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Mental health problems – are they or are they not a risk factor for dropout from drug treatment?

A systematic review of the evidence

Short title: Retention of dual diagnosis clients in drug treatment

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Abstract

Background: A sizeable number of recent studies investigating whether clients with substance misuse and mental health problems (dual diagnosis clients) are at heightened risk of dropout from drug treatment have been published. It is timely that their findings are brought together in a comprehensive review of the current evidence.

Aims: The aim of the review is to examine whether dually diagnosed clients are less likely to be retained in drug treatment than clients without mental health problems, and if so, whether this varies for clients diagnosed with different types of mental health problems.

Methods: The review considers peer-reviewed research published after 1 January 1990, which was located using the literature databases Medline and PsycInfo. Pre-defined search terms were used. Further papers were identified from the bibliographies of relevant publications.

Findings: 58 studies (84% from the US) met the inclusion criteria for the review. The findings suggest that for most clients, having a *past* history of mental health problems does not influence the likelihood of being retained in drug treatment. The body of evidence regarding *concurrent* mental health problems is contradictory. On the whole, the majority of studies suggest that neither presence nor severity of depressive, anxiety, or other Axis-I disorders is related to retention, but these findings are not entirely unequivocal, as a few studies report strong positive or negative associations between depression and anxiety disorders and retention. Few researchers looked separately at psychotic spectrum disorders hence no conclusions could be drawn. The presence of most personality disorders also did not appear to affect treatment tenure, with the exception of anti-social personality disorder, for which the evidence points towards a greater risk of dropout.

Conclusions: The balance of evidence suggests that overall, dual diagnosis clients with Axis-I disorders who seek treatment in drug treatment services are retained as well as clients without dual diagnosis. Subgroups of clients who appear more vulnerable to premature dropout include those with anti-social personality disorder. Methodological shortcomings of the reviewed studies and resulting implications for this review and future research are discussed.

Keywords: Systematic review, dual diagnosis, comorbidity, mental health, dropout, retention

Introduction

Retention in drug treatment has long been recognised as a crucial process factor determining positive treatment outcomes. Clients staying in treatment longer have been shown to have superior outcomes across the whole range of outcome domains compared to those that leave prematurely (e.g., Stark 1992; Simpson et al. 1997; Gossop, Marsden, Stewart and Rolfe 1999; Siqueland et al. 2002; Zhang et al. 2003; Hser et al. 2004). Despite this, studies continue to report high dropout rates in all drug treatment modalities (Gossop et al. 1998; Gossop, Marsden, Stewart, Lehmann et al. 1999; Gossop, Marsden, Stewart and Rolfe 1999; Hser et al. 2001; Klein et al. 2002). For the past 30 or so years, huge research effort has gone into the identification of risk factors for early dropout. Amongst these, one risk factor which has received a significant amount of attention is the presence or absence of mental health problems.

Clients accessing drug treatment may present for treatment with a number of psychological or psychiatric problems, and co-morbidity of psychiatric problems and substance dependence is common. Recent prevalence estimates of such co-morbidity in drug treatment samples were reported to range from 20% to 93% (Marsden et al. 2000; Franken and Hendriks 2001; Virgo et al. 2001; Manning et al. 2002; Weaver et al. 2003).

Amongst clinicians as well as researchers, there often appears to be an underlying assumption that clients with a psychiatric co-morbidity are more difficult to retain in drug treatment settings and major research effort has gone into trying to establish the relationship between “dual diagnosis” and treatment retention. The only literature on this topic to date is a short section in a clinically-oriented narrative review of a range of predictors of drug treatment retention (Stark et al 1992). Stark and colleagues reviewed research published prior to 1990, and it is not clear on what basis studies were located and selected. Thus it is timely to try to bring together the results of studies exploring the link between dual diagnosis and retention in drug treatment.

METHODS

Inclusion criteria

Inclusion criteria were (1) the treatment was delivered either in substance misuse services or, considered separately, specialist dual diagnosis services; (2) the authors report comparisons of completion rates or length of stay between clients with varying levels or diagnoses of psychological or mental health problems, (3) the authors report original research with samples of at least 20 clients (excluding reviews, clinical intervention descriptions, case studies and very small sample studies), and (4) the papers were published in English-language peer-reviewed journals between January 1990 and March 2006 (prior research is reviewed in Stark et al, 1992). Reports focusing specifically on treatment in general psychiatry settings, or telephone/web-based treatment were excluded because of the differences in client groups and service delivery. Studies were also excluded if they reported on variations in retention rates for different treatments for a homogenous group of dual diagnosis clients.

(Insert Table 1 about here)

Procedure

The electronic databases Medline, PsycInfo and ISI Web of Social Science were searched for articles meeting the above inclusion criteria. The list of search terms used is given in Table 1. The retention search string was paired in turn with each of the dual diagnosis search strings. Duplicates were removed and abstracts for all located articles were obtained and classified as (1) definitely reporting a result linking mental health problems and retention, (2) potentially reporting a result linking mental health problems in a relevant setting (where the abstract was vague on the included list of retention predictors or treatment setting), (3) definitely not reporting a relevant result, (4) treatment setting in general psychiatry, review articles, sample <30, clinical intervention descriptions. The full-text versions of all articles classified as (1) or (2) were obtained and read by two independent reviewers, the first author and a postgraduate student, to make a final decision on eligibility for inclusion. The bibliographies of located articles were hand-searched for further articles.

For each study, we abstracted (where available) information on the geographical region of the study, study design, mental health measure, retention measure, overall retention rate, retention rates by client subgroups, prevalence of dual diagnosis in the sample, total sample size, sample composition in terms

of substance type or any special characteristics, intervention/treatment type and whether the study explicitly aimed to find out about the link between mental health and retention or whether this was merely an additional finding reported by the authors.

We considered undertaking a meta-analysis of the included studies to help us make sense of the contradictory results we report below and increase the power and precision of our conclusions. However, studies were clinically and methodologically heterogeneous regarding design, chosen predictor and outcome measures, treatment populations and settings (see the sample of studies section below) so that it proved impossible to define large enough homogenous subgroups of studies which would have lent themselves to a meta-analytic approach.

RESULTS

Sample of studies

We were able to identify 58 studies that report on the relationship between mental health problems and retention in drug treatment, together including some 15,000 clients. In terms of geographical origin, 49 of the 58 studies were from the USA, three from Canada, one from Australia, four from southern Europe and three from northern Europe.

