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Changes in cannabis use among psychotic clients without specialised substance use treatment

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ABSTRACT

The need to address substance use among people with psychosis has been well established. However, treatment studies targeting substance use in this population have reported mixed results. Substance users with psychosis in no or minimal treatment control groups achieve similar reductions in substance use compared to those in more active substance use treatment, suggesting a role for natural recovery from substance use. This meta-analysis aims to quantify the amount of natural recovery from substance use within control groups of treatment studies containing samples of psychotic substance users, with a particular focus on changes in cannabis use. A systematic search was conducted to identify substance use treatment studies. Meta-analyses were performed to quantify reductions in the frequency of substance use in the past 30 days. Significant but modest reductions (mean reduction of 0.3–0.4 SD across the time points) in the frequency of substance use were found at 6 to 24 months follow up. The current study is the first to quantify changes in substance use in samples enrolled in no treatment or minimal treatment control conditions. These findings highlight the potential role of natural recovery from substance use among individuals with psychosis, although they do not rule out effects of regression to the mean. Additionally, the results provide a baseline from which to estimate likely changes or needed effects sizes in intervention studies. Future research is required to identify the processes underpinning these changes, in order to identify strategies that may better support self-management of substance use in people with psychosis.

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1. Introduction

Rates of psychoactive substance use in psychotic populations are much higher than those in the general population, and this use has been associated with detrimental psychological, social, and physical effects (Hjorthøj et al., 2009). These observations have led to concerted efforts to develop effective psychological treatments to reduce this consumption and its associated harm. However, the results of clinical trials on these treatments have been mixed (Hjorthøj et al., 2014; Hjorthøj et al., 2009; Kavanagh et al., 2004; Madigan et al., 2013).

An issue with efforts to address this problem is the extent of change in control conditions. Similar reductions in substance use among people with psychosis are often seen after these treatments and in assessment only, minimal treatment or treatment-as-usual control conditions (Kavanagh and Mueser, 2007). A recent review of treatment studies of first episode psychosis groups, including five with and nine without specialised substance use treatment, found that participants were able to reduce their average consumption, regardless of whether they received specialist substance use treatment or not (Wisdom et al., 2011). Receipt of specialised substance use treatment did not result in

larger reductions or better rates of abstinence (Wisdom et al., 2011). In fact, follow up research on patients with psychosis not treated for substance use (Baeza et al., 2009; Caspari, 1999; Lambert et al., 2005; Wade et al., 2006) have reported abstinence rates of 21%–63% over 15 months to 5 years (Caspari, 1999; Lambert et al., 2005; Wade et al., 2006).

These results highlight the potential role of natural recovery from substance use in psychotic populations (Wisdom et al., 2011). While these improvements may reflect effective self-management of substance use, they may also reflect regression to the mean (if participants entered treatment during a period of unusually heavy substance use). Observations of reduced consumption in the first month after a negative experience from cannabis, of similar or greater size as in the general population are consistent with both of these suggestions (Green et al., 2007). Regardless of the phenomenon's determinants, clarifying its extent is important in the interpretation of clinical outcomes and in planning treatment trials.

A gap in current knowledge is that research is yet to quantify the extent of untreated improvements from substance use that occurs. Accordingly, the current study conducts a meta-analysis that aims to quantify the reductions in the frequency of substance use that is achieved within control groups of treatment studies targeting psychotic clients. It focuses particularly on changes in use of cannabis, the most

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commonly used illicit substance worldwide (United Nations Office on Drugs and Crime, 2014), and a substance that has been linked to increased risk of psychotic symptomatic exacerbations and relapse (Hides et al., 2006).

2. Methods

Electronic searches were performed in January 2016 to find studies that included a control group and had tested treatment for current cannabis use in people with both a psychotic and substance use disorder. The searches used title, abstract and keywords of Medline, PsycINFO, Psychology Journals, and Psychology Subject Corner. The search was expanded to include other substances (due to limited results for cannabis alone), giving the search terms: (cannabis or marijuana or marihuana or addiction or abuse or substance or cocaine or dual diagnosis or comorbid or comorbidity or co-occurring) and (psychosis or psychoses or schizophren* or schizotypal or psychotic or bipolar) and (treatment or randomi* control).

