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Contingency management: New directions and remaining challenges for an evidence-based intervention

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Abstract

This article introduces the special issue on contingency management (CM), an efficacious intervention for the treatment of substance use disorders with low uptake in clinical settings that is not commensurate with evidence for efficacy. In this special issue of the *Journal of Substance Abuse Treatment*, we present 16 articles representing the latest research in efficacy, implementation, and technological advances related to CM. Combined, this collection of articles highlights the diverse populations, settings, and applications of CM in the treatment of substance use disorders. We conclude by highlighting directions for future research, particularly those that may increase CM's appeal and uptake in routine clinical care.

Keywords

motivational incentives; reinforcement; reinforcers; substance abuse treatment

1. Introduction

1.1 Background and Efficacy

Contingency management (CM) is a behavioral intervention that has been especially useful and effective in the treatment of substance use disorders (SUD). CM is based on behavioral theory and involves the provision of tangible incentives when clients demonstrate target behaviors (Stitzer & Petry, 2006). Target behaviors have most often been drug abstinence or attendance to treatment sessions. CM's application to SUD treatment was spurred in part by efforts to find an effective treatment for cocaine use during the crack epidemic (Higgins,

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Budney, & Bickel, 1994). Thus, cocaine has been frequently targeted, although CM is efficacious across most substances, including other stimulants, opioids, marijuana, nicotine, and alcohol (Lussier, Heil, Mongeon, Badger, & Higgins, 2006). CM has also been extended to other health behaviors among individuals with SUD, such as medication adherence and increasing physical activity (Sorensen et al., 2007; Weinstock, Barry, & Petry, 2008). This introduction to the CM special issue in the *Journal of Substance Abuse Treatment* briefly summarizes the breadth of this intervention's efficacy, articles included in this special issue, and highlights directions for future research.

1.2 CM delivery methods

Two reinforcement methods are most commonly used: prize-based and voucher-based CM. These approaches generate moderate effect sizes in regards to treatment outcome (i.e., *d*s = 0.40–0.68; Benishek et al., 2014; Dutra et al., 2008; Griffith, Rowan-Szal, Roark, & Simpson, 2000; Lussier et al., 2006; Prendergast, Podus, Finney, Greenwell, & Roll, 2006) with no differences in outcome noted in head-to-head comparison of these two monetary reinforcement methods (Petry, Alessi, Hanson, & Sierra, 2007; Petry, Alessi, Marx, Austin, & Tardif, 2005). Voucher methods offer a set reinforcement amount when patients meet target behaviors (e.g., $2 per cocaine-negative sample) and typically escalate with consecutive performance of the behavior (e.g., $2 for first negative sample, $2.50 for second consecutive negative sample, $3.00 for third, and so on). Earnings are exchanged for goods or services selected by the patient, allowing for a high level of individual preference. A recent study indicates that patients, particularly women, may prefer voucher systems over prize-based approaches in part for their predictability (Hartzler & Garrett, 2016). However, voucher methods as typically implemented have been costly, with maximum possible earnings per client of about $1000 over 12 weeks in many studies (Festinger, Dugosh, Kirby, & Seymour, 2014; Higgins, Wong, Badger, Ogden, & Dantona, 2000; Higgins et al., 2003); such costs may pose a significant barrier to clinical implementation.

Prize-based CM, also called fishbowl CM, attempts to lower the costs of the incentives through the introduction of probabilistic earnings and variability in prize magnitude. Patients demonstrating the identified target behavior earn draws from a fishbowl in a systematic manner, either in a set number (e.g., 1 draw for each cocaine negative sample) or with an escalating schedule as has been used in voucher programs (e.g., 1 draw for the first negative sample, 2 draws for the second consecutive negative sample, 3 draws for the third and so on). Probability is introduced via an intermittent reinforcement schedule in which some draws are winning ("small prize") and others have no prize value ("good job"). A typical fishbowl is comprised of 500 slips, about half of which are winning. Prize earnings indicated on winning slips vary in magnitude from $1 to $100, with the majority of winning slips comprised of the smallest magnitude ($1). A smaller number provide large magnitude (e.g., $20) prizes, and one slip in the bowl is the maximum prize ($100). Winning draws are exchanged for gift certificates or prizes selected from the on-site cabinet offering a wide range of goods to accommodate individual preference. Average maximum possible earnings per client have typically ranged from $250–450 over 12 weeks (e.g., Peirce et al., 2006; Petry, Barry, Alessi, Rounsaville, & Carroll, 2012; Petry, Peirce, et al., 2005), a significant