There were some commonalities in the methodological approach of all included studies: They followed clients entering one or more treatment service/modality, assessed psychopathology at the start of treatment and obtained a measure of either completion of a period of treatment or length of stay. The studies took one of three methodological approaches to report on the relationship between retention and psychological health: (1) division of the sample by diagnostic group or symptom severity and comparing these groups on retention measures (2) division of the sample into completers and non-completers and comparing the groups regarding psychopathology at intake, and (3) correlation of a measure of length of stay with a psychopathology at intake score. Studies using group designs either compared clients with and without comorbidity, or clients with different diagnoses, whereas correlational studies measured the severity of psychiatric symptoms and length of stay as a continuous variable. The included studies varied widely according to sample size (ranging from 55 to 5269).

Type of mental health problem

Depression

Twenty-three studies looked at the effects of concurrent depression (see Table 2), and most found no relationship between presence and/or severity of depression and retention in a number of different treatment modalities (Ravndal and Vaglum; Ryan et al. 1995; Alterman et al. 1996; Araujo et al. 1996; Galanter et al. 1996; Charney et al. 1998; Siqueland et al. 1998; Avants et al. 1999; Hiller et al. 1999; Petry and Bickel 1999; Avants et al. 2000; Lang and Belenko 2000; Knight et al. 2001; Sayre et al. 2002; Gonzalez et al. 2003; Meier et al. 2006). Two studies found that retention was better for depressed clients (Martinez-Raga et al. 2002; Gerra et al. 2006) and three others found that depression was related to dropout (Kleinman et al. 1992; Kokkevi et al. 1998; Curran et al. 2002). However, Curran et al's study makes a useful distinction between severity of depression: whilst severe depression was related to treatment tenure, mild depression was not. Two papers derived from the large scale DATOS study (Broome et al. 1999; Joe et al. 1999) suggest an interaction of psychiatric problems with treatment modality: there was no effect of depression on retention in methadone maintenance or abstinence-oriented outpatient programmes, but in residential programmes current depression was related to completion. However, since none of the other studies set in residential rehabilitation services reported a significant effect, no clear pattern of differences between modalities can be detected. Studies also did not seem to differ by primary substance (ie whether samples consisted mainly of opiate, cocaine or alcohol users). Overall, the bulk of the evidence suggests that neither presence nor severity of depression influences whether a client is retained in treatment.

(Insert Table 2 about here)

Anxiety, attention deficit hyperactivity and posttraumatic stress disorder

In comparison to depressive disorders, anxiety disorders have received somewhat less attention and only nine studies reporting on this were located. Those with anxiety disorder were less likely to be retained compared with drug use-only patients in two studies (Lang and Belenko 2000; Gerra et al.

2006) but more likely to be retained in another (Kokkevi et al. 1998). In the remaining six studies, no relationship was found (Araujo et al. 1996; Broome et al. 1999; Hiller et al. 1999; Knight et al. 2001; Martinez-Raga et al. 2002; Meier et al. 2006). Again, there were no obvious explanations for the contradictory findings, as studies covered all treatment modalities as well as substance use categories. There was only one study each specifically looking at attention deficit hyperactivity disorder (King et al. 1999) and posttraumatic stress disorder (Martinez-Raga et al. 2002), both studies found no effect of the presence or absence of the disorders on retention.

Psychosis

Only two studies reported on the retention of those with psychotic disorders in drug treatment (see Table 2). In fact, in many studies, clients with acute psychotic symptoms were excluded. One study found no difference in retention rates (Galanter et al. 1996), however, another reported that the retention rate for schizophrenia clients was far lower than that of clients with depressive, anxiety or personality disorders (Gerra et al. 2006). Only 8% of clients with psychosis were retained in this study, compared to 72% of those with major depression, 18% of those with personality disorders, or 45% of those without a dual diagnosis. It needs to be noted that Gerra et al's sample included only a small number of clients with psychotic disorders, hence results may not be reliable. In both studies, clients had access to regular psychiatric medication and care, however, the Galanter et al study is based in a highly specialised inpatient programme whereas the Gerra et al study is set in an outpatient substitute prescribing programme.

Axis-I disorders

Seven studies did not distinguish between different Axis-I disorders and compared clients with any Axis-I disorder to those without mental health problems or those with Axis-II disorders only. No effect for the presence of Axis-I disorders on retention was reported by most studies (Greenberg et al. 1994; Nuttbrock et al. 1998; Siqueland et al. 1998; Maremmanni et al. 2000; Cacciola et al. 2001). In contrast, only one study reported better retention of clients with Axis-I disorders (Saxon and Calsyn 1995) and one large-sample study worse retention (Moos and King 1997). Again, there is limited and contradicting evidence in support of a link between mental health problems and retention.

(Insert table 3 about here.)

Personality disorders

A number of studies have looked at the effect of personality disorders (PDs) on treatment retention, with most evidence available for clients with antisocial personality disorder (APD, see Table 3). Not all studies differentiated between different PDs, and three studies that compared dropout in clients with a diagnosis of any personality disorder versus no personality disorder reported a link between PD and dropout (Cacciola et al. 2001; Ball et al. 2005; Gerra et al. 2006). This effect appeared to be independent of whether clients also had an Axis-I disorder (Cacciola et al. 2001).

Five studies reported findings that clients with a diagnosis of APD were more likely to drop out (Greenberg et al. 1994; Siqueland et al. 1998; Avants et al. 1999; Goldstein et al. 2001; Martinez-Raga et al. 2002), however, other studies were not able to replicate these findings and did not find an association of APD and retention (Gill et al. 1992; Alterman et al. 1996; Kokkevi et al. 1998; King et al. 2001). One study actually found a relationship with longer retention, however, this was in a small sample of perinatal substance misusing women, where those with APD were retained longer than women without APD (Haller et al. 1997).

Borderline personality disorder (BPD) was associated with an increased risk of dropout in one study (Martinez-Raga et al. 2002) but not in three others (Kokkevi et al. 1998; Siqueland et al. 1998; Darke et al. 2005).

No effect was found for any of the other PDs (Greenberg et al. 1994; Marlowe et al. 1997; Kokkevi et al. 1998; Siqueland et al. 1998).

Finally, in one sample consisting of clients with personality disorder, the overall severity of symptoms was related to dropout (Ball et al. 2005), but in another study with 75% of the sample suffering from a PD the overall severity of PD symptoms was unrelated to dropout (Marlowe et al. 1997).

Level of symptom severity

Several studies looked at overall severity of the clients' psychological problems rather than at diagnoses (see Table 4). Most of these studies used either the Addiction Severity Index subscale for psychological/psychiatric symptoms or the Symptom Check List-90. Eight studies found that the severity of a client's psychological symptoms was unrelated to retention (Epstein et al. 1994; Ryan et al. 1995; Saxon et al. 1996; Ross et al. 1997; Tidey et al. 1998; McCaul et al. 2001; Sayre et al. 2002; Wallace and Weeks 2004). However, there is also a considerable amount of evidence that clients with more severe symptoms were more likely to leave treatment (Carroll et al. 1993; Petry and Bickel 1999; Lang and Belenko 2000; Haller et al. 2002; Haller and Miles 2004; Kissin et al. 2004; Van Stelle and Moberg 2004). Moreover, three further studies reported gender differences: two studies found that symptom severity was related to early drop out in women but not men (Mertens and Weisner 2000; Siqueland et al. 2002), but another associated severe symptoms with drop out in men only (Green et al. 2002). Petry and Bickel (1999) stress the importance of the therapeutic alliance: Clients with a good client-counsellor relationship stayed regardless of symptom severity, but of those with a poor relationship, clients with severe symptoms were more likely to drop out than those with mild symptoms. This might suggest that a good alliance buffers against potentially negative effects of psychological problems.