Potential studies were evaluated for inclusion in this review, based on whether they: (a) provided data that allowed the calculation of pre-post effect sizes in a group of participants receiving inactive (e.g. waitlist) or routine care (excluding substance use treatment); (b) were in English; (c) did not comprise case studies or personal accounts. In order to report results on a single measure, we restricted the studies to those reporting days of substance use in the past 30 (or equivalent). If this data was not reported, attempts were made to contact the authors to obtain it. Due to limited number of trials, studies that had some participants who used substances (including cannabis) and only reported days of substance use (as a global measure) were also included. However, studies that were solely focused on alcohol or nicotine were excluded.

The examination of effect sizes used Comprehensive Meta-Analysis (Borenstein et al., 2005). A random effects model was applied as it is a more conservative approach and is the appropriate method to use when samples or treatments are different, irrespective of whether significant heterogeneity is demonstrated (Borenstein et al., 2009). Effects are reported 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 et al., 2014), the reliability of the 3–12 month assessments of cannabis use in the current trials is unknown. As a result an estimate of 0.70 was used for the primary analyses. Sensitivity analyses were also undertaken using test-retest correlations of 0.60 and 0.80. Where means and standard deviations were reported on different sample sizes at baseline and follow-up, the follow-up sample size for the analysis was used, estimating baseline scores for retained participants using the full sample. Sample-weighted mean days of use at baseline, post and follow-up assessments are displayed in Appendix A.

3. Results

The search elicited 1492 articles (see Fig. 1). Based on reviews in the area, no relevant articles appeared to be missed (e.g., Hjorthøj et al., 2014; Wisdom et al., 2011). A final decision on the inclusion of all papers was made after reading the full paper. Any ambiguous articles were reviewed until consensus was reached. Some studies reported substance use in general, but reported the number of cannabis users in the sample and were therefore retained in this study.

Of the 30 papers identified, those by Lehman et al. (1993); Hellerstein et al. (1995); Baker et al. (2002, 2006); James et al. (2004) and Hjorthøj et al. (2013) were excluded due to an inability to estimate days of cannabis use in the previous 30. A further 16 studies were excluded due to an inability to calculate a within-group effect size from the data provided (Bellack et al., 2006; Bonsack et al., 2011; Burman,

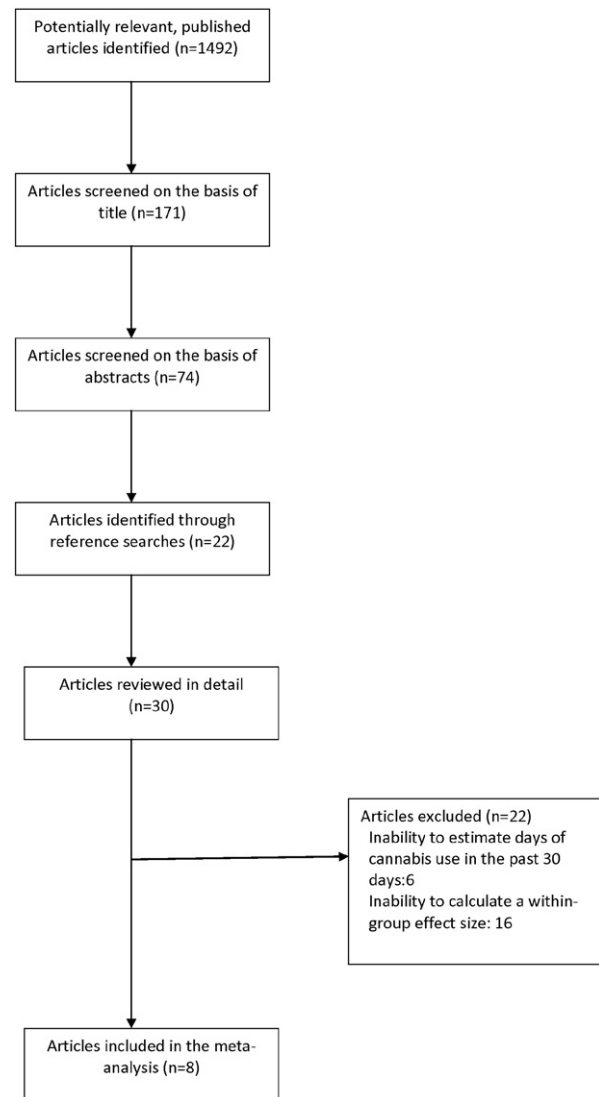


Fig. 1. Flow chart of inclusion criteria.

