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EVIDENCE BRIEF

Risk Factors for Simultaneous Use of Alcohol and Cannabis

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Key Messages

- Simultaneous use of alcohol and cannabis is prevalent in Canada, especially among youth, and is associated with more harmful consequences than using either substance alone.
- Evidence suggests possible risk factors for simultaneous use include demographic, psychosocial, environmental and problematic substance use factors.
- Most studies reviewed found that engaging in some form of problematic use of one substance (especially problematic alcohol use) was associated with simultaneous use of alcohol and cannabis.
- Future studies should use a standardized set of risk factors for easier synthesis of evidence across studies.

Issue and Research Question

Combined use of alcohol and cannabis is the most common form of simultaneous polysubstance use (excluding combined use of alcohol and tobacco).[1] The term "simultaneous polysubstance use" refers to the use of more than one substance at the same time, while the term "concurrent use" involves the use of two or more substances separately within a given time period (for example, within 30 days).[2,3] The potential for synergistic and additive effects of substance use is highest when substances are consumed simultaneously,[3] which presents unique challenges and considerations for this pattern of use. A public health approach to addressing simultaneous alcohol and cannabis use requires an understanding of the harms and risk factors associated with this behaviour.

The term cannabis refers to the cannabis plant, Cannabis sativa, and its products.[4] Although there are many terms used for cannabis products, we have used "cannabis" throughout this evidence brief for clarity.

The purpose of this Evidence Brief is to identify risk factors associated with simultaneous alcohol and non-medical cannabis use. These can then be used to potentially highlight populations or groups who may be at increased risk for this behaviour.

This Evidence Brief asks: "What are the risk factors for simultaneous use of alcohol and cannabis?" It is beyond the scope of this review to address interventions aimed at reducing simultaneous use of alcohol and cannabis.

Background

Prevalence

Simultaneous use of alcohol and cannabis is prevalent in both youth and adult populations;[2,5-8] particularly among males.[2,3,9,10] Despite concerns about the effects of this type of use, however, there is minimal data documenting prevalence among Canadians. Further, the majority of available data is self-reported. In surveys of Canadian youth (aged 12-18), 13% of students reported engaging in this pattern of use in the past year, and up to 27% when asked the same question without a time frame.[6,7]

In jurisdictions outside of Canada, combined data from a 2005 and 2010 U.S. survey of adults aged 18 and older demonstrated that among people who reported using alcohol in the past 12 months, 9.3% of males and 5.5% of females reported simultaneous alcohol and cannabis use.[2] Rates of simultaneous use were almost twice as high as concurrent use (7.5% and 3.9%, respectively) suggesting those who use both substances are more likely to use them at the same time.[2] Additionally, a national survey of grade 12 students in the U.S. found that from 2005-2014, 20% of students had engaged in simultaneous use of alcohol and cannabis in the past year.[5]

Research also demonstrates that this type of use pattern is particularly prevalent among people who use cannabis. Data from the U.S. and Norway indicate that among youth aged 14-20 who use cannabis, 62%

and 82% reported engaging in simultaneous use of alcohol and cannabis.[1,8] This information is especially concerning as rates of cannabis use among Canadian youth (age 15) are among the highest in the world.[11]

Harms

Overall, research demonstrates that simultaneous use of alcohol and cannabis is associated with more harmful consequences than the use of either substance alone, including negative physical, social and behavioural outcomes.[2,9,13-19]

Several studies point to the additive effects that result when alcohol and cannabis are used simultaneously.[2,13-18] This behaviour has been shown to have harmful effects on cognitive and psychomotor performance,[13] impair driving performance[13,14] and significantly increase the risks of collision[15] and odds of impaired driving.[2] Data from the 2017 Canadian Cannabis Survey showed that among respondents aged 16 and older who used cannabis in the last 12 months, 39% reported driving within two hours of using cannabis and 40% of those reported doing so within the last 30 days.[12] The 'Additional Resources' section of this Evidence Brief provides further information on the effect of combined use of alcohol and cannabis on driving.