(Insert Table 4 about here)

History of past mental health problems

There were five studies that used clients' mental health treatment histories as a proxy for psychiatric problems in the past. All but one of these studies found that past mental health treatment does not affect retention (Agosti et al. 1996; Hiller et al. 1999; Claus and Kindleberger 2002; Brady et al. 2004), however one reports that amongst offenders in residential rehabilitation a mental health treatment history was a good predictor for dropout (Lang and Belenko 2000). It has to be noted that the latter study investigated a large number of predictors in a relatively small sample and there may be methodological concerns about power and multiple testing. Two of the already mentioned studies also used indicators of previous rather than current mental health problems (Broome et al. 1999; Gonzalez et al. 2003) and largely support the notion that past problems do not affect retention, although Broome et al found that in methadone treatment only, lifetime diagnoses of depression and anxiety were related

to dropout. The majority of evidence therefore indicates that if there is a relationship between mental health and treatment retention, concurrent problems are more important than past problems only.

Specialist treatment versus standard drug treatment

Nine of the reviewed studies specified offering either specialist DD treatment or concurrent psychiatric treatment for dual diagnosis clients. Six were set in specialist dual diagnosis services (Greenberg et al. 1994; Galanter et al. 1996; Ross et al. 1997; Mierlak et al. 1998; Maremmani et al. 2000; Ball et al. 2005), two specifically mentioned facilitated access to psychiatric care (Saxon and Calsyn 1995; Brady et al. 2004) and one was based on dual-diagnosis focused 12-step groups (Laudet 2003). Of these studies, four reported no effect of various mental health indicators on retention (Greenberg et al. 1994; Galanter et al. 1996; Ross et al. 1997; Maremmani et al. 2000; Brady et al. 2004). One study reported a positive effect of Axis-I disorders (Saxon and Calsyn 1995), two a negative effect of personality disorders (Greenberg et al. 1994; Ball et al. 2005), one a negative (Mierlak et al. 1998) and one a positive effect (Laudet 2003).of prior mental health treatment on retention. The patterns of findings is broadly consistent with those in non-specialist services.

Effects of scheduled treatment duration

We investigated whether the scheduled duration of treatment is an important factor in explaining some of the inconsistency in the results. Detoxification programmes can be as short as one week, whereas methadone maintenance programmes and residential rehabilitation treatment can last between 6 months and several years. Information on the duration of treatment can be found in the last column in Tables 1-4. There were more studies on long-term treatments (defined as 6+ months) than medium-term (3-6 months) and relatively few studies reported on short-term treatment (up to 3 months). However, similar proportions of studies on long-term and shorter-term treatment reported relationships between mental health problems and retention. This was regardless of whether we looked at all studies together, or clusters of studies by type of mental health problem. Hence, there is no indication that differences in scheduled treatment duration are helpful in explaining inconsistencies between studies.

Inpatient versus community-based treatments

Finally, we compared findings in different treatment settings. Again, similar patterns of results were observed for studies reporting on inpatient detoxification, residential rehabilitation, outpatient drug-free, day care, or substitution treatment. Clients with Axis-I disorders appeared to be as likely to be retained as those without mental health problems, independent of the treatment setting. Clients with personality disorders were less likely to be retained, and again type of service appeared to be unrelated to this. However, severity of symptoms may be more predictive of retention in inpatient settings, as studies in residential rehabilitation and detoxification services were particularly likely to report relationships between more severe mental health problems and dropout.

DISCUSSION

Despite the lack of a coherent effort to synthesise evidence, there appeared to be a wide-spread belief in the field that, as one author puts it, “early unplanned discharge is a feature of comorbidity” (Crawford 2001). The aim of the current review was to see whether the available evidence supports this belief.

Whilst there is considerable disparity in the results of the reviewed study, the tentative conclusion of this review is that most clients with a dual diagnosis who seek treatment in drug treatment services are retained as well as clients without dual diagnosis. Whilst overall dropout for clients is high in many studies, those with additional psychological problems do not seem at a disadvantage regarding their chance of staying in treatment long enough for it to have an impact. On the other hand, when examining the kinds of treatment programme offered in the participating services, it was interesting to note that only very few studies mention that psychiatric care was available to those with mental health problems. Whilst some authors may have omitted this information, it appears likely that this supports previous findings which suggests that specialist drug services tend to focus on treating the substance misuse problem rather than offering a comprehensive service to their dually diagnosed clients (Lewin et al. 2004; Lowe and Abou-Saleh 2004). In light of this, we need to bear in mind that it is possible that in some cases longer retention is not necessarily positive: clients may stay in treatment longer because one of their key problems, ie mental health, is not adequately addressed and progress is hindered by this.

Studies suggest that there may be a specific subgroup of clients who may be more vulnerable to premature dropout, namely those with anti-social personality disorder. It has been suggested that staff

may find it easier to empathise with, and therefore engage, clients with depression or anxiety disorders in contrast to those with anti-social personality disorder (Martinez-Raga et al. 2002), however, this assumption has not been investigated to date. Too few studies included clients with severe mental illness; hence, no conclusions can be drawn regarding this client group.

There are a significant number of limitations that need to be considered when interpreting the findings of this review, both in terms of the quality of the evidence underlying this review and the review methodology itself.

The client samples in the reviewed studies are unlikely to be representative of all those with dual diagnosis. The exclusion of clients with acute or severe mental illness was mentioned as a study exclusion criterion in many papers, and where this was the case, we have noted this in the “sample” column of the tables. However, we have to bear in mind that preselection is often at work even before studies start, as many drug services do not accept dual diagnosis clients with acute or severe mental health problems. In the UK, two recent surveys found that just 74% of all drug services and 55% of residential drug services accept dual diagnosis clients, and not all of them accepted acute cases (Meier and Best 2006; Schulte 2007). It is quite possible that in some of the other studies, researchers were unaware or did not report that clients with SMI were underrepresented in their samples.

One key problem we faced when reviewing the available evidence was that it was often impossible to disentangle “true differences” between studies’ findings and differences caused by the inconsistent definitions and methodological approaches. Our ability to synthesise the available evidence and to determine whether treatment settings, interventions and patient characteristics explain differences between single and dual diagnosis clients was limited by 1) a lack of agreed upon definitions of both attrition and mental health problem, and 2) the consequent variation in assessment strategies.