1997; Calsyn et al., 2005; Castle and Ho, 2003; Clark, 2001; Craig et al., 2008; Drebing et al., 2005; Haddock et al., 2003; Hellerstein et al., 2001; Herman et al., 1997; Kavanagh et al., 2004; Martino et al., 2006; Ries et al., 2004; Sigmon and Higgins, 2006; Weiss et al., 2007). Essock et al. (2006) was included after consensus by all authors that the standard case management provided to participants was part of routine care and was unlikely to have included extensive substance use treatment. The final eight articles meeting full inclusion criteria are described in Table 1 and the methodological details in Table 2.

Over 6 months, weighted mean days fell from 13.2 to 10.6 across 6 studies (a summary of the mean effects is provided in Appendix A). Using a test-retest correlation of 0.70, the random effects meta-analysis gave a mean reduction of 0.332 SD ($p < 0.001$; Fig. 2), and 80 missing studies would be required to take the result to $p > 0.05$. There was no significant heterogeneity ($Q(5) = 10.23, p = 0.069$). Sensitivity analyses using test-retest correlations of 0.60 ($-0.330, CI: -0.460$ to -0.200) and 0.80 ($-0.332, CI: -0.461$ to -0.204) made little difference to the obtained effect.

Over 10–12 months, the random effects meta-analysis produced a mean reduction of 0.328 SD over 7 studies ($p < 0.001$; Fig. 3), and 82 missing studies would be required for the result to reach $p > 0.05$. Heterogeneity fell short of significance ($Q(6) = 7.91, p = 0.245$). Sensitivity analyses using test-retest correlations of 0.60 ($-0.337, CI: -0.433$ to

Table 1

Methodological characteristics of cannabis and other substance use treatment trials in psychotic populations: studies reporting the days of cannabis or other substance use in the past 30 days.

Author (date)	Sample type at baseline	Disorder	Country	Control group	Measure	Substance	Retention rates
Drake et al. (1998)	OP	SCZ/SA/BP SUD	US	SCM, team approach in community targeting MH & SUD	Days of use in past 6 months	Illicit	91% at 3 years
Edwards et al. (2006)	OP	PDNOS CUD	AU	10 week group psychoeducation on psychosis	Percent days used Cannabis in past 4 weeks	Cannabis	71% at 6-months
Essock et al. (2006)	OP HM	SCZ/SA/BP/MD SUD	US	SCM, team approach in community targeting MH & SUD	Number of days of drug use in past 6 months	Illicit	96% at 3 years
Morse et al. (2006)	OP HM	SCZ/PDNOs/BP/MD/SA SUD	US	Shown a list of MH & SU treatment agencies	Days used substances in past 90	Illicit (19% cannabis)	88% at 2 years
Barrowclough et al. (2010)	OP	SZ/SA SUD	UK	Psychiatric care (medication, case management)	Proportion of days abstinent from main substance in past 90 days	Any (50% cannabis)	72% at 2 years
Morrens et al. (2011)	IP	PDNOS SUD	BE	TAU focused on psychotic symptoms	Frequency of cannabis use over past 30 days	Illicit (60% cannabis)	71% at 3-months 20% at 1 year
Smeerdijk et al. (2012)	OP	SCZ/PDNOs CUD	NL	Routine family support	Mean days of cannabis use in the past 90	Cannabis	86% at 10-months
Madigan et al. (2013)	OP	PDNOS SUD	IE	Multidisciplinary care, antipsychotic treatment	Frequency of cannabis use over past 30 days	Cannabis	76% at 3-months 66% at 1 year

AU: Australia, BE: Belgium, IE: Ireland, NL: The Netherlands, US: United States of America.

IP: Inpatients, HM: Homeless/unstably housed, OP: Outpatients.

BP: Bipolar, MD: Major Depression, SCZ: Schizophrenia/schizophreniform, SA: Schizoaffective.

PDNOS: Psychotic Disorder Not Otherwise Specified/psychotic disorder spectrum.

SUD: Substance Use Disorder (abuse or dependence), CUD: Cannabis Use Disorder (abuse or dependence).

–0.241) and 0.80 (–0.318, CI: –0.422 to –0.215) again had little impact.

