Authors' objectives
To integrate the findings from diverse studies on the effectiveness of contingency management (CM) interventions in outpatient methadone treatment settings.

Searching
MEDLINE, PsycLIT, PsycINFO, the Science Citation Index and the Social Sciences Citation Index were searched. In addition, references in reviewed and non-reviewed articles and book chapters were examined, pertinent journals were handsearched, and researchers in the field were consulted.

Study selection
Study designs of evaluations included in the review
All studies of CM interventions that included a control group, or that reported pre- and post-intervention data, were eligible for inclusion in the review. It was unclear from the review if all studies included a control group: of the 30 studies included, 17 were classed as random assignment and 13 as non-random. None were classified as 'uncontrolled', although it was possible that uncontrolled studies may, by default, have been grouped together with non-randomised-controlled studies.

Specific interventions included in the review
The use of a CM intervention, defined as providing a system of incentives and disincentives designed to make supplemental drug use less attractive, and abstinence more attractive. The CM interventions included in the review had to contain a reinforcement or punishment contingent on urinalysis results. The actual CM interventions included in the review were: increase or decrease in methadone dose; increase in methadone; decrease in methadone; take-home methadone; vouchers; mixed. The target behaviour could be the use of one or more drugs. It was unclear what comparators were included in the review.

Participants included in the review
Studies of patients receiving methadone therapy in an out-patient setting were considered for inclusion in the review.

Outcomes assessed in the review
The result of urinalysis was the primary outcome measure considered in the review. Studies that failed to report urinalysis data were excluded.

How were decisions on the relevance of primary studies made?
The authors do not state how the papers were selected for the review, or how many of the reviewers performed the selection.

Assessment of study quality
The authors do not report a method for assessing validity. The authors do not state how the papers were assessed for validity, or how many of the reviewers performed the assessment.

Data extraction
The individual studies were coded on the following variables or category of variables: year of publication; source of publication; if study was grant-funded; the number of patients; the average age of the sample; the type of reinforcer used; the duration of the CM intervention; the time to reinforcement delivery; the targeted CM drug; the type of incentive; the number of urine specimens; methadone dosage; and whether patients were assigned to the treatment group on a random or non-random basis.
Two reviewers independently coded all the studies. In cases where there was a discrepancy, a third reviewer was used to reach a decision.

**Methods of synthesis**

*How were the studies combined?*

The studies were combined by a meta-analysis using a fixed-effect model, where the correlation coefficient (r) was used to represent the effect size. The statistics reported in the individual studies were used to derive r-values, as described by Rosenthal (see Other Publications of Related Interest no.1) and Mullen and Rosenthal (see Other Publications of Related Interest no.2). The r-values were transformed to Fischer's Zr-values, in order to normalise the distribution, then weighted by sample size (see Other Publications of Related Interest no.3). The weighted and unweighted mean effect sizes were computed. The reliability of the mean effect sizes was established using Stouffer's Z (see Other Publications of Related Interest nos.1 and 4). The effect of the moderator variables was examined by regressing moderator variables on the effect size, to yield an estimate of the between-group variance.

*How were differences between studies investigated?*

The Qw statistic (see Other Publications of Related Interest no.5) was used to provide an index of within-group variance or homogeneity.

**Results of the review**

A total of 30 studies (n=1,568) were included in the review. Based on the type of reinforcer, there were: 4 studies of methadone increase or decrease; 1 of methadone increase; 2 of methadone decrease; 6 of take-home methadone; 6 of vouchers; and 10 of mixed interventions. The target behaviour was single-drug use in 9 studies and multi-drug use in 21 studies.

The overall estimated effect size (30 studies) suggested that the CM interventions resulted in better outcomes, as indicated by the significant weighted effect size (r) of 0.25 (95% confidence interval, CI: 0.20, 0.30). This was significantly greater than that expected by chance (Z=9.87, p<0.0001), and thus the assumption of homogeneity of effect sizes was rejected (Qw=116.95, d.f.=29, p<0.0001). Thus the hypothesis of an overall CM effect across the literature was supported, although its magnitude varied considerably. The removal of the three outliers achieved homogeneity (mean weighted Zr=0.20, 95% CI: 0.15, 0.25).

A file-drawer analysis was performed using the fail-safe N method of Rosenthal (see Other Publications of Related Interest no.6). This estimated that 731 studies showing no effect of CM would be required in order to reverse the statistically-significant effect of CM intervention in reducing positive urinalysis. The effects of the moderators were discussed in detail in the review. There were eight moderators examined, of which five were found to have a significant effect: type of reinforcer, time to reinforcement delivery, targeted CM drug, number of urine specimens collected per week, and type of patient assignment.

**Authors' conclusions**

The overall results confirmed that CM was effective in reducing supplemental drug use while patients participated in methadone treatment. Secondly, several parameters were shown to be effective in promoting drug-free urine samples while patients were in treatment. These included the following: the use of increases in methadone dose or take-home methadone as incentives; the use of immediate reinforcement; targeting a single drug; and monitoring urine three-times a week.

**CRD commentary**

This review addressed an appropriate question and specified well-defined inclusion criteria, with the exception of study design; from the details provided in the report it was difficult to be sure if uncontrolled studies were included or not.

The literature search appeared to be comprehensive and an assessment of the impact of publication bias was
performed. No language restrictions were reported in the review, but it was not possible to ascertain whether non-English language publications were included.

The methods used for data extraction were reported, whereas the number of reviewers who performed the initial study selection were not. The authors did not undertake any validity assessment of the primary studies, nor did they report their design. Furthermore, some of the studies included had very small sample sizes. Thus the meta-analysis may have included some studies of very poor quality, and if so, this may be a source of weakness in the findings of the review. The methods for pooling the studies were reported in detail and appeared to be appropriate.

The authors’ conclusions regarding the reliability of the overall result appeared over-confident, given the highly-significant heterogeneity identified.

**Implications of the review for practice and research**

Practice: The authors state that the reinforcement should be immediate, targeted towards changing a single behaviour and closely monitored, in order to change the behaviour of the patients.

Research: The authors state that more studies are needed to investigate other important issues in CM; in particular, the stage of treatment when CM is most effective, which patients are most responsive to CM, and information on follow-up outcomes.

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**Other publications of related interest**


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This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.