Attrition is often arbitrarily dichotomized into completion and non-completion and in most studies, no distinction was made between those who were asked to leave by the programme and those who decided to leave themselves. Other studies assess length of stay in treatment, or length of stay up to a study-end point chosen by the researchers. In many cases, the completion status was defined by the programme, and it is not clear whether clients would define the end of treatment in the same way.

There was also large variability regarding the measurement of mental health problems between studies. Apart from a multitude of different assessment instruments, we also found that studies reported either the presence of absence of a diagnosis or the overall severity of psychological symptoms but seldom both. Hence, we could extract little information on how different levels of severity of the same disorder might affect retention.

Whilst most studies assessed mental health before or during treatment intake, some waited several weeks to allow substance-related symptoms to abate, and others did not specify when assessments were undertaken. Too few studies use the same assessment point to enable us to assess the effect of this. Whilst some studies adopted a multi-measure multiple-assessment points approach, most researchers report a single assessment for mental health problems. One-off assessments of dual diagnosis, especially at intake and during withdrawal can be unreliable as clients often seek help in mid-crisis and withdrawal is an exceptional emotional situation. Problems with the reliability of diagnostic criteria for mental health disorders in current substance abusers have been previously documented (Gerstley et al. 1990; Bryant et al. 1992; Carroll et al. 1993). Many of the antisocial behaviours and borderline symptoms described in the DSM criteria for anti-social personality disorder (i.e. poor work performance and/or unemployment, criminality, irritability and impulsivity) are common correlates of substance abuse. Mood, anxiety and psychotic symptoms in drug users are not always stable or indicators of psychopathology, and reliable diagnoses of mental health problems in substance users are achieved only when assessments take into account the temporal patterns of the disorders (Hasin et al. 2006). This was not commonly the case in the reviewed studies.

There was often too little information about the treatment programme provided to enable true comparisons, especially regarding whether services offered targeted mental health interventions. Generally, there was also little control over other intervening variables and too few studies have included treatment process variables or early symptom improvement, which may moderate the dual-diagnosis-retention relationship.

Studies looking at symptom severity and length of time to dropout had an underlying assumption of linearity of the relationship. However, as Epstein et al (1994) point out, this might not be justified. In a hypothetical example, those with few problems might start feeling better and consequently stay, those

with the most severe problems may be desperate and therefore stay, but those with moderate problems might see unsatisfactory initial improvement and leave.

As noted previously, the evidence base is strongly biased towards US research, where funding, time-limited approach to treatment, and philosophy of treatment provision are different from other countries. However, as far as it is possible to tell from a limited sample of non-US studies, US and non-US findings are broadly consistent.

As in all reviews, there is the potential problem of publication bias (the “bottom-drawer” problem), and it is also common that authors select only a subset of the original variables to report in publications (Williamson and Gamble 2005). However, as non-publication of findings is more likely when there is no effect to report, we suggest that both biases are likely to shift the evidence further in the direction of our tentative main conclusion that there is no difference between dual diagnosis and single-diagnosis clients’ retention in drug treatment.

Further limitations of this review are that research was not systematically scored according to methodological quality and that a meta-analytic approach could not be taken. Regarding the former, only few studies would have been included in a more formal systematic review with strict inclusion criteria, as the vast majority of studies used a cohort design with only limited attempts to control for intervening variables and changes over time. Meta-analysis was made impossible by the clinically and methodologically heterogeneous nature of the studies.

Finally, this review of retention outcomes of dual diagnosis clients in drug treatment does not extend to other outcomes, and we cannot say whether dually diagnosed clients benefit from treatment to the same degree as single-diagnosis clients in terms of during and post-treatment drug use and psychosocial wellbeing.

Further research directions

There is an urgent need for studies in countries other than the US, as results cannot be generalised to countries with different treatment systems with any confidence. Clearly, larger-scale studies are needed that include all diagnostic groups and different treatment settings and use a sufficiently rigorous

methodology. There are several recommendations for the design of such studies, which would serve to surmount some of the difficulties encountered when assessing the evidence for this review. 1) Studies need to assess, report and, where appropriate, statistically control for intervening variables including at the very least symptom improvements, changes in substance use, and treatment delivery variables including any mental health treatment received by the clients. 2) Studies should use multiple well-validated assessments of mental health, which include both diagnostic categories and severity assessments. Assessments should be scheduled to start at treatment intake and continue at regular intervals so that the co-variation of psychological symptoms with changes in substance use can be better understood. 3) Some studies should specifically include those with multiple co-morbidities, as currently little is known about possible cumulative effects of mental health problems. 4) Studies need to define clearly the indicators of retention, ideally including the length of stay in days as well as completion status. Regarding the latter, special attention should also be paid to the distinction between voluntary dropout and being asked to leave by the service, something that has been largely ignored in the past but that could potentially be relevant in the context of co-morbidity.

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Tables

Table 1. List of search terms

1. Retention in treatment search string:

(Retention or completion or attrition or dropout or premature discharge or days in treatment or weeks in treatment or months in treatment or length of stay) and (treatment or programme or program or intervention or rehabilitation)

2. Dual diagnosis strings

mental (health or disorder or illness) and substance (user or misuse or abuse or dependency or dependence or dependent or addicted or addiction)

mental (health or disorder or illness) and drug (user or misuse or abuse or dependency or dependence or dependent or addicted or addiction)

mental (health or disorder or illness) and (heroin or methadone or opiate or opioid or cocaine or crack or stimulant or alcohol) and (user or misuse or abuse or dependency or dependence or dependent or addicted or addiction)

(dual diagnosis or dually diagnosed or co-morbidity or comorbidity or co-morbid or comorbid)

Table 2. Relationship between psychiatric problems and retention in drug treatment: Axis-I disorders