The four studies with data to 24 months had a mean reduction of 0.450 SD ($p < 0.001$; Fig. 4), and 81 missing studies would be required to take the result to $p > 0.05$. There was significant heterogeneity in this subgroup ($Q(3) = 22.99$, $p < 0.001$). Sensitivity analyses using test-retest correlations of 0.60 (–0.452, CI: –0.723 to –0.182) and 0.80 (–0.444, CI: –0.699 to –0.189) did not substantially change the results.

A review of the methodological quality of the control group data is in Table 2. Retention rates for 4 of the studies were at least 70% at 6 months, which is an overall strength of the studies. Another strength was that 5 had single-blind follow-up. All of the studies verified substance use disorder and substance use across the studies using structured methods

with 3 studies verifying substance use with urine or hair analysis. A significant weakness of the results being interpreted as natural recovery was the limited information pertaining to substance use interventions within standard case management. Every study had at least one significant issue that should induce caution in the interpretation of its results.

4. Discussion

The current review found significant reductions in the frequency of cannabis use among users with psychosis. At 6 months, patients were only using 11 days per month with an average reduction of 0.3 SD. This result provides the degree of change in treatment trials potentially due to natural recovery and the effect required to enhance future

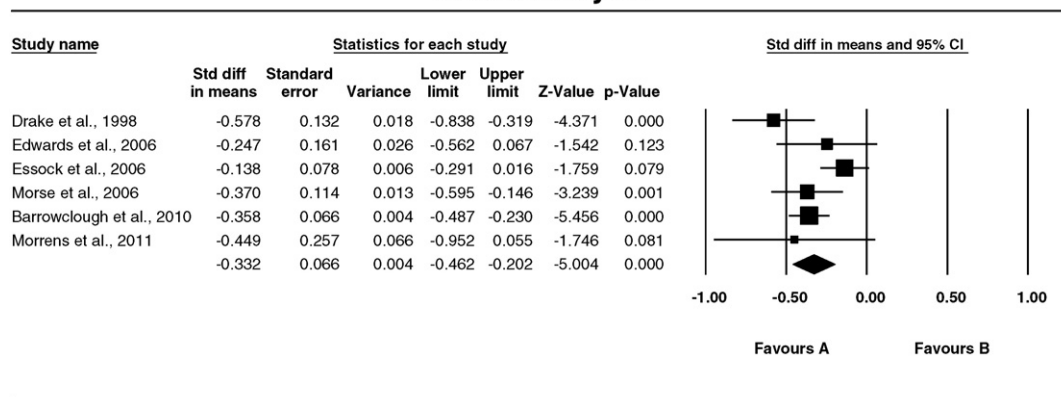
Table 2

Methodological review of control treatments from the included randomised controlled trials.

Study	Symptom/diagnostic measure	Treatment received by controls	Follow-up retention	Intention to treat (and management of missing data)	Single-blind follow-up
Drake et al. (1998)	SUD: SCID SU: TLFB, ASI, Urinalysis	Standard case management	NR	NR	NR
Edwards et al. (2006)	SUD: SCID CU: CASUAS, self-report	10 individual PE sessions focused on psychosis, avoiding explicit discussion of cannabis Standard case management	74% to 6 months	Yes (LOCF)	Yes
Essock et al. (2006)	SUD: SCID SU: TLFB, ASI, urinalysis	Standard case management	NR	NR	NR
Morse et al. (2006)	SUD: SCID CU: self-report	NR Between 0.39 and 0.16 contacts per month in regards to substance abuse treatment	NR	Yes (NR)	No
Barrowclough et al. (2010)	SUD: SCID CU: TLFB self-report, hair analysis (25%)	Standard case management	91% to 6 months 71% to 24 months	Yes (secondary analyses)	Yes
Morrens et al. (2011)	SUD: Clinical interview CU: ASI, self-report	Standard case management with no formal for substance use	71% to 6 months 20% to 12 months	Yes (carried previous data forward)	Open label
Smeerdijk et al. (2012)	SUD: Clinical interview CU: TLFB	Meetings with a family therapist. No formal skills provided	77% to 10 months	Yes (means of the multiple imputation method)	Yes
Madigan et al. (2013)	SUD: SCID CU: ASI	Standard care. Five participants previous addiction counselling (>12 months ago)	76% to 3 months 65% to 12 months	Yes (NR)	Yes

SUD: Substance Use Disorder, CU: Cannabis use, SU: Substance use.

Meta Analysis



Meta Analysis

Fig. 2. Control group effects over 6 months.

specialised substance use treatment trials. The results remained modest over time, at 10–12 months an average reduction of 0.3 SD and 24 months 0.4 SD. These results need to be interpreted with caution due to the methodological limitations outlined.

