Commentary: Understanding pathways to cannabis use and from use to harm

John Macleod1* and Matthew Hickman2

The question of why people use cannabis, and the potential risks associated with this use, has long been a subject of study for policy-makers, the public, and population scientists. Many putative explanations for cannabis use have emerged, encompassing host, environment, and agent. Risk factors identified include genes, psychological and behavioural problems, the tendency to seek sensations or take risks, and prior use of ‘gateway’ drugs. Alternative possible explanations have their basis in parental behaviour and other aspects of families and friendships, still more are based on wider socio-environmental adversity and material deprivation.1–4 Social trends such as the normalization of illicit drug use and the increased availability of most drugs may also have contributed.5 Whatever the reasons, cannabis use is now common with ~20% of young adults in both the UK and the US using the drug at least monthly.6,7 Though the probable public health consequences of this use are currently unclear there is no reason to assume they will be benign, particularly because of the intimate relation between cannabis use and tobacco use.8,9 Clarifying pathways to cannabis use has therefore become a priority, as this may inform effective prevention.

The study by Hayatbakhsh et al.10 from the Mater University cohort study contributes to the evidence base on possible determinants. Their findings show that children of mothers who changed partners between the child’s fifth and 14th year were around twice as likely to report ever-use of cannabis at the age of 21 and four times as likely to report that they had first used cannabis before their 15th birthday. More partner changes were associated with larger effect sizes. These estimates were barely attenuated on adjustment for maternal age, maternal substance use, maternal mental health, marital status when the child was aged five years, and family income. Adjustment for child psychological health at age 5 years also appeared to have little influence on effect estimates. The authors of this interesting paper tentatively suggest that they may have identified a relatively novel environmental cause of cannabis use, particularly early cannabis use.

It is important to consider this question of causality critically, because non-causal associations are unlikely to form the basis of effective interventions. Aside from causality there are, broadly, three possible non-causal mechanisms through which this apparently robust association between maternal partner change and reports of child cannabis use may have arisen. First, ‘reverse causation’ argues that it was the child’s cannabis use that led to the break-up of their mother’s relationship rather than vice versa. This seems unlikely as the relationship changes were before the child was 14 years old and most of the cannabis use reported was subsequent to this. Second, ‘reporting bias’ is a possibility. This bias is most relevant when self-reported exposures influenced by notions of social desirability are related to similarly influenced self-reported outcomes.11 It may also be important when individuals whose outcome status is already known report exposure retrospectively.12 Neither of these situations applies to the present study since partner change was reported by mothers when their children were aged 14 and cannabis use was reported by children themselves aged 21. The third possibility is confounding by common antecedents of both paternal partner change and children’s cannabis use. The obvious candidate for a confounding factor in this context is general material deprivation. Partnerships may be more fragile and prone to change in difficult circumstances and children growing up in these circumstances may be at greater risk of using cannabis (particularly at an earlier age) through mechanisms independent of their mother’s partner changes. To some extent, this question has been addressed in the analysis, which adjusted for: maternal use of drugs, low income, prior psychological problems, and lone parenthood itself. The issue of paternal drug use was not considered and it may have been important. As with maternal drug use, paternal drug use predicts offspring drug use and maternal relations with drug using fathers or father figures may be more volatile. The general point about confounding, however, is its pervasive nature and the difficulty in overcoming it through adjustment, particularly when the adjustment factor is an imprecise index of the confounder.13 Adjustment does not, as often seems to be assumed, remove confounding, rather attenuation of effect estimates on adjustment gives clues to the presence or absence of confounding. The authors would presumably concede that some of their adjustment factors were likely to be imprecise indices of the possible confounding factor they were interested in, for example the binary categorization of income at age five as an index of social disadvantage across the early life course. Nevertheless, it is notable that in most cases adjustment led to very little, if any, attenuation of estimates.

The remaining possibility is that maternal partner change during middle childhood and early adolescence causes an increase in risk of using cannabis amongst adolescents. Plausible mechanisms that might mediate such a causal relation are discussed in the paper. Assuming the association is, or might be, causal two further questions remain; how important is it in...
population terms and what are its implications for prevention? Totally 19.4% of mothers in the study had one or two partner changes over the relevant period of their child’s life course; 3.9% had three or more partner changes. From these proportions and the fully adjusted odds ratios in table 3 of the paper it appears that up to 15% of ever-use of cannabis and ~24% of early use in this population might be caused by maternal partner change [Assuming population attributable risk to be \( p_{\text{exp}} (OR - 1) / \{p_{\text{exp}} (OR - 1) + 1 \} \) where \( p_{\text{exp}} \) is the proportion in the population exposed].

Clearly, these are substantial attributable fractions; however, their interpretation warrants a degree of caution. First, the calculation assumes naively that the relation between maternal partner change and child cannabis use is completely causal and that the fully adjusted estimates in table 3 of the paper represent the full magnitude of this effect, net of any residual confounding. Second, attributable fractions are a guide to ‘best case scenarios’ in terms of the impact of public health interventions and involve an implicit assumption that the risk factor in question is amenable to manipulation. As the authors appear to acknowledge, maternal partner change, by itself, does not seem a promising target for intervention. Of course, if the mechanisms mediating a causal relation between maternal partner change and children’s cannabis use were more fully understood this understanding might suggest a means to intervene short of changing maternal partner change per se. In this context, it would be interesting to know whether different kinds of partner change had different effects. In the present study the authors note that the transition into marriage appeared to be associated with a similar effect on cannabis use as the transition out of marriage, though they had limited power to examine this question in detail.

Identification of risk factors for cannabis use has not, so far, led to substantial progress towards effective prevention.18,19 Part of what has perhaps been absent in the past, and will be needed in the future, is the ability to take a life course perspective. It is likely that pathways to cannabis use and dependence, and those to other adverse outcomes that may be associated with use, are established early in life, even if they are also influenced by subsequent factors. Consideration of this question requires prospectively collected, unbiased information on exposures (genetic and environmental) acting in the early life course that may cause increased risk of cannabis use but that may also confound associations between cannabis use and other outcomes. These minimum data requirements are currently only met by a few relatively small studies that also have data on later cannabis use.20,21 Objectively corroborated measures of cannabis use are a further advantage as they allow insight into the presence or absence of reporting bias. Finally, genetically informed study samples are desirable for other reasons. Genes seem to influence level of cannabis use and there is preliminary evidence on particular polymorphisms that may be implicated in this effect.22,23 It seems unlikely that these individual genes explain a substantial proportion of cannabis use in the population; moreover, genetic risk factors do not readily lend themselves to prevention. Nevertheless, identifying genes that influence level of cannabis use may provide useful instrumental variables that allow better clarification of true causal relations.24 These strategies, along with the testing of risk-factor based interventions in randomized trials, should lead to improved understanding of the pathways to cannabis use and of the public health consequences of use that effective prevention might avert.

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References