Authors	Effect	Retention rate	Mental Health measure	Retention Measure	Diagnostic groups/ Prevalence of DD in sample	Sample ^a	Type of service	Tx duration
Axis-I disorders (non-psychotic)								
Alterman et al 1996	No effect of DEPR	Control: 83%; DEPR only: 75%; APD only and APD+DEPR: 71%	SCID, PDE	Completion of 7 mo, days in treatment	APD (13%), Depr (33%), Depr & APD (19%), Drugs only (35%)	184 male opiate users, SMI excluded, Axis-I excl if not also Depr	MM + infrequent counselling	>6mo
Araujo et al 1996	No effect of DEPR or ANX	65.5% overall	HAM-D, HAM-A	Completion of detox (5-10 days)	n/a	148 heroin and cocaine users	i/p detox	<2 wks
Avants et al 1999	No effect for DEPR	81% complete 12-wk programme	SCID	Length of stay	22% current APD, 25% major DEPR	291 opiate users	O/p enhanced MM	3mo
Avants et al 2000	No effect of DEPR	12-wk retention: 73% (DEPR), 78% (non-DEPR)	SCID, BDI	Length of stay	Depression (49% above BDI cut-off)	307 opiate users	O/p enhanced MM	3mo
Broome et al 1999	Interaction with modality: RR: Current DEPR predicts completion. No effect for ANX. MM and ODF: no effects	n/a	SCL-90 DEPR, DIS ANX & DEPR	Completion of 90 days (o/p, RR) or 360 days (MM)	n/a	2,362 in LTR, 1,896 in ODF, 1,011 in MM	RR, o/p MM, ODF, some with psychol services	>6mo
Charney et al 1998	No effect of DEPR	66% at 3 mo	HAM-D, GAF, BDI	Completion of 3 mo	36% DEPR (19% ANX, 35% PDs, 5% psychosis)	75 substance users	ODF	>6mo
Curran et al 2002	Severe DEPR associated with early dropout but not late dropout. No effect for mild DEPR	80% completion (of dropout 64% was classified as early)	DEPR-Arkansas (D-ARK), BDI, own PTSD screening	Early (<5 sessions) and late dropout	67% major DEPR disorder, 81% PTSD	126 male substance users	Intensive ODF	<1mo
Gerra et al 2006	Better retention for DEPR clients than other diagnoses or drug use only. Worse retention of ANX clients compared to drugs only (Depr > Drugs only > ANX > PD > SC)	Total sample: 6 mo: 54%, 12 mo: 44%– 12-mo retention: drugs only 45%, DEPR 72%, ANX 39%, PD 18%, SC 8%	SCID and Structured Interview for DSM-IV for Axis II	Completion of 12 mo	30% DEPR, 11% ANX, 6% SC, 22% BPD/APD, 32% drugs only	206 opiate users	Buprenorphine maintenance	>6mo

Table 2. Relationship between psychiatric problems and retention in drug treatment: Axis-I disorders (cont.)

Authors	Effect	Retention rate	Mental Health measure	Retention Measure	Diagnostic groups/ Prevalence of DD in sample	Sample ^a	Intervention	Tx duration
Gonzalez et al 2003	No effect of DEPR		Lifetime DEPR: HAM-D, CESDI, SCID	Retention	36% with major DEPR, 64% no DD	149 cocaine & opiate users, SMI excl	Several o/p	3mo
Hiller et al 1999	No effect of DEPR or ANX in multivariate model. (Univariate: completers had lower DEPR and ANX)	77% completion	Psychiatric & treatment history, TCU DEPR and ANX scale	Completion	n/a	339 drug users	Prison and transition after prison - TC-based units	>6mo
Joe, Simpson & Broome 1999	RR only: DEPR modestly related to better retention. No effect in other modalities	64% RR, 55% ODF, 54% MM	DIS, CIDI, SCL-90	Completion of 90 days (RR and ODC), 360 days MM		3,209 drug users retained > 1 mo	RR, MM o/p, ODF o/p	>6mo
King et al 1999	No effect for ADHD diagnosis	12mo retention rate: 76%, 18% of ADHD, 25% of non-ADHD	SCID, ADHD interview, CPT (also ADHD)	Length of stay	ADHD vs no ADHD	125 opiate users	MM plus counselling (weekly or more)	>6mo
Kleinman et al 1992	DEPR related to dropout.	70% stay > 2 sessions, 30% stay > 8 sessions	SCL-90, BDI	Number of sessions attended		86 cocaine/crack users	ODF	3-6mo
Knight et al 2001	No effect of DEPR or ANX	44% completion	TCU DEPR and ANX scales	Completion	18% high DEPR scores, 40% high ANX scores	87 women	6-12-mo RR for women with children	>6mo
Kokkevi et al 1998	DEPR related to dropout, ANX to retention.	Retention at 4-6 weeks: 80%	SCID-R, CIDI	Completion	60% any PD (34% APD, 28% BPD), Axis-I only 20%, Axis-I & II 40% Axis II only 20%, Drugs only 21%	226 drug users, SMI excl	ODF and i/p drug-free	3-6mo
Lang & Belenko 2000	No effect of DEPR. ANX related to dropout	61% completion	TCU DEPR and ANX scales	Completion		150 drug users, offenders, SMI excl	Long-term RR (TC) - instead of prison	>6mo
Martinez-Raga 2002	DEPR related to completion. No effect for ANX or PTSD	67% planned discharge	Diagnoses through psychiatrists	Unplanned discharge	36% DEPR, 23% ANX, 8% PTSD, 17% BPD, 20% APD	482 alcohol users	alcohol detox & relapse prevention	1mo

Table 2. Relationship between psychiatric problems and retention in drug treatment: Axis-I disorders (cont.)

Authors	Effect	Retention rate	Mental Health measure	Retention Measure	Diagnostic groups/ Prevalence of DD in sample	Sample ^a	Intervention	Tx duration
Meier et al 2006	No effect of DEPR or ANX	54% stay 3+ mo	TCU DEPR and ANX scales	Completion of 3 mo	73% DEPR, 44% past suicide attempts	187 drug users	RR	3-6mo
Petry & Bickel 1999	No effect of DEPR	56% stay 4+ mo	ASI, BDI	Completion of 4 mo		114 opiate users, untreated SMI excl	Buprenorphine & counselling, o/p	3-6mo
Ravndal & Vaglum 1994	No effect of DEPR	12mo retention: 30% (30% DEPR, 29% non-DEPR)	MCMII Dysthymia, SCL-90	Completion of 12mo	69% DEPR	144 users	RR (TC) followed by o/p aftercare	>6mo
Ryan et al 1995	No effect of DEPR	42% complete 8 weeks	BDI, ASI, clinician rating	Completion of 8 weeks	n/a	98 alcohol users	O/p alcohol	1-3mo
Sayre et al 2002	No effect of DEPR	35% complete 20 sessions	BDI, ASI	Completion of 20 sessions, early vs late attrition		165 cocaine users, heroin excl, current Axis-I excl	o/p cocaine	3mo
Siqueland et al 1998	No effect of DEPR	51% completion	BSIGSI, BDI, HAM-D, SCID	Length of stay (to 6 month)	Axis-I (25%), PD (48% with 19% APD)	286 cocaine users (only considering those randomised to treatment), SMI excl	ODF: DYN, CBT, IDC	6mo
Schizophrenia								
Gerra et al 2006	Retention rates were lowest for clients with SC compared to clients with DEPR, ANX, PD or drug use only	Total sample: 6 mo: 54%, 12 mo: 44%– 12-mo retention: DEPR 72%, drugs only 45%, ANX 39%, PD 18%, SC 8%	SCID and Structured Interview for DSM-IV for Axis II	Completion of 12 mo	30% DEPR, 11% ANX, 6% SC, 22% BPD/APD, 32% drugs only	206 opiate users	Buprenorphine maintenance	>6mo

Table 2. Relationship between psychiatric problems and retention in drug treatment: Axis-I disorders (cont.)