While treatment of cannabis use in people with psychosis has limited differential effectiveness above self-management, results of the current study demonstrate that on average, this population may have potential to self-manage their consumption if they are sufficiently motivated to do so. It is possible that part or all of the observed changes were due to regression to the mean, although the maintenance of the changes over as long as 24 months suggests concerted self-management rather than statistical aberration. Further research is also needed to determine the extent that the observed improvements across studies have substantial functional or clinical impact.

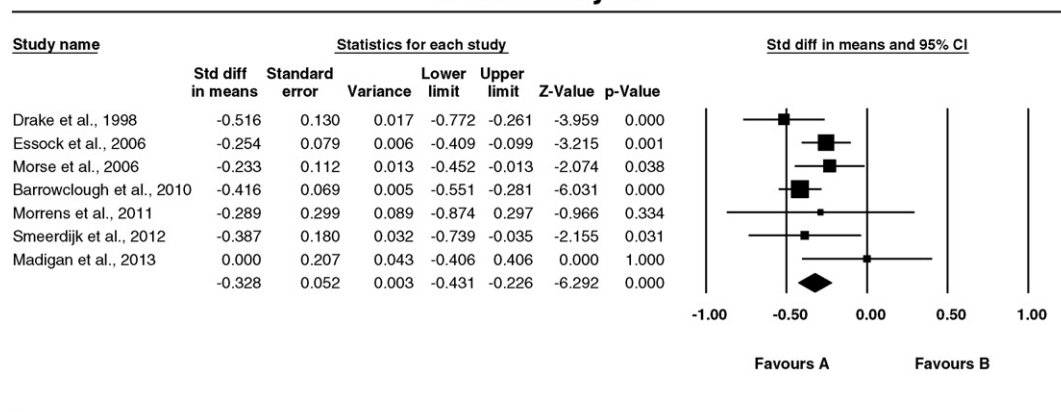
In our recent review examining reductions in days of cannabis use within control groups of treatment studies we found that average weighted mean days of use in the previous 30 days fell from 24.8 to 18.6 at 2–4 months across nine studies (Rebgetz et al., 2015b). A meta-analysis could only be undertaken to 2–4 months (due to limited studies providing data on longer follow up periods), which showed an average reduction of 0.540 SD, which was highly significant ($p < 0.001$). While the reduction over 6 months in the psychosis samples (0.33 SD) was 40% less than non-psychotic samples obtained over 2–4 months (0.54 SD), the higher level of baseline consumption frequency in the non-psychotic group may have allowed greater regression to the

mean. However, due to different time periods a direct comparison between those with and without psychosis cannot be made.

Research into natural recovery from substance misuse in the general population has provided valuable insights into recovery strategies for enhancing treatments. Since at least a partial average recovery appears to also occur in people with psychosis, a similar research approach may also identify new ways to support self-management of substance use among this population. A handful of studies have attempted to explore this area, although due to their limited number and methodological limitations, further well-designed research is required (Rebgetz et al., 2015a).

An important limitation to the current study was the need to exclude 22 papers that did not allow a calculation of effect sizes on the frequency of cannabis or other substance use in the previous 30 days. While this criterion ensured comparability across studies, the substantial loss of potential studies highlighted the need for common minimum data reporting in treatment trials across this field. Other methodological limitations include the fact that only one author conducted the main literature search, although any issues on inclusions were referred to all authors for collective decision, and no additional papers were identified from reviews. The presence of differing psychiatric diagnoses or problem substances, and a lack of control for symptom severity or for multiple substance use also raise issues. The Essock et al. (2006) paper was included despite some substance use treatment being provided to the participants, but the study showed less change than most others and

