Parliament of Australia
Department of Parliamentary Services

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RESEARCH NOTE
7 June 2007, no. 21, 2006–07, ISSN 1449-8456

Does cannabis use lead to mental-health problems?: findings from the research

In 1987, a large-scale Swedish study confirmed an association between cannabis use and the development of schizophrenia. Ever since, it has become widely accepted by clinicians that there are links between cannabis use and mental illness.[1] Experts have expressed particular concern about the mental-health effects of cannabis use on young people, as 'adolescence is the developmental stage when drug-using patterns emerge and teenagers may be more vulnerable than adults to the effects of cannabis'.[2]

However, the research to date suggests that the relationship is complex—for example, there is ongoing debate about causality, as well as over the role of other factors in the development of mental illness among cannabis users.

This Research Note provides an overview of recent research into the links between cannabis use and mental-health problems.

Cannabis use in Australia

Cannabis is the most commonly used illicit drug in Australia. According to the 2004 National Drug Strategy Household Survey, one in three (33.6 per cent, 5.5 million) Australians aged 14 years and older have used cannabis in their lifetime. At the time the Survey was conducted, one in twenty (4.6 per cent, 0.8 million) Australians had used cannabis in the last week.[3] The average age at which Australians first use cannabis is 18.7 years.[4]

Recent research

There is now a significant volume of research which shows an *association* between cannabis use and mental-health problems. However, according to Professor Ian Hickie, Executive Director of the Brain and Mind Research Institute at the University of Sydney, much of the science in this area is 'relatively new'.[5]

The two main claims that have been made in the research about cannabis use and mental health are as follows:

- that cannabis use is related to the development of psychotic disorders such as schizophrenia among some cannabis users, and
- that cannabis use is related to the development of depression and other mood disorders among some cannabis users.

The research in each of these areas is discussed below.

Cannabis and psychosis

It is generally accepted that the immediate effects of cannabis use can include mood changes, including feelings of panic, anxiety and mild paranoia. These short-term mood changes are dose-dependent (that is, their severity is usually related to the size of the dose taken), and usually do not persist after the effects of the dose have worn off.[6] Various studies have demonstrated that cannabis use can also be associated with short-term psychotic (or quasi-psychotic) symptoms among vulnerable individuals, such as hearing voices and unwarranted feelings of persecution.[7]

Most of the research in this area, however, has focused on the relationship between cannabis use and the development of psychotic disorders in the long-term. Psychotic disorders are characterized by 'disordered thought, feeling or perception, as in delusions or hallucinations … and are said to involve loss of contact with reality'.[8] The two major psychoses are schizophrenia and bipolar disorder.

The *association* between cannabis use and psychotic disorders appears to be well established. However, there is still considerable debate over whether there is a *causal* relationship between cannabis use and mental-health problems. Part of this debate has been concerned with the role of predisposition in the development of mental-health problems (that is, whether or not cannabis users who develop mental-health problems were predisposed to these problems and may have developed them anyway). The debate has also focused on the importance of confounding factors (such as the use of other drugs).[9]

Within this debate, four main hypotheses have been advanced.

- Cannabis use causes mental health problems (the 'causal hypothesis'). This hypothesis encompasses two possible scenarios: scenario a) cannabis use may cause a psychotic disorder (a distinct 'cannabis psychosis') that would not have occurred in the absence of cannabis use and, scenario b) cannabis use may precipitate schizophrenia or exacerbate its symptoms.[10]
- Cannabis use may exacerbate the symptoms of psychosis.[11]
- Cannabis use is a consequence of mental health problems (the 'self-medication hypothesis).
- Cannabis use and mental health problems may coincide as a result of common variables (the 'common cause hypothesis').[12]

This paper focuses on the first three of these hypotheses, as these posit a more-or-less direct relationship between cannabis use and mental health problems, and have generated relatively clear research findings. The final hypothesis is

difficult for researchers to rule out because many variables co-exist for both cannabis users and people with mental health problems.[13]

According to a recent review of the research to date, the evidence is strongest for scenario b in the first of these hypotheses, and for the third hypothesis. [14]