Authors	Effect	Retention rate	Mental Health measure	Retention Measure	Diagnostic groups/ Prevalence of DD in sample	Sample ^a	Intervention	Tx duration
Axis-I disorders (all)								
Cacciola et al 2001	No effect for Axis I diagnoses	Retention rates: Axis I & II: 65%, Axis II: 67%, drugs only: 82%, Axis I: 83%	SCID, SIDP-R	Dropout before month 7	Drugs only, Axis I, Axis II, Axis I & II	278 opiate users, only 45 women, SMI excl	MM	>6mo
Moos & King 1997	Axis-I diagnosis related to dropout	55% completion	BSI	Completion	33% Axis-I diagnosis	2794 substance users (99% male)	RR	1-3mo
Nuttbrock et al 1998	No effect for Axis-I diagnosis	2mo retention: 79%, 6mo retention 48%, 12mo retention 30%	CES-D, BPRS, GAF	Completion of 6 mo and 12 mo	49% psychosis, 22% DEPR	290 DD clients	RR: TC (n=169) and community residence (n=121)	>6mo
Saxon & Calsyn 1995	Axis-I disorder related to better retention.	6-mo completion 70% of Axis-I clients, 59% drugs only clients	Psychiatrist diagnosis	Length of stay	Axis- I (46.4%) vs drugs only (53.6%)	222 drug users	O/p (3 groups: MM/Naltrexone/ODF), DD routine psychiatric care	>6mo
Siqueland et al 1998	No effect for Axis-I diagnosis (marginally longer retention; p<.09).	51% completion	BSIGSI, BDI, HAM-D, SCID	Length of treatment (to 6 month)	Axis-I (25%), PD (48% with 19% APD)	286 cocaine users (only considering clients randomised to treatment), SMI excl	ODF: DYN, CBT, IDC	6mo

Key: **Treatment forms:** o/p=outpatient, i/p=inpatient, RR=residential rehabilitation, DC=day care, TC=therapeutic community, MM=methadone maintenance, ODF- outpatient drug-free treatment; IDC=drug counselling, DYN=dynamic psychotherapy, CBT= cognitive/cognitive behaviour therapy, o/c=outcome, MH Mental Health, DD=Dual Diagnosis, Intensive = 3+ visits per week in o/p treatment. Enhanced = offering components in addition to MM or Counselling, **Mental Health:** DEPR = depression, ANX=anxiety, PD= Personality Disorder, APD = Antisocial Personality Disorder, BPD = Borderline Personality Disorder, PTSD = post traumatic stress disorder, SC=Schizophrenia, SMI – severe mental illness

^a where exclusion of SMI clients was not mentioned by authors, it was assumed that SMI clients are included.

^b Study focus denotes whether the investigators had specifically designed their study to inform on the link between psychiatric problems and retention

Table 3. Relationship between psychiatric problems and retention in drug treatment: Axis-II disorders

Authors	Effect	Retention rate	Mental Health measure	Retention Measure	Diagnostic groups/ Prevalence of DD in sample	Sample ^a	Intervention	Tx duration
AXIS-II/Personality disorders								
Alterman et al 1996	No effect for APD	7-mo retention: drugs only: 83%; DEPR only: 75%; APD only and APD+DEPR: 71%	SCID, PDE	Completion of 7 mo, days in treatment	APD (13%), Depr (33%), Depr & APD (19%), Drugs only (35%)	184 opiate users, SMI excl	MM + counselling (weekly or less)	>6mo
Avants et al 1999	APD related to dropout.	81% complete 12-wk programme	SCID	Length of stay	22% current APD, 25% major DEPR	291 opiate users	O/p enhanced MM	3mo
Cacciola et al 2001	PDs related to dropout (whether or not with Axis I disorder).	Retention rates: Axis I & II: 65%, Axis II: 67%, drugs only: 82%, Axis I: 83%	SCID, SIDP-R	Dropout before month 7	Drugs only, Axis I, Axis II, Axis I & II	278 opiate users, MSI excluded	O/p MM	>6mo
Darke et al 2005	No effect for BPD.	12-mo retention BPD 42%, non BPD 39% (ns), days in tx: BPD 164, non-BPD 182 (ns), no difference by modality	CIDI BPD	Completion, Days in treatment	45% BPD (by modality: MM 34%, detox 46%, RR 60%, No tx 43%:)	485 substance users	MM, detox, RR	>6mo
Gerra et al 2006	PDs related to dropout: Clients with PD worse retention than clients with drug use only or DEPR or ANX, but higher than for clients with SC.	Total sample: 6 mo: 54%, 12 mo: 44%— 12-mo retention: drugs only 45%, DEPR 72%, ANX 39%, PD 18%, SC 8%	SCID and Structured Interview for DSM-IV for Axis II	Completion of 12 mo	30% DEPR, 11% ANX, 6% SC, 22% BPD/APD, 32% drugs only	206 opiate users (68% with co-morbidity)	Buprenorphine maintenance	>6mo
Gill et al 1992	No effect for APD.	12-mo retention: 20%	DIS-III	Days in treatment	42% APD, 58% drugs only	55 opiate users	MM	>6mo
Goldstein et al 1999	APD clients higher dropout rate only in 6mo, not in 3mo treatment (marginal)	Not given	DIS-III-R	Length of stay	APD diagnosis vs antisocial behaviour without diagnosis	257 drug users, SMI excl	RR	Trial: 3mo vs 6mo trial

Table 3. Relationship between psychiatric problems and retention in drug treatment: Axis-II disorders (cont.)

