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Systematic analysis of changes in cannabis use among participants in control conditions of randomised controlled trials

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ABSTRACT

Introduction: Cannabis remains the most used illegal substance across the globe, and negative outcomes and disorders are common. A spotlight therefore falls on reductions in cannabis use in people with cannabis use disorder. Current estimates of unassisted cessation or reduction in cannabis use rely on community surveys, and few studies focus on individuals with disorder. A key interest of services and researchers is to estimate effect size of reductions in consumption among treatment seekers who do not obtain treatment. Effects within waiting list or information-only control conditions of randomised controlled trials offer an opportunity to study this question.
Method: This paper examines the extent of reductions in days of cannabis use in the control groups of randomised controlled trials on treatment of cannabis use disorders. A systematic literature search was performed to identify trials that reported days of cannabis use in the previous 30 (or equivalent).
Results: Since all but one of the eight identified studies had delayed treatment controls, results could only be summarised across 2–4 months. Average weighted days of use in the previous 30 days fell from 24.5 to 19.9, and a meta-analysis using a random effects model showed an average reduction of 0.442 SD. However, every study had at least one significant methodological issue.
Conclusions: While further high-quality data is needed to confirm the observed effects, these results provide a baseline from which researchers and practitioners can estimate the extent of change required to detect effects of cannabis treatments in services or treatment trials.

1. Introduction

Cannabis remains the most used illegal drug across the world, and while rates of use are generally falling, the incidence of related harm is rising internationally (United Nations Office on Drugs and Crime, 2014). Australia has particularly high rates of use, with 35% of adults reporting lifetime consumption, and 10% using it in the previous 12 months (Australian Institute of Health and Welfare, 2014).

However, 70–80% of cannabis users stop using it by their mid-thirties (Chen & Kandel, 1998), and even over 5–6 years, substantial rates of cessation or reduced consumption in adolescents or young adults are seen (Kandel & Raveis, 1989; Pollard, Tucker, de la Haye, Green, & Kennedy, 2014; Sussman & Dent, 2004). In common with other substances, most successful cessation occurs without treatment (Cunningham, 2000; Price, Risk, & Spitznagel, 2001). While these changes are typically greatest among infrequent or non-problematic users (Chen & Kandel, 1998), people with cannabis abuse or dependence also have substantial rates of recovery. For example, an analysis of data from Wave 1 of the National Epidemiologic Survey on Alcohol and Related Conditions (Agosti & Levin, 2007) found that 81% of people with lifetime cannabis dependence did not meet criteria over the previous year.

While community samples can provide good estimates of the degree and timing of recovery from cannabis use disorder, sample sizes need to be large to provide accurate estimates of these rates. So, a study of 1228 adolescents (Perkonnigg et al., 1999) found only 12 with lifetime cannabis dependence, and the resultant estimate of full remission (32%) therefore had a substantial standard error (26%). Furthermore, treatment trial researchers and services need estimates of remission in treatment seekers.

A study of control groups in treatment studies provides fertile ground for the estimation of changes in treatment seekers who do not receive substantial assistance. These studies have several advantages: high-quality trials typically have diagnostic interviews and other assessments that are able to characterise the samples well, the nature of treatments is standardised or tracked carefully, and substantial effort is put into ensuring that follow-up assessments maximise retention rates. While individual studies often have relatively small sample sizes in their control group, meta-analytic methods provide an opportunity

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Table 1
Studies on treatment of cannabis use in the past 30 days within control groups of general populations: Studies reporting mean values.

Author (date)	Sample type	Basis of participation	Disorder	Country	Control group	Measure
Stephens et al. (2000)	COM	Wanting help quitting	98% current CUD	US	Delayed treatment	# days used cannabis per month
Litt et al. (2005)	COM	Treatment	100% current CUD	US	Delayed treatment	% days used cannabis in the past 90
Walker et al. (2006)	SCH	Information re their CU	68% current CUD (86% lifetime CUD)	US	Delayed treatment	# days used cannabis in the past 60
Stephens et al. (2007)	COM	Feedback on CU (not treatment)	93% current CUD	US	Delayed feedback	# days used cannabis per week
Martin and Copeland (2008)	COM + OP	Information, discussion	85% CUD	AU	Delayed treatment	# days used cannabis in the past 90
Fischer et al. (2012)	UNI	…[1]	CU	CAN	General health information	# days used cannabis in the past 30
Gates et al. (2012)	COM	Information or counselling on CU concerns	98% probable CUD on SDS	AU	Delayed treatment	# days used cannabis in the past 28
Rooke et al. (2013)	COM	Wanting to reduce or cease CU	CU	AU	Cannabis information	# days used cannabis in past month

AU: Australia; CAN: Canada; US: United States of America;
OP: Outpatients; COM: Community; HM: Homeless/unstably housed; SCH: School; UNI: University;
CU: Cannabis use; CUD: Cannabis use disorder (DSM-IIR or DSM-IV Cannabis Dependence or Abuse);
SDS: Severity of Dependence Scale (Gossop et al., 1992).
[1] Mass advertising described the intervention study. Specific details on the basis of participation are not provided.

to obtain estimations of effect sizes over multiple studies and substantial samples.