With respect to scenario a in the first hypothesis, the evidence in support of cannabis use causing a specific 'cannabis psychosis' is not strong. It is plausible that high doses of cannabis can lead to psychotic symptoms in the short term. However, the evidence for a distinct cannabis condition or syndrome which would not occur other than from heavy cannabis use is less compelling 'because the clinical symptoms reported by different observers have been so mixed'.[15] It is also notable that alcohol abuse is a stronger predictor of psychotic symptoms than regular cannabis use (by a factor of four).[16]

With respect to scenario b in the first hypothesis, there is consistent evidence to suggest that cannabis use can bring about the onset of a psychotic condition (like schizophrenia) in people who are vulnerable to psychosis (and who may possibly have developed it anyway).[17] For example, a recent study of 2400 young people in Germany found that 'exposure to cannabis during adolescence and young adulthood increases the risk of psychotic symptoms later in life'. Further, it found that 'this association is stronger for individuals with predisposition for psychosis and stronger for the more severe psychotic outcomes'.[18] The significance of these results was that the researchers controlled for other variables known to increase the risk of psychosis, as well as for the effect of the use of other drugs including alcohol and tobacco.[19]

Further, there is good evidence that:

- a younger age of initiation to cannabis use may increase the risks of mental-health problems substantially, and
- the greater the amount of cannabis consumed, the more likelihood there is of developing a mental illness in those who are predisposed to doing so.[20]

However, there are still important unresolved questions about the causal direction in the association between cannabis use and onset of psychosis in vulnerable individuals.[21] Rather than cannabis use causally inducing psychosis, there is a hypothesis that such use is an attempt to 'self-medicate', and reduce certain symptoms of a psychotic condition which has already developed independently (sometimes known as 'reverse causality').[22] The 'self-medication' hypothesis is discussed in more detail below.

There is now reasonably clear evidence to support the second hypothesis outlined above: that cannabis use makes worse the symptoms of psychosis in those individuals already affected by such conditions.[23] One explanation for this is that cannabis (through its active component, tetra-hydro-cannabinol, or THC) affects the dopamine system, a key source in the development of psychotic symptoms.[24]

Cannabis and depressive disorders

As is the case with cannabis use and psychotic disorders, the available research suggests that there is an association between cannabis use and mood or affective mental conditions such as depression.[25] For example, a recently published study of Australian teenagers found an association between cannabis use and depression (whether conceptualised as 'clinical'—that is, medically diagnosed—depression, or as 'depressed mood'). However, their study did not determine whether cannabis use causes depression or vice versa, or whether in fact both cannabis use *and* depression could be caused by a common aetiological (disease-causing) factor or factors[26]

Further, a 15-year follow-up study of 1920 adults in the US published in 2001 showed that use of cannabis increased the risk of major depression by a factor of four. Specifically, cannabis use was associated with an increase in suicidal thoughts and anhedonia (an inability to experience pleasure from normally pleasurable activities).[27]

However, while there is strong evidence supporting an *association* between cannabis use and mood disorders such as depression, there is considerable debate over the issue of causality. In other words, while it is possible that cannabis use triggers or precipitates the onset of depression, it is not clear that cannabis use actually *causes* depression.[28] Further, some commentators also argue the validity of the 'self-medication' hypothesis in relation to cannabis use and depression: that is, that people suffering from depression 'self-medicate' with cannabis, and thus that depression precipitates cannabis use, rather than the other way round.

The self-medication hypothesis

A recent review of the evidence to date on cannabis use and mental health found that, while the self-medication hypothesis is 'superficially compelling', most research which has specifically examined it suggests that the hypothesis is weak.[29] For example, the study of 2400 young people in Germany (mentioned above) did not support the self-medication hypothesis: the study found that predisposition to psychosis was not a significant predictor of cannabis use.[30] Other studies have also supported these results.[31]

On the other hand, some studies have found that schizophrenic patients 'report using cannabis because its euphoric effects relieve negative symptoms and depression'.[32] Others have suggested that the relationship between the two factors is probably more complex than is generally suggested.[33] For example, a long-term New Zealand study reported in 2000 that mental-health problems among 15–year-olds were a predictor of cannabis use at 18, while cannabis use at 18 was a predictor of mental-health problems at age 21.[34]

Given the complexity surrounding issues of causality and the persistence of arguments for the validity of the 'self-medication' hypothesis, recent reviews have identified the need for further research in this area. Nevertheless, it should be noted that most reviews tend to suggest that the 'self-medication' explanation is weaker than arguments for a causal role of cannabis.[35]

Recent national data in Australia

Two recent major national reports or surveys have produced data which supports the argument that cannabis use is associated with mental-health problems.

