literature on adults that such low levels of use are associated with any lasting cognitive impairment.

This does not mean that acute cognitive impairment is irrelevant in adolescents; only that any cognitive impairment found in those who use cannabis is more likely to be the result of the acute effects of cannabis intoxication than the effects of long-term use. If this became a regular occurrence in the everyday life of an adolescent their school performance would suffer, especially if it was poor or below average to begin with.

Early cannabis use leads to the precocious adoption of adult roles

An alternative hypothesis is that early cannabis use is associated with the precocious transition to adult roles, including early school leaving. Fergusson & Horwood³² have argued that much of the apparent influence of early cannabis use on subsequent outcomes can be attributed to the social setting in which adolescent cannabis use typically occurs, namely, within a group of delinquent and substance using peers. They concluded (p. 294):

Most of the elevated risk seen among early onset cannabis users is likely to arise from factors that were antecedent to the decision to use cannabis, rather than as a consequence of

cannabis use. Nonetheless, early onset usage is not without risks and those engaging in these behaviours may be more vulnerable to later psychosocial problems as a result of the social context within which cannabis is used and obtained.

On Fergusson & Horwood's hypothesis, the important causal factor is that cannabis use occurs in a peer group that rejects conventional values, such as educational achievement and social conformity, and encourages instead non-conformist behaviour and a premature transition to adulthood. This explanation implies that the effects of cannabis use on educational attainment (and other social outcomes) are largely dependent on the social milieu in which cannabis use is typically purchased and consumed. There is some support for this hypothesis as a number of studies have shown that adolescent cannabis use, as well as being associated with early school leaving, is associated with precocious sexual activity,³⁸ unplanned parenthood during adolescence,^{15, 20} unemployment³² and leaving the family home early.^{20, 32}

Two features of the research presented above may potentially provide additional support for this hypothesis. First, findings suggest that the relationship between cannabis use and educational attainment may be related to an early age of initiation of cannabis use rather than to any use or even regular use, as the extent of cannabis use associated with diminished educational attainment has typically been quite low. Such findings suggest that biological hypotheses linking cannabis use to reduced educational performance are implausible. Secondly, the studies reported by Krohn *et al.*²⁰ and by Ellickson *et al.*³⁴ indicated that the effects of early cannabis use on subsequent educational attainment may not be uniform across different subpopulations. This again suggests that the apparent effects of early cannabis use may be related more to the social context within which cannabis is used and accessed rather than to any biological effects of cannabis. As suggested by an anonymous reviewer, given the recent increase in the prevalence of cannabis use among youth, it is possible that, as use becomes more common and therefore less strongly associated with non-conformity, the association between cannabis use and educational attainment will reduce.

Conclusion

Cross-sectional and longitudinal research indicates that young people who use cannabis are at increased risk of poor school performance and reduced educational attainment. The evidence from longitudinal studies suggests that some component of these associations arises because the risk factors that predispose young people to cannabis use overlap with those factors that independently predict poor educational attainment. However, not all of the association between early cannabis use and reduced educational attainment can be explained by the effects of common or correlated risk factors. In particular, there is evidence that early cannabis use independently increases the risks of early school leaving.

A plausible mechanism that may explain these associations has been suggested by Fergusson & Horwood,³² who argue that early cannabis use increases the chances of adopting an unconventional lifestyle characterized by affiliations with delinquent and substance-using peers and disengagement from conventional social roles including completing education and obtaining employment. The acute effects of cannabis intoxication may also play a role, particularly among the minority of students who are daily cannabis users.

These results have a number of implications for the identification and remediation of poor school performance related to cannabis use. The strong association between regular cannabis use by adolescents and poor school performance means that children who perform poorly in primary school years are among those at greatest risk of early cannabis use. It also means that cannabis users are likely to be over-represented among adolescents who perform poorly in high school.

The implications for prevention of cannabis use among school students are clear. Early cannabis use shares a common set of risk factors (such as, social disadvantage, family problems, familial conflict and parental drug and alcohol problems) with a wide range of adverse social outcomes, such as delinquency, early sexual activity, teenage pregnancy, depression and attempted suicide.³² This suggests that efforts to prevent cannabis use should be part of broadly targeted strategies rather than the sole focus of a specific intervention. Recent findings indicate that interventions aimed at preventing multiple difficulties are efficacious if they are both com-

prehensive and delivered on an ongoing, long-term basis.⁵⁶

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