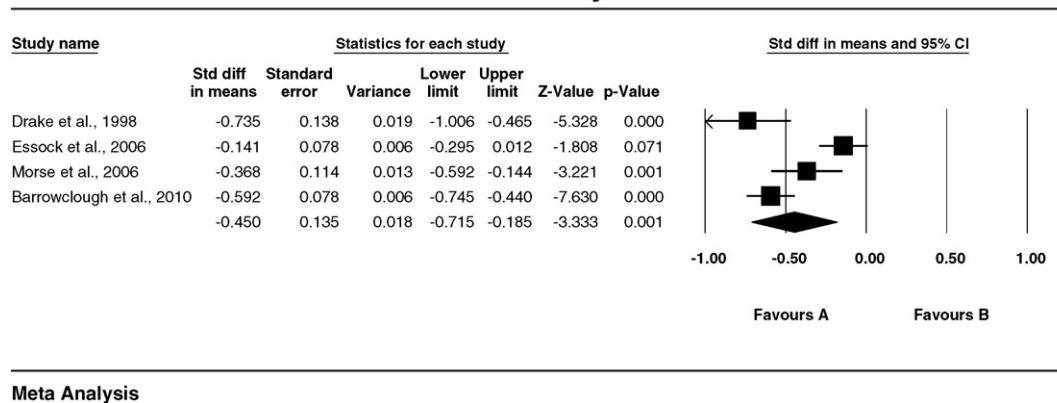
Meta Analysis



Meta Analysis

Fig. 3. Control group effects over 12 months.

Meta Analysis



Meta Analysis

Fig. 4. Control group effects over 24 months.

therefore its inclusion did not inflate the size of the obtained effect. Several other studies involved treated samples in which informal substance use interventions may have occurred, although specialist treatment for substance use was not provided. Retention rates across the studies appeared to be adequate, although it is possible that participants with more severe substance use problems were more likely to drop out, which may have inflated positive outcomes. However if this did occur, it is also likely in future research and clinical applications. Lastly, most studies only included self-reports of substance use without urine drug screening. Urine drug screening may have assisted to verify self-reports of cannabis use. However, our previous study, reported high levels of agreement between cannabis immunoassays or gas chromatography/mass spectrometry and self-reported cannabis use (Cohen's kappa = 0.90), which suggests that self-reports are reliable (Hides et al., 2006; Rebgetz et al., 2014). While inflation of the currently observed effects due to reporting biases cannot entirely be ruled out, this research on the reliability of self-reports suggests that any such influence is likely to be minor.

This is the first meta-analysis to explore changes in cannabis/substance use in minimal or no treatment control conditions of clinical trials targeting substance use in psychotic patients. Its findings are

important: It shows that modest but well-maintained reductions in the frequency of average cannabis use can be seen in patients with psychosis who did not receive specialist substance use treatment. A more detailed understanding of strategies that are perceived to assist self-control of substance use in these populations could inform the development of new more effective substance use treatment.

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There was no funding sponsor involved in this study.

Contributors

S. Rebgetz, D. Kavanagh and L. Hides contributed to the development of the research questions, data analysis and preparation of the paper. All authors contributed to and approved the final manuscript.

Conflict of interest

The authors have declared that there are no conflicts of interest in relation to the subject of this study.

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Nil.

Appendix A. Days of cannabis or other substance use in the past 30 days, in control groups of substance use treatment trials in psychotic samples at baseline and follow up.

	Substance	Baseline			6 months			10–12 months			24 months		
		N	M	SD	N	M	SD	N	M	SD	N	M	SD
Drake et al. (1998) ¹	S	40	12.5	8.7	40	7.6	8.2	40	7.9	9.1	40	6.3	8.1
Edwards et al. (2006) ²	C	24	7.8	8.5	24	5.6	9.2						
Essock et al. (2006) ¹	S	99	8.1	9.5	99	6.8	9.4	99	5.8	8.4	99	6.8	8.8
Morse et al. (2006) ³	S/C	49	3.2	3.2	49	2.1	2.5	49	2.5	2.7	49	2.1	2.6
Barrowclough et al. (2010) ⁴	S/C	163	21.9	8.2	148	18.1	11.5	137	17.6	11.2	117	15.4	11.9
Morrens et al. (2011)	S/C	35	5.5	2.1	10	4.3	2.9	7	4.8	2.6			
Smeerdijk et al. (2012) ³	C	27	17.6	10.7				20	13.4	11.0			
Madigan et al. (2013)	C	29	10.1	3.6				14	10.1	4.0			
Weighted means													
Studies to 6 months			13.2			10.6							
Studies to 10–12 months			13.5						10.6				
Studies to 24 months			14.3									9.3	

Conversion formulae from reported means (M) to give days of use in the past 30 days.

¹ Days used in past 6 months: $M / 6$.

² % days used in past 4 weeks: $M \times 30$.

³ Days used in past 90: $M / 3$.

⁴ Proportion of days abstinent from main substance in past 90: $(1 - M) \times 30$.

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