reduction in total possible earnings in comparison to typical voucher programs. However, even these lower costs can be initially prohibitive for clinics.

Other non-monetary CM methods are empirically supported as well (e.g., Gruber, Chutuape, & Stitzer, 2000; Jones, Wong, Tuten, & Stitzer, 2005; Tuten, DeFulio, Jones, & Stitzer, 2012). These CM interventions provide reinforcement via access to free lunch, program-sponsored recreational activities within the community, vocational training, and group therapy. An example of this type of CM program is included in this special issue (Tuten, Shadur, Stitzer, & Jones, 2017).

1.3 Sustainability of effects

While there is considerable evidence supporting CM's efficacy during the time that an active intervention is in place, CM's effects have been criticized for deteriorating or disappearing once the intervention is removed. In fact, most addiction treatments, whether pharmacological or psychological in nature, suffer from high rates of relapse (Miller, Walters, & Bennett, 2001; Moos & Moos, 2006). In many studies, CM shows similar rates of relapse to various other SUD therapies. Some studies, however, do find persistent effects of CM post intervention (e.g., Alessi, Hanson, Wieners, & Petry, 2007; Dougherty et al., 2015; Higgins, Badger, & Budney, 2000; Higgins, Wong, et al., 2000; Petry, Martin, & Simcic, 2005; Petry & Martin, 2002). Investigation of factors that promote sustained effects will be important moving forward as will identification of behavioral, neurocognitive and environmental markers that are associated with and predictive of long-term treatment outcomes. An interesting example is found in the paper by Wardle et al. (2017) in this issue which identifies anhedonia as a potentially modifiable individual difference associated with poorer response to CM. Another perspective comes from a recent paper by McKay (2016) that discusses the potential role of competing environmental reinforcement for sustained good outcomes in substance users. Insights from future research may lead to tailored interventions designed to modify factors that underpin good long-term treatment outcomes.

2. For whom is CM effective?

Awareness of CM costs has led researchers and clinicians alike to ask for whom CM is most effective. Or, in other words, given limited resources, to whom can we direct CM interventions with the most effect?

2.1 Demographic and clinical characteristics

A number of studies have examined demographic and clinical characteristics associated with response to CM. Results suggest that CM is efficacious and generalizable to a wide range of characteristics including income (Rash, Andrade, & Petry, 2013; Rash, Olmstead, & Petry, 2009; Secades-Villa et al., 2013), race (Barry, Sullivan, & Petry, 2009), gender (Burch, Rash, & Petry, 2015; Rash & Petry, 2015), comorbid disorders (Ford, Hawke, Alessi, Ledgerwood, & Petry, 2007; García-Fernández, Secades-Villa, García-Rodríguez, Peña-Suárez, & Sánchez-Hervás, 2013; Rash, Alessi, & Petry, 2008a; Weinstock, Alessi, & Petry, 2007), co-occurring substance use (Alessi, Rash, & Petry, 2011), medical comorbidities (Burch, Morasco, & Petry, 2015; Walter & Petry, 2015), history of prior SUD treatment (Rash,

Alessi, & Petry, 2008b), and history of prostitution (Rash, Burki, Montezuma-Rusca, & Petry, 2016). In this issue, Shoptaw and colleagues (2017) have shown that abstinence-based incentives can be effective even outside the context of formal SUD treatment with MSM (men who have sex with men) methamphetamine users enrolled in an HIV risk reduction project.