Alcohol and cannabis use can also cause abnormal brain function (e.g., decreased cognitive functioning) and significant changes in brain structures (e.g., hippocampus) when used for a prolonged period.[16] Such effects are more prominent than those produced by each substance separately.[16] Additionally, individuals who engage in simultaneous use of alcohol and cannabis (either via smoking[17] or vaporizing)[18] may experience increased plasma tetrahydrocannabinol (THC), resulting in increased positive subjective mood.[17]

In terms of social and behavioural consequences, simultaneous use of alcohol and cannabis has been found to increase the likelihood of unprotected sexual intercourse with a main partner,[19] as well as other substance-related consequences such as legal, health, academic and relationship problems.[9]

Methods

Ovid MEDLINE and PsycINFO were searched on July 6, 2017 by PHO Library Services for articles published from 2010-2017. Articles were eligible for inclusion if they were published in English between 2010 and 2017 and were written for a context similar to Canada, e.g., a member-country of the Organisation for Economic Co-operation and Development (OECD). Studies were eligible if they focused on risk factors for simultaneous use of alcohol and cannabis. Articles were excluded if they focused on single substance use, substance combinations that included additional substances other than alcohol and cannabis, or exclusively focused on concurrent alcohol and cannabis use. Title and abstracts were screened for eligibility by one reviewer and a 25% sample was screened by a second reviewer for verification. Any disagreements on inclusion were resolved by discussion until consensus was reached. Articles that met inclusion criteria after review of the titles and abstracts were retrieved and 100% were reviewed as full-text documents by two reviewers. References from the included articles were hand searched for additional relevant studies. Articles published prior to 2010 were included based on the citation search only if they met the criteria for inclusion. Relevant information was extracted from each

included article by one reviewer and 100% of the extracted information was reviewed by a second reviewer for verification. The full search strategy is available upon request.

Two reviewers independently conducted quality appraisal. PHO's HPCDIP Knowledge Synthesis Services team guided the selection of the appropriate tool for included articles based on study design. The Newcastle-Ottawa Quality Scales for cross-sectional and cohort (longitudinal) studies were used to conduct quality appraisal. Discrepancies in quality appraisal outcomes between the reviewers were resolved by consensus. Information on the full results of quality appraisal is available upon request.

Main Findings

The search identified a total of 1,154 articles, of which 127 met the inclusion criteria based on title and abstract screening. Following full text review, two articles were chosen to be included in the synthesis and a citation search of the included articles yielded an additional three articles, two of which were published prior to 2010 (in 1998 and 2007). Therefore, a total of five articles were included in the synthesis.[1,3,9,10,20]

Of the included articles, four looked at simultaneous alcohol and cannabis use among adolescents and young adults (aged 12-25),[1,3,9,20] while one explored use among adults (18 and older).[10] Two of the included studies used a prospective cohort design while the other three used a cross-sectional design. Sample sizes for the studies ranged from 722 to 34,850. All studies used self-reported measures of simultaneous alcohol and cannabis use, with most asking individuals to recall this pattern of use within the last 12 months. Each study looked at a variety of demographic, psychosocial, environmental and substance use risk factors associated with simultaneous use. The findings of each article as they pertain to the risk factors identified above are discussed below.

Demographic factors

Most studies included age, sex and ethnicity. Results demonstrating the effect of ethnicity were mixed, with one study reporting greater likelihood of simultaneous alcohol and cannabis use among white high school students,[1] and another among African American high school students.[3] In terms of sex, two studies found that males were more likely to engage in simultaneous use of alcohol and cannabis, however after adjusting for additional variables, this finding became non-significant.[9,10] One study found that when frequency of substance use was accounted for, females were more likely to engage in this behaviour.[1] Results from the study examining simultaneous use among adults found that this behaviour was more common among younger individuals (age 18-49 versus age 50+).[10]

Psychosocial factors

Psychosocial factors studied included behaviour, drug use beliefs and intentions, relationship status, social interactions, academic achievement and reasons for alcohol or cannabis use.[1,3,10] Among youth in grades 10-12, problematic behaviours (truancy, acting out in school and stealing),[1,3] positive perceptions of drug use outcomes,[3] and drug-use intentions[3] were all found to be associated with simultaneous alcohol and cannabis use. Among youth in grade 12, spending a higher number of evenings out (during

the week for fun/recreation)[1] was associated with this pattern of substance use. Results that demonstrated the association between academic achievement and simultaneous alcohol and cannabis use were mixed. Additionally, among adults 18 years of age and older, not having a regular partner (partnered defined as living with a spouse, living as a couple, married; and not partnered/not with spouse defined as legally separated, divorced, widowed and never married)[10] was associated with simultaneous alcohol and cannabis use.