Authors	Effect	Retention rate	Mental Health measure	Retention Measure	Diagnostic groups/ Prevalence of DD in sample	Sample ^a	Intervention	Tx duration
Haller et al 1997	APD related to retention.	39% complete 20-wk programme	SCID, SIDP-R	Days in treatment & completion	APD (31%)	65 perinatal female drug/alc users	3-day/wk day care, Psychotherapy	3-6mo
King et al 2001	No effect for APD	12mo retention: Drugs only: 40%, APD only 38%, other psychiatric only 40%, APD + other 47%	SCID, ADHD interview based on DSM-IV	Length of stay	APD only (14%), APD & other psychiatric (10%), other psychiatric only (25%), drugs only (51%)	513 opiate users	MM plus counselling (weekly or more)	>6mo
Kokkevi et al 1998	No effect for any PDs	Retention at 4-6 weeks: 80%	SCID-R, CIDI	Completion	60% any PD (34% APD, 28% BPD) Axis-I only 20% Axis-I & II 40% Axis II only 20% Drugs only 21%	226 drug users, SMI excl	O/p and i/p	3-6mo
Marlowe et al 1997	No effect for number of PD-related symptoms nor diagnoses	n/a	SCID-II, BDI, BAI	Length of stay	75% any PD (26% APD, 20% BPD, 17% narcissistic, 22% paranoid)	137 cocaine users	ODF CBT-based individual and/or group therapy with contingency management	1-3mo
Martinez-Raga 2002	APD and BPD associated with dropout	67% planned discharge	Diagnoses through psychiatrists	Unplanned discharge	36% DEPR, 23% ANX, 8% PTSD, 17% BPD, 20% APD	482 alcohol users	Alcohol detox & relapse prevention	1mo
Siqueland et al 1998	APD related to dropout (p<.06), no effect for other PDs	51% completion	BSIGSI, BDI, HAM-D, SCID	Length of treatment (to 6 month)	Axis-I (25%), PD (48% with 19% APD)	286 cocaine users (only those randomised to treatment), SMI excl	ODF: DYN, CBT, IDC	6mo

Key: **Treatment types:** o/p=outpatient, i/p=inpatient, RR=residential rehabilitation, DC=day care, TC=therapeutic community, MM=methadone maintenance, ODF- outpatient drug-free treatment; IDC=drug counselling, DYN=dynamic psychotherapy, CBT= cognitive/cognitive behaviour therapy, o/c=outcome, MH Mental Health, DD=Dual Diagnosis, Intensive = 3+ visits per week in o/p treatment. Enhanced = offering components in addition to MM or Counselling. **Mental Health:** DEPR = depression, ANX=anxiety, PD= Personality Disorder, APD = Antisocial Personality Disorder, BPD = Borderline Personality Disorder, PTSD = post traumatic stress disorder, SC=Schizophrenia, SMI – severe mental illness

^a where exclusion of SMI clients was not mentioned by authors, it was assumed that SMI clients are included.

^b Study focus denotes whether the investigators had specifically designed their study to inform on the link between psychiatric problems and retention

Table 4. Relationship between psychiatric problems and retention: The role of psychiatric treatment history and global severity scales

Authors	Effect	Retention rate	Mental Health measure	Retention Measure	Diagnostic groups/ Prevalence of DD in sample	Sample ^a	Intervention	Tx duration
Psychiatric severity scales								
Carroll et al 1993	High ASI-P score related to dropout	n/a	ASI Psych, Schedule for Affective Disorders and Schizophrenia	Length of stay	53% had current diagnosis, 46% affective, 14% ANX	298 cocaine users, heroin users excl	O/p drug free and i/p	3-6mo
Epstein et al 1994	No effect for SCL-90 score	14% baseline, 21% dropout, 22% part completion, 43% completion	SCL-90-R	Dropout (session 0-4), part completion (5-14), completion (15+)	N/a	105 male alcohol users, SMI excl	o/p couple therapy	3-6mo
Green et al 2002	ASI-P related to dropout for men, but not women. No effect for number of MH complaints	43% completion	ASI	Completion	N/a	293 substance users	ODF	1-3mo
Haller, Miles & Dawson 2002 (?same parent study as 2004)	Severity of psychopathology related to dropout	Mild, moderate and severe psychopathology completion rates were 36%, 57%, 76%.	MCMI-III psychopathology	Completion	N/a	78 women drug users	DC	3-6mo
Haller & Miles 2004	Severity of psychopathology related to dropout	Mild, moderate and severe psychopathology completion rates were 66%, 45%, 29%.	MCMI-III psychopathology	Completion	N/a	97 women drug users	RR	3-6mo
Kissin et al 2004	ASI-P related to dropout	81% completion	ASI	Length of stay, completion	N/a	152 pregnant women	7-day residential stay	<2wks
Lang & Belenko 2000	ASI-P related to dropout	61% completion	ASI	Completion		150 drug users, offenders, SMI excl	Long-term RR (TC) - instead of prison	>6mo

Table 4. Relationship between psychiatric problems and retention: The role of psychiatric treatment history and global severity scales (cont.)

Authors	Effect	Retention rate	Mental Health measure	Retention Measure	Diagnostic groups/ Prevalence of DD in sample	Sample ^a	Intervention	Tx duration
McCaul et al 2001	No effect for ASI-P score	% not given, LOS means between 105 and 163 days depending on drug group	ASI	Length of stay	N/a	268 alcohol, drug and drug & alcohol users	Intensive ODF	>6mo
Mertens & Weisner 2000	ASI-P related to shorter stay for women, not men (weak effect). No difference in completion rate.	55% stay >1mo, 25% >2mo	ASI	Length of stay, completion	N/a	317 women and 599 men	Several alcohol and drug o/p	1-3mo
Petry & Bickel 1999	ASI-P related to dropout (moderated by alliance)	56% stay 4mo	ASI, BDI	Completion of 4 mo in treatment	N/a	114 opiate users, untreated SMI excl	Buprenorphine & counselling, o/p	3-6mo
Ryan et al 1995	No effect for ASI-P score	42% complete 8 weeks	BDI, ASI, clinician rating	Completion of 8 weeks	N/a	98 alcohol users	O/p alcohol treatment	1-3mo
Saxon et al 1996	No effect for ASI-P score	18-mo retention: 22%	ASI	Completion	N/a	353 opiate users	MM	>6mo
Sayre et al 2002	No effect for ASI-P score	35% complete	BDI, ASI	Completion of 20 sessions, early vs late attrition	N/a	165 cocaine users, current Axis-I excl	o/p cocaine	3mo
Siqueland et al 2002	Psych problems related to shorter stay for women, longer stay for men	31% complete 6 mo	Composite score made up of BSGSI, HAM-D, BDI, SCID	Length of stay	14% full APD, 32% APD without childhood onset, 28% cocaine-induced mood disorder, 5% cocaine-induced ANX disorder	487 cocaine users, DD requiring medication excl	O/p DYN, CBT, IDC	6mo
Tidey et al 1998	No effect for ASI-P score	n/a	ASI	Length of stay	Severity: 23% low, 38% medium, 39% high	185 drug users	O/p counselling	6mo
Van Stelle et al 2004	Severity of psychopathy and psychiatric symptoms related to dropout.	25% completion rate	BSI, PCL-SV, DPRS, PSAS, ASI	Completion of 9-month programme	100%	179 DD men (mainly alcohol & cocaine)	DD unit, jail-based RR (TC)	>6mo
Wallace & Weeks 2004	No effect for ASI-P score	71% retention rate	ASI	Length of stay, Completion	N/a	133 mainly alcohol users	Intensive ODF	1-3mo

Table 4. Relationship between psychiatric problems and retention: The role of psychiatric treatment history and global severity scales (cont.)