2.2 Housing status

Rash and colleagues (2017) further extend investigations of efficacy within special subgroups by examining whether SUD patients who are residing in community-based homeless and recovery housing programs during treatment respond to CM. Most of these programs encourage or mandate abstinence, and access to or loss of housing may be a powerful contingency that overshadows CM interventions as delivered in the clinic setting. Indeed, abstinent-contingent housing, in tightly controlled research settings, is a powerful contingency (Milby, Schumacher, Wallace, Freedman, & Vuchinich, 2005; Tuten et al., 2012). However, the results of Rash et al. (2017) suggest that patients benefited from clinic-delivered CM regardless of community housing status, possibly because community-based housing contingencies are less carefully controlled and thus exert less influence on behavior than abstinent-contingent housing in research settings. As such, individuals in community housing programs appear to be appropriate candidates for CM programs based on this preliminary work.

Expanding on this theme, another study, also in this issue, focused on the use of recovery housing in conjunction with reinforcement-based treatment (RBT), an adaptation of CM. Tuten and colleagues (2017) examined the impact of RBT paired with recovery housing compared to RBT without recovery housing in a sample of individuals with opiate use disorder. They found that individuals who accessed recovery housing, regardless of whether it was provided as part of the intervention or obtained on their own, had better abstinence and employment outcomes than those who did not access recovery housing. In Rash et al. (2017), those accessing housing had better outcomes on just one of the three primary outcomes, whereas effects of accessing recovery housing were more robust in Tuten et al. (2017). This difference may in part be due to the mix of housing types (e.g., homeless shelters) included in Rash et al. (2017), which may vary considerably in patient clinical characteristics and recovery support. Further work in this area is needed, particularly with regard to how housing type, duration and abstinence policies might impact CM response. Nonetheless, these studies suggest pairing CM with access to community-based housing, particularly recovery housing, does not undermine the efficacy of CM and might bolster treatment outcomes.

2.3 Substance use severity

Active versus remitted substance use at treatment entry is highly predictive of treatment response overall (e.g., Campbell et al., 2014; Stitzer et al., 2007). Further, initial drug use status may interact with CM intervention efficacy. For example, Campbell et al. (2014) in a study of abstinence- and adherence-based incentives delivered to SUD treatment patients with a variety of substance use profiles, showed that those testing drug negative at outpatient treatment entry had higher overall rates of abstinence throughout treatment compared to

those testing drug positive. In that study, beneficial effects of incentives were seen only in those with active use (testing positive at treatment entry); those testing negative at entry showed little drug use throughout the trial and these good outcomes did not improve further with the CM intervention. Petry and colleagues (2012) conducted a study that specifically randomized cocaine users based upon drug use status at treatment entry. Patients testing cocaine-negative at entry had generally good during-treatment outcomes, as expected; CM improved compliance with urine testing and provided some evidence of better abstinence outcomes relative to usual care. However, among the cocaine-positive patients, CM clearly improved abstinence outcomes relative to usual care provided that the magnitude of prize-based CM was sufficiently high. These results suggest that additional or more potent CM interventions may be necessary for patients who are using at treatment entry.

In this issue, Cunningham et al. (2017) expand the Campbell et al. (2014) results by examining treatment response related to patients' substance use at treatment entry from a cost perspective. In CM interventions, costs are determined by patient outcomes; the more often patients demonstrate the target behavior, the more draws or vouchers earned. Cunningham and colleagues (2017) found that CM patients who were abstinent at treatment entry accounted for 69% of total prize expenditures despite no difference in their treatment outcome in comparison to patients receiving standard care. These findings suggest that tailoring treatment based on intake drug results may reduce overall costs, which in turn may increase CM's potential for widespread adoption. Tailoring might take the form of limiting access to CM, adjusting the focus of CM (abstinence versus attendance), discontinuing CM if there is no response (Weinstock, Rash, & Petry, 2010), or considering higher magnitude CM as in Petry et al. (2012) based on whether patients are actively using substances at treatment admission. It is important, however, to consider the possible clinical impacts of such policies should patients, for example, become aware that testing drug-positive provides access to more desirable treatment or higher magnitude incentives. In addition, while it is clear that active drug use at treatment admission is an important predictor of treatment outcome, further investigations of this indicator are needed to guide clinical decision making. Both the Stitzer et al. (2007) and the Petry et al. (2012) studies found some benefits of CM relative to standard care among the drug-negative patient subgroup. In contrast, no benefits of CM in terms of abstinence were identified among those testing drug-negative in the sample from the Cunningham et al. (2017) study. Additional work is needed to understand what benefits, if any, CM treatment may provide relative to standard care in relation to patients' drug use at treatment intake, especially for those who are already abstinent from drugs at intake.