According to the Australian Institute of Health and Welfare's (AIHW) *Mental health services in Australia 2003–04* report, people who regularly use cannabis are likely to experience higher levels of 'psychological distress' (including anxiety and depressive symptoms).[36]

The 2004 National Drug Strategy Household Survey found that cannabis users are twice as likely to report diagnosis and/or treatment for a mental-health condition than non-users. It found that, of recent marijuana/cannabis users, 16.5 per cent reported diagnosis and/or treatment for a mental-health condition in the last 12 months, compared with 8.6 per cent of non-users. (On the other hand, 0.9 per cent of recent cannabis users reported diagnosis and/or treatment for diabetes, compared with 4.4 per cent of those who had not used cannabis in the last 12 months).[37]

Evidence to the contrary?

There is little, if any, available evidence that contradicts the various studies discussed above which show an association between cannabis use and mental-health problems (however the association is characterised).

One study published in the medical journal *The Lancet* in 2004 argued that the evidence for a causal link was not strong. The study found that confounding factors such as the fact that cannabis users are also more likely to report 'an increased use of other illicit drugs' make it difficult to conclusively demonstrate causality between cannabis use and psychological problems.[38]

However, research conducted by a team in New Zealand found that it is unlikely that the link between cannabis use and psychotic symptoms results from confounding factors.[39] This directly challenges the argument advanced by the authors of the *Lancet* study.

Nonetheless, other researchers have also questioned the link between cannabis use and mental illness, particularly with psychotic disorders such as schizophrenia. For instance, there is an argument that if the association between cannabis use and mental illness were genuine, there should have been an increase in the incidence of schizophrenia in the last three decades as teenage cannabis consumption has increased[40] (and also perhaps as a result of increased cannabinoid content of cannabis in the past twenty years[41]). However, despite an increase in cannabis use in Australia (particular amongst teenagers) over the past 30 years, there does not appear to have been a corresponding rise in the prevalence of schizophrenia'.[42]

Conclusion

The evidence reviewed above suggests that cannabis use is *associated* with the development of mental disorders such as schizophrenia and depression. However, there is ongoing debate over exactly how this association should be characterised. In brief, it appears that while *the majority of cannabis users will not develop mental illnesses* as a consequence of their cannabis use, *a 'vulnerable minority appear to be at increased risk of experiencing harmful outcomes'*.[43] As noted above, there is good evidence that young people and heavy users are particularly at risk.

The public-policy implications of this are complex. According to a recent review, the main challenge will be in communicating with young people about the probable risks of cannabis use:

> This task will be complicated by the conflicting interpretations of the evidence on either side of the policy debate about the legal status of cannabis. We can expect those who defend current policy to support a strong causal interpretation of the evidence and proponents of cannabis liberalization to dismiss the evidence as the latest version of 'reefer madness'. These contrasting responses may amplify scepticism among young people about messages about the mental health risks of cannabis use.[44]

In other words, it is crucial that emerging evidence about the links between cannabis use and mental-health problems is communicated clearly (particularly to those most at risk) and in a way that acknowledges the complexity of the issues involved without obscuring the level and gravity of the risks posed by cannabis use to vulnerable groups.

Acknowledgements

Thanks to Dr Louisa Degenhardt, National Drug and Alcohol Research Centre; Dr Jon Jureidini and Dr Ben Wells, Psychological Medicine, Women and Children's Hospital, Adelaide; and Dr Stephen Rosenman, St. Vincent's Hospital, Sydney/St John of God Hospital, Burwood; and Parliamentary Library staff who provided helpful comments on earlier drafts of this Research Note. The authors remain responsible for any errors and omissions.

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