Authors	Effect	Retention rate	Mental Health measure	Retention Measure	Diagnostic groups/ Prevalence of DD in sample	Sample ^a	Intervention	Tx duration
Psychiatric history/past problems								
Agosti et al 1996	No effect of past DEPR	4-wk retention: 31%	(clinic's own) Life History Questionnaire	Completion of 1 mo	History of treatment for Depr	198 cocaine users	ODF	1-3mo
Brady et al 2004	No effect for past MH treatment, but clients with MH history were 3x as likely to be asked to leave	Variation by programme from 10% to 68% completion	Self-report history of mental health treatment	Completion vs dropout vs asked to leave vs leave prison before completion	9.1% MH treatment history	690 prisoners	5 prison programmes : 3 TCs, 2 eclectic with 12-step component, 1 education, standard MH services	1-3 and 3-6mo
Broome et al 1999	Interaction with modality: RR/ODF: no effect. MM: lifetime ANX/DEPR diagnosis predicts dropout.	n/a	SCL-90 DEPR, DIS ANX & DEPR	Completion of 90 days (o/p, RR) or 360 days (MM)		2,362 in LTR, 1,896 in ODF, 1,011 in MM	RR, o/p MM, ODF, some with psychol services	>6mo
Claus & Kindleberger 2002	No effect for past MH treatment	60% retained for >2 sessions	Previous MH treatment, DD according to ISAP (Hile et al 1998)	Dropout after 1-2 sessions vs stay for 3+ sessions		260 drug, alcohol and both drug and alcohol	Centralised assessment and referral to RR or ODF	1-3mo
Hiller et al 1999	No effect for past MH treatment	77% completion	Treatment 7 MH history, TCU DEPR, ANX scale	Completion	n/a	339 drug users	Prison - TC-based unit	>6mo
Lang & Belenko 2000	History of MH treatment related to dropout	61% completion	Previous MH treatment	Completion		150 drug users, offenders, SMI excl	Long-term RR (TC) - instead of prison	>6mo
Laudet et al 2003	More prior MH treatment related to completion. Current psychiatric medication related to dropout.	12-month retention 71%	Previous MH treatment, Colorado Symptoms Index	Completion of 1 yr	For completers/non-completers: SC (39%/27%), Depr (22%/28%), Bipolar (24%/24%). MH treatment (92%/83%), on MH medication (91%/98%)	276 drug users, retained for 1+ month	12-step groups, DD-provision	>6mo

Table 4. Relationship between psychiatric problems and retention: The role of psychiatric treatment history and global severity scales (cont.)

Authors	Effect	Retention rate	Mental Health measure	Retention Measure	Diagnostic groups/ Prevalence of DD in sample	Sample ^a	Intervention	Tx duration
Other psychiatric indicators								
Claus & Kindleberger 2002	No difference in very early dropout according DD	60% retained for >2 sessions	DD according to ISAP (Hile et al 1998)	Dropout after 1-2 vs stay for 3+ sessions	N/a	260 drug, alcohol and both drug and alcohol	Centralised assessment & referral to RR or ODF	1-3mo
King et al 2001	No effect for psychiatric diagnoses other than APD	12mo retention rate: Drugs only: 40%, APD only 38%, other psychiatric only 40%, APD + other 47%	SCID, ADHD interview based on DSM-IV	Length of stay	APD only (14%), APD & other psychiatric (10%), other psychiatric only (25%), drugs only (51%)	513 opiate users	MM plus counselling (weekly or more)	>6 mo
Magura et al 1998	No effect of presence of any MH problems	3yr retention 38%	Client notes – MH problem yes/no	Length of stay	25% had MH problems	1026 opiate users	MM	>6mo
Pani et al 1997	No effect of presence of DD	56% for DD, 63.3% for non-DD at 1 yr (ns)	Psychiatrist's diagnosis	Length of stay for 2 yrs	19% (severe) DD	124 drug users (subsample with retention data)	MM	>6mo
Dual Diagnosis Specialist Units								
Ball et al 2005	PDs severity related to dropout in trial treatment only.	40% stay >1mo	SCID, PDQ-4R, ASI, BSI	Length of stay	100% PD (no subgroups)	52 homeless substance abusers, acute SMI excl	DD specialist: RCT of new counselling method for PD	6mo
Galanter et al 1996	No effect of DEPR. No effect for SC	N/a	Psychiatrist evaluation, ASI, prior hospitalisation	Months in treatment	24% SC, 17% major DEPR, 59% all other (incl drugs only and Axis-II)	298 cocaine users	Drug-free day care, psychiatric management	>6mo
Greenberg et al 1994	APD strongly related to dropout, no effect for other PD. No effect of Axis I diagnosis (among clients with PD)	62% completion	Psychiatrist discharge form	Completion of 6 week programme	100% DD. PD with or without Axis-I (44.6%), or Axis-I only (55.4%)	316 DD clients (mainly alcohol and cocaine)	DD specialist i/p unit	<3mo
Maremani et al	No effect for Axis-I diagnosis	DD: 87% stay > 3 mo, 50% > 1yr,	Psychiatrist diagnoses	Completion of 90 days	Axis I- DD vs no DD	90 opiate users	DD specialist	>6mo

2000		no-DD 85% stay >3 mo, 42% > 1yr	(Axis-I only)				O/p MM	
Mierlak et al 1998	More MH inpatient admissions related to dropout	6mo retention 34%	MH treatment history	Completion of 6 mo	100% Axis-I (66% psychosis, 33 affective)	189 DD homeless men with SMI	Modified TC (RR) for DD	6mo
Ross et al 1997	No effect for SCL-90 score	72% completion	SCL-90-R	Completion	N/a	282 drug users, SMI referred on	Specialist DD, Several o/p (2 week DC or 8 sessions 1-2-1 counselling)	<1mo

Key: **Treatment forms:** o/p=outpatient, i/p=inpatient, RR=residential rehabilitation, DC=day care, TC=therapeutic community, MM=methadone maintenance, ODF- outpatient drug-free treatment; IDC=drug counselling, DYN=dynamic psychotherapy, CBT= cognitive/cognitive behaviour therapy, o/c=outcome, MH Mental Health, DD=Dual Diagnosis, Intensive = 3+ visits per week in o/p treatment. Enhanced = offering components in addition to MM or Counselling, **Mental Health:** DEPR = depression, ANX=anxiety, PD= Personality Disorder, APD = Antisocial Personality Disorder, BPD = Borderline Personality Disorder, PTSD = post traumatic stress disorder, SC=Schizophrenia, SMI – severe mental illness

^a where exclusion of SMI clients was not mentioned by authors, it was assumed that SMI clients are included.

^b Study focus denotes whether the investigators had specifically designed their study to inform on the link between psychiatric problems and retention