3. Extensions to other health behaviors

There are a number of other health-related behaviors in addition to drug abstinence where CM has demonstrated efficacy. A number of the papers in this special issue highlight these areas of on-going research.

3.1 Smoking cessation

Among the earliest and most popular behavioral targets is smoking cessation (e.g., Paxton, 1980), and research on cigarette smoking has guided much of our knowledge about reinforcement schedule effects (e.g., Roll, Reilly, & Johanson, 2000; Roll, Higgins, & Badger, 1996; Roll & Higgins, 2000). CM has been applied with success to a large variety of patient populations with tobacco use, including otherwise healthy adults (e.g., Alessi, Badger, & Higgins, 2004; Dallery, Glenn, & Raiff, 2007; Lamb, Morral, Kirby, Iguchi, & Galbicka, 2004; Ledgerwood, Arfken, Petry, & Alessi, 2014), adolescents (e.g., Krishnan-Sarin et al., 2006, 2013; Reynolds et al., 2015; Reynolds, Dallery, Shroff, Patak, & Leraas, 2008), psychiatric patients (Hertzberg et al., 2013; Tidey, Rohsenow, Kaplan, Swift, & Reid, 2011), homeless persons (Businelle et al., 2014; Carpenter et al., 2015; Rash, Alessi, White, & Petry, 2014), and pregnant and postpartum women (e.g., Donatelle et al., 2004; Heil et al., 2008; Higgins et al., 2014).

Another population of interest is smokers in SUD treatment. Historically, smoking cessation for smokers engaged in SUD treatment has gone unaddressed, in part because of fears that attempts to quit smoking may undermine alcohol and illicit drug recovery efforts (Richter, 2006) and because of staff ambivalence (Richter, Hunt, Cupertino, Garrett, & Friedmann, 2012). Within the last two decades, efforts to engage these smokers have increased, and data suggest that concurrent treatment is both efficacious and does not undermine primary recovery efforts (Reid et al., 2008; Thurgood, McNeill, Clark-Carter, & Brose, 2016).

CM smoking cessation interventions have been evaluated in methadone maintenance settings (Dunn et al., 2010; Dunn, Sigmon, Thomas, Heil, & Higgins, 2008; Shoptaw et al., 2002; Shoptaw, Jarvik, Ling, & Rawson, 1996; Sigmon et al., 2016), residential settings (Alessi, Petry, & Urso, 2008; Alessi & Petry, 2014; Hunt, Rash, Burke, & Parker, 2010; Robles et al., 2005; Rohsenow et al., 2015), and non-methadone maintained outpatient settings (Winhusen et al., 2014; Wiseman, Williams, & McMillan, 2005). In this issue, two studies add to this body of research (Cooney et al., 2017; Rohsenow, Martin, Tidey, Colby, & Monti, 2017). Rohsenow et al. (2017) focused on non-treatment-seeking smokers in residential SUD treatment settings. This trial found CM in concert with nicotine replacement therapy (NRT) and counseling yielded significantly higher rates of smoking abstinence during treatment (20%) relative to those found with NRT and counseling alone (5%). However, CM effects did not persist over time (4% vs. 2% at 6- and 12-months). Cooney and colleagues (2017) engaged alcohol dependent smokers in smoking cessation while undergoing intensive outpatient SUD treatment. The addition of CM to cognitive-behavioral therapy for smoking cessation with NRT led to higher quit and abstinence rates during treatment (60% vs. 29%) that gradually declined over time (41% at 1-month and 12% at 6-months). Both studies found that CM substantially enhanced quit rates during treatment and found no adverse effects of CM treatment on primary recovery efforts. These results are compelling and suggest CM is effective in the short-term for smoking cessation in SUD treatment settings. These studies also illustrate the substantial challenges of extending initial success beyond the intervention period.