Accordingly, the aim of the current paper was to determine the degree of 'natural recovery' in the control groups from randomised controlled trials on substance use disorders, which reported changes in the frequency of cannabis use. 'Natural recovery' in this article refers to processes where consumption of cannabis is reduced or ceased without professional intervention. It was operationalised as the degree of change in cannabis use within groups receiving inactive or minimal interventions.

2. Methods

Electronic searches were performed in January 2015, to find studies that included a control group that had explored the topic of cannabis use treatment. The search used title, abstract and keywords of Medline, PsycINFO, Psychology Journals, and Psychology Subject Corner. The search terms were: (cannabis OR marijuana OR marihuana OR addiction OR abuse OR substance) AND (treatment OR randomi* control).

Potential studies were evaluated for inclusion in this study by the first author, based on whether they: (a) provided data on cannabis use, which allowed the calculation of pre–post effect sizes in a group of participants randomised to receive inactive (e.g. waitlist) or minimal interventions (e.g. drug-related information only); (b) were in English; (c) did not comprise case studies or personal accounts; (d) did not include participants with severe mental disorders (i.e., schizophrenia, bipolar disorder, posttraumatic stress disorder, major depressive disorder). In order to report results on a single measure, we restricted the studies to those allowing a calculation of cannabis use in the previous 30 days.

The formal examination of effect sizes used Comprehensive Meta-Analysis (Borenstein, Hedges, Higgins, & Rothstein, 2005), and the primary analysis applied a random effects model. This is the appropriate approach to use when samples or treatments are potentially different, regardless of whether significant heterogeneity is evidenced (Borenstein, Hedges, Higgins, & Rothstein, 2009). We report effects as standardised mean differences (Cohen's d). Analyses of degree of change require estimates of test–retest correlations of the measures, or reported analyses of changes within groups. While Timeline Followback assessments of cannabis use can have a 7–14 day test–retest reliability of 0.92 (Robinson, Sobell, Sobell, & Leo, 2014), we do not know the reliability of the 3–12 month assessments of cannabis use in the current trials. We use an estimate of 0.70 for the primary analyses below, but also undertake sensitivity analyses with test–retest correlations of .60 and .80. Where means and standard deviations were reported on different sample sizes at baseline and follow-up, we used the follow-up sample size for the analysis, estimating baseline scores for retained participants from reported data using the full sample. We also present sample-weighted mean days of use at baseline, post and follow-up assessments.

3. Results

The search of cannabis treatment in general population samples elicited 2554 articles. Reviewing article titles to confirm that they met the search criteria left 374, and this number was reduced to 55 after reading abstracts. Further searching using reference lists and cited reference search yielded 12 potential articles, and 3 others were suggested by reviewers. Review papers were examined (Carballo et al., 2007; Dutra et al., 2008; Sobell, Ellingstad, & Sobell, 2000; Tanner-Smith, Wilson, & Lipsey, 2013) to identify any additional papers, but none were added from that procedure. A final decision on inclusion was determined after reading the full paper, and any that raised potential questions on inclusion were reviewed by all authors, until consensus was reached. Studies by Copeland et al. (2001), Lozano et al. (2006), Kadden et al. (2007), Kay-Lambkin et al. (2009), Fernandes et al. (2010), Peters et al. (2011), Stein et al. (2011), Walker et al. (2011), Litt et al. (2013) and Hoch et al. (2014) were excluded due to an inability to calculate a within-group effect size on cannabis use per month from the data provided. The control groups of Stephens et al. (1994), Hendriks et al. (2011) and Budney et al. (2000) provided too much support for them to meet inclusion criteria as a control treatment condition.

Details of the eight included studies are displayed in Table 1, their results are provided in Table 2 and their methodological quality is

Table 2
Mean days of cannabis use in the past 30 days, in control groups of treatment trials on people with cannabis use disorders.

Study	Baseline			2–4 months		
	N	M	SD	N	M	SD
Stephens et al. (2000)	86	24.9	6.1	79	17.1	10.7
Litt et al. (2005)[1]	148	30.0	4.7	148	25.2	10.2
Walker et al. (2006)[2]	50	18.4	8.5	50	16.4	10.3
Stephens et al. (2007)[3]	64	26.0	8.2	64	24.6	8.2
Martin and Copeland (2008)[4]	20	18.5	10.5	20	18.2	10.5
Fischer et al. (2012)	32	23.9	6.1	32	23.1	6.9
Gates et al. (2012)[5]	81	23.9	6.3	61	13.4	12.2
Rooke et al. (2013)	119	20.8	8.7	58	14.1	8.8
Total N, weighted mean	600	24.5		512	19.9	

Conversion formulae from reported means (M) to give days of use in the past 30 days:.
[1] % days used in past 90: M × 30.
[2] Days used in past 60: M/2.
[3] Days per week: (M/7) × 30.
[4] Days used in past 90: M/3.
[5] Days used in past 28: (M/28) × 30.