One study reported increased likelihood of this use pattern among adults (18 and older) with less than high school-level education[10] and another found increased simultaneous use among grade 12 students with a higher grade point average (GPA).[1] Among adults 18 years of age and older, simultaneous use of alcohol and cannabis was associated with depression and higher scores on a, self-reported, 15-item scale for social consequences of alcohol use.[10]

Students in grade 12 reported reasons for alcohol or cannabis use and those most strongly associated with frequent simultaneous use included using alcohol or cannabis to increase the effect of another drug and perceived dependence.[1]

Environmental factors

Peer substance use[9] and receiving drug offers[3] were both found to be associated with simultaneous alcohol and cannabis use among students in grades 7-12. One study assessed situations associated with simultaneous alcohol and cannabis use among grade 12 students.[1] Situations of alcohol or cannabis use that were most strongly associated with frequent simultaneous use included using alcohol in a park or car, using cannabis in a park or at school, and using alcohol or cannabis at a party indicating the social nature of this substance use pattern.[1] The alcohol use social situation that was most strongly associated with frequent simultaneous use was using alcohol while alone.[1]

Substance use factors

Most of the included studies found a relationship between simultaneous use of alcohol and cannabis and some form of problematic substance use. Early onset cannabis use in grade seven or eight, was found to predict later simultaneous alcohol and cannabis use (in grade 10).[9] As well, among students in grades 7-12 simultaneous use was associated with higher alcohol[1,9] or cannabis use frequency.[1,9] Among youth in grades 7-11 and adults 18 and older, two studies found this pattern of use was associated with problematic alcohol use such as alcohol intoxication[9] and alcohol dependence-using DSM-IV criteria.[10] Another study found simultaneous use was more common among young adults (e.g., aged 18-25) in the moderate (versus heavy) drinking group based on alcohol use in the past 30 days.[20]

Additionally, one study found that among adults aged 18 or older, simultaneous alcohol and cannabis use was associated with heavy drinking (drinking five or more drinks in one day).[10]

Protective factors

Along with risk factors for simultaneous alcohol and cannabis use, some factors were protective. Results demonstrated that being female,[3] of Asian American,[3] African American or Hispanic descent,[1] part of an

"intact nuclear family" (living with both mother and father),[3] and having high religious commitment[1] were associated with a decreased likelihood of engaging in this pattern of substance use.

Discussion and Conclusions

This review aims to provide an overview of factors influencing simultaneous use of alcohol and cannabis. Studies investigating risk factors for simultaneous use of alcohol and cannabis are limited and the majority are based on self-reported substance use. Based on the available evidence, several factors were associated with simultaneous use. These include demographic, psychosocial, environmental and substance use factors.

Of the demographic factors studied, being of white[1] or African American descent[3] and younger age (aged 18-49 versus 50 and older)[10] were associated with increased likelihood of simultaneous use of alcohol and cannabis. A variety of psychosocial factors were found to be associated with simultaneous alcohol and cannabis use including depression,[10] problem behaviour,[1,3] social concequences,[10] positive perceptions of drug use,[3] drug use intentions,[3] not having a regular partner,[10] academic achievement[1,10] and higher number of evenings out.[1] Reasons most strongly associated with this substance use pattern included using alcohol or cannabis to increase the effect of another drug and perceived dependence.[1] In terms of environment, receiving drug offers[3] and peer substance use[3,9] were both found to predict simultaneous use. Among grade 12 students, situations most strongly associated with simultaneous alcohol and cannabis use included using alcohol while alone or in a park or car, using cannabis in a park or at school, and using alcohol or cannabis at a party.[1]

Most of the included studies demonstrated an association between simultaneous use of alcohol and cannabis with some form of problematic substance use (especially alcohol). These include: alcohol intoxication,[9] alcohol dependence,[10] heavy and moderate drinking,[10,20] higher alcohol[1,9] or cannabis use frequency,[1,9] and early onset of cannabis use.[9] Several protective factors were identified from the studies: being female,[3,9,10] Asian American,[3] African American or Hispanic descent,[1] part of an "intact nuclear family",[3] and having high religious commitment.[1]

There are confounding factors that may influence the results found in the current studies, and some authors provided hypotheses to explain their results. Regarding the association between Asian American and African American ethnicity and patterns of simultaneous use, Collins et al. attributed these findings to confounding with advantaged standing (being "less at risk") in one or more variables predicting simultaneous alcohol and cannabis use, which included: positive drug use beliefs, drug use intentions, receiving drug offers, problem behaviour, and family structure.[3] Further, Collins et al. found that none of the predictors of simultaneous polysubstance use explained the decreased likelihood of simultaneous use among females, and hypothesized that this finding may be attributed to females viewing the consequences of simultaneous polysubstance use more negatively than males.[3]

