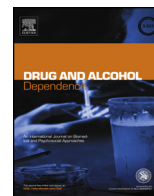




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Review

Internet and computer based interventions for cannabis use: A meta-analysis[☆]

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ABSTRACT

Background: Worldwide, cannabis is the most prevalently used illegal drug and creates demand for prevention and treatment services that cannot be fulfilled using conventional approaches. Computer and Internet-based interventions may have the potential to meet this need. Therefore, we systematically reviewed the literature and conducted a meta-analysis on the effectiveness of this approach in reducing the frequency of cannabis use.

Methods: We systematically searched online databases (Medline, PubMed, PsychINFO, Embase) for eligible studies and conducted a meta-analysis. Studies had to use a randomized design, be delivered either via the Internet or computer and report separate outcomes for cannabis use. The principal outcome measure was the frequency of cannabis use.

Results: Data were extracted from 10 studies and the meta-analysis involved 10 comparisons with 4125 participants. The overall effect size was small but significant, $g = 0.16$ (95% confidence interval (CI) 0.09–0.22, $P < 0.001$) at post-treatment. Subgroup analyses did not reveal significant subgroup differences for key factors including type of analysis (intention-to-treat, completers only), type of control (active, waitlist), age group (11–16, 17+ years), gender composition (female only, mixed), type of intervention (prevention, 'treatment'), guided versus unguided programs, mode of delivery (Internet, computer), individual versus family dyad and venue (home, research setting). Also, no significant moderation effects were found for number of sessions and time to follow-up. Finally, there was no evidence of publication bias.

Conclusions: Internet and computer interventions appear to be effective in reducing cannabis use in the short-term albeit based on data from few studies and across diverse samples.

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[☆] Supplementary material can be found by accessing the online version of this paper. See [Appendix A](#) for more details.

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1. Introduction

Globally, cannabis has a 12-month prevalence of about 4% among those aged 15–64 years (United Nations Office of Drugs and Crime, 2006a). The prevalence of past year and lifetime use of cannabis is typically higher in younger adults, thus in the USA, the lifetime and past year prevalence for those aged 18–25 years is around 51% and 30% respectively (Substance Abuse and Mental Health Services Administration, 2010). Problematic cannabis use has adverse impacts on health, mental health, cognition, social and educational outcome measures (Grant et al., 2003; Horwood et al., 2012; Kalant, 2004; Patton et al., 2002). Consequently, cannabis is second to opiates as the primary illegal drug for which treatment is sought (United Nations Office of Drugs and Crime, 2006b), with demand for treatment rising in some jurisdictions (Bonn-Miller et al., 2012; Copeland and Swift, 2009; Rotondi and Rush, 2012). However, among those meeting the criteria for cannabis abuse or dependence (American Psychiatric Association, 1994), only 6.3% received specialist treatment in the USA (Substance Abuse and Mental Health Services Administration, 2011).

Interventions for cannabis use have been developed along a continuum from universal prevention programs to treatment for those with diagnosed dependence. Prevention programs are mostly targeted at school-based groups. Given that most substance use starts in the mid-teens to early adulthood (Kessler et al., 2007) this could be regarded as a critical period in which to deliver preventive or early interventions (Zickuhr and Smith, 2012). The seminal review of school-based universal drug prevention programs found that mainly interactive programs that allow the exchange of ideas and the development of new skills were effective in reducing the use of substances including cannabis (Tobler et al., 2000). In terms of specific outcomes for cannabis, an overall effect size was estimated at $d = 0.58$ in reducing cannabis consumption (Porath-Waller et al., 2010). Few studies have evaluated the effectiveness of targeting 'high risk' students ('selective prevention'), but preliminary evidence suggests that this approach may be effective (Gottfredson and Wilson, 2003).

The effectiveness of screening and brief intervention for problematic alcohol use is well established (Moyer et al., 2002) but has not been widely tested for substance use problems, including cannabis use (Babor et al., 2007). Nevertheless, initial findings show that interventions based on cognitive behavioral therapy (CBT) and motivational enhancement therapy (MET) among non-treatment seekers (Martin and Copeland, 2008), incarcerated youth (Stein et al., 2011) and integrated into a stepped approach leading to specialist treatment (Madras et al., 2009) can be effective in reducing the use of cannabis.

At the treatment end of the spectrum, for those with cannabis use disorders, a systematic review identified six randomized trials of psychosocial interventions (Denis et al., 2006). As with brief

interventions, benefits were reported from CBT and MET. The addition of contingency management (i.e., payment for providing 'clean' urine samples) appears to increase the effect of CBT but the heterogeneity of the studies prevented a combined effect size from being calculated (Denis et al., 2006). A review by Benyamina et al. (2008) concluded that extended therapies which combined therapeutic approaches (i.e. CBT + MET) performed better than brief interventions and achieved reductions in cannabis use of 20–25%. Thus, in-person interventions can reduce cannabis consumption in those with diagnosed problems.

Substance users have identified numerous impediments to accessing treatment including costs, transport, inconvenience, social and work related stigma and discrimination (Substance Abuse and Mental Health Services Administration, 2011). Interventions delivered via the Internet have been posited as a means of over-coming many of these traditional barriers to accessing health services. In particular, Internet interventions can be anonymous, low-cost or free, and available whenever required. The latter factor may be especially important in addressing addiction problems, both from the perspective of being available when clients are highly motivated to commence treatment and available when the risk of relapse is high. Thus, Internet interventions may be especially relevant for addictive disorders.

There is an expanding literature on the effectiveness of Internet interventions in the treatment of a range of mental health conditions such as anxiety, depression and related problems (e.g. insomnia, stress, headaches; Griffiths and Christensen, 2006; Griffiths et al., 2010b) plus health promotion and risk reduction interventions (Portnoy et al., 2008). Similarly, there is a sound evidence base for the use of Internet interventions in addressing problematic alcohol use. Systematic reviews report effects in the range of $d = 0.12$ – 0.42 for Internet or computer based interventions (Rooke et al., 2010; Tait and Christensen, 2010; White et al., 2010) with an analysis of unguided self-help Internet interventions for adults (excluding students) reporting an effect of $g = 0.27$ for single session interventions and $g = 0.61$ for multiple session interventions (Riper et al., 2008, 2011). With respect to cessation of smoking, the results have generally been positive although the magnitude of effects appears to be smaller, with a recent review reporting an effect of $d = 0.14$ (Rooke et al., 2010).

Internet interventions for illegal drug use, including cannabis use, are at a less mature stage of development than those for alcohol use. For example, a recent review by Gainsbury and co-workers of guided internet therapies that found no studies specifically for cannabis users that fulfilled their criteria (Gainsbury and Blaszczynski, 2011). However, this review excluded some types of intervention such as self-help and prevention programs that may be effective in reducing the use of cannabis or future demand for treatment. A review by Moore and colleagues of computer based interventions for substance use in general, including opiates,

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