Regarding the association between alcohol and cannabis use with problem behaviour, Collins et al. hypothesized that prior problem behaviour may "enhance the likelihood of exposure to pro-drug influences" (e.g., exposure to drug offers and people who use drugs) and vulnerability to these

contexts.[3] Additionally, Terry-McElrath et al. explained that factors associated with simultaneous alcohol and cannabis use included both factors that are typically associated with higher substance use (e.g., problem behaviour and substance use frequency), as well as those "indicative of higher socioeconomic standing and socially active lifestyles" such as higher grades and more evenings out.[1]

Regarding social and environmental factors, Midanik et al. hypothesized that in these situations (e.g., attending a party), the increased availably of alcohol and cannabis may facilitate their simultaneous use.[10]

The protective effect of family structure was thought to be due to the influence of strong family bonds on making individuals less vulnerable to "pro-drug social influences."[3]

Conclusions

A variety of demographic, psychosocial, environmental and substance use factors were found to be associated with simultaneous alcohol and cannabis use among youth (aged 12-25) and adults (18 and older). Inconsistency in the set of risk factors measured across included studies limited further synthesis of results. The literature examining this specific type of substance use pattern is lacking as many studies focus on concurrent rather than simultaneous substance use. There is a need for more high quality evidence investigating factors that predict this unique type of substance use behaviour. In addition, prevention efforts can be further informed by research into the situations and reasons for simultaneous use, allowing for a better understanding of the context and motivations that predict this behaviour.

Limitations

All of the included studies used retrospective self-reported measures of simultaneous alcohol and cannabis use which may limit reliability and validity of the data. Most studies measured risk factors using self-reported questionnaires or surveys.[1,3,9]

Four studies[3,9,10,20] asked participants to recall "any" simultaneous alcohol and cannabis use, rather than capturing use frequency. Collins et al. noted that predictors of "any" simultaneous use may differ from those associated with regular/ongoing simultaneous use.[3] Three studies[1,10,20] used a cross-sectional design, limiting the ability to draw causal inferences. Two[1,20] described satisfactory response rates, and two described methods for addressing missing data.[3,9] One study describing a low response rate noted that this was common for telephone surveys in the geographical area and stated that evidence suggests this may not significantly affect substance use measures.[10] Of the three cross-sectional studies, none compared respondent and non-respondent characteristics[1,10,20] and of the two cohort studies neither demonstrated that the outcome of interest was not present at the start of the study.[3,9]

Adjustment for confounders was variable across studies. One study controlled for cannabis use[20] and the others controlled for respondents between 7-14 years of age, psychosocial and substance use variables.[1,3,9,10]

Implications for Practice

As most studies pointed to an increased likelihood of simultaneous alcohol and cannabis use among individuals who tended to already use these substances, public health efforts to reduce this problematic pattern of use could focus strategies on separating their use as a way to reduce potential harms.

Research investigating social contexts associated with simultaneous alcohol and cannabis use identify social gatherings as a common setting for this type of use.[1,2,10] As such, strategies to minimize simultaneous use of alcohol and cannabis could consider targeting these settings or individuals who frequently engage in this type of social situation.

Provision of education around the negative consequences associated with mixing alcohol and cannabis is an important consideration for minimizing this pattern of use.[1,9] In the absence of warning, this behaviour may not be understood as having additional consequences beyond single substance use and may appear normative.[9] Public health programs can include consideration of simultaneous use within existing programming that intersects with substance use (e.g., school health programs, harm reduction, injury prevention, and reproductive health). Further, simultaneous use is an important consideration for public policy on the sale, advertising, and consumption of alcohol and cannabis products, as well as road safety. As perceptions surrounding the harms and acceptability of cannabis use may change with the planned legalization of recreational use,[20] examining factors contributing to this unique pattern of substance use over time remains an important consideration.[3,10]

Additional Resources

- Driving Under the Influence of Cannabis and Risk of Motor Vehicle Collision
  http://www.publichealthontario.ca/en/eRepository/EB_DUIC_RFs_Interventions.pdf

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Specifications and Limitations of Evidence Brief

The purpose of this Evidence Brief is to investigate a research question in a timely manner to help inform decision making. The Evidence Brief presents key findings, based on a systematic search of the best available evidence near the time of publication, as well as systematic screening and extraction of the data from that evidence. It does not report the same level of detail as a full systematic review. Every attempt has been made to incorporate the highest level of evidence on the topic. There may be relevant individual studies that are not included; however, it is important to consider at the time of use of this brief whether individual studies would alter the conclusions drawn from the document.

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