3.2 Medication adherence

CM has been successfully adapted to increase medication adherence for several different medical disorders, including HIV, tuberculosis, SUD, hepatitis, schizophrenia, and hypertension. Some of these medications experience low adherence due to side effects or complicated and arduous dosing schedules. For many disorders, full courses of the medication are particularly important for efficacy, both for the individual taking the medication and for public health. A meta-analysis (Petry, Rash, Byrne, Ashraf, & White, 2012) examining the use of incentives for medication adherence found a medium to large effect size ($d = 0.77$) for improvement in outcomes with the addition of incentive interventions.

In this issue, Herrmann et al. (2017) conducted a systematized review of studies using incentives in the control of infectious diseases among SUD populations. Individuals who use alcohol and drugs are at especially high risk for non-adherence (e.g., Golin et al., 2002; Hicks et al., 2007; Lucas, Gebo, Chaisson, & Moore, 2002) and are in need of efficacious interventions for infectious disease control. The review includes interventions targeting medication adherence as well as those targeting adherence to diagnostic behaviors (e.g., returning for tuberculosis skin reading, following through with referral for chest x-ray) and prevention regimens (i.e., hepatitis B). Herrmann et al.'s (2017) review finds an average 35% improvement in adherence rates among patients exposed to CM relative to control conditions. The majority (85%) of studies identified found favorable impacts of CM interventions, suggesting infectious disease control is a promising area for further research in CM. Given the potential public health impact of non-adherence in this area, the application of CM to infectious disease control may meet with fewer barriers to widespread dissemination. Such progress may well establish precedents that carry over to CM's use as a SUD intervention.

3.3 Adjunctive treatment targets

To date, CM is primarily an intervention to reduce substance use. It has also been used to address low engagement and adherence of other interventions that in turn exert impacts on SUD treatment outcomes (e.g., reinforcing therapy attendance). Two articles in this special issue are exemplars of this approach (Kiluk et al., 2017; Weinstock, Farney, Elrod, Henderson, & Weiss, 2017). Weinstock and colleagues (2017) describe a CM protocol to increase moderate to vigorous physical activity (i.e., exercise) in SUD treatment settings. Exercise is hypothesized to enhance SUD treatment outcomes due to its modulating effects on comorbid psychiatric conditions (e.g., depression, anxiety), effects that are thought to occur via positive mood induction, craving reduction, and stress buffering (Penedo & Dahn, 2005; Ussher, West, Doshi, & Sampuran, 2006). However, exercise itself is plagued by poor adherence, a problem that can be remediated by applying a CM intervention (Mitchell et al., 2013). Another example of an adjunctive intervention that may improve SUD treatment outcomes is in the paper by Kiluk and colleagues (2017) that describes the use of CM to increase engagement in a cognitive remediation intervention among SUD patients. Their results suggest that either attendance-based or performance-based incentives may be adequate for motivating engagement in cognitive remediation tasks among individuals in

SUD treatment. Additional work that includes a non-incentive control group will be needed to determine the additive effects of incentives versus practice effects or exposure alone.

A final example of the application of CM to adjunctive behaviors comes from the study in this issue by Letourneau and colleagues (2017). Working with substance using adolescents enrolled in a highly structured drug court program, the investigators incorporated an additional focus on high-risk sexual behaviors within a SUD intervention that uses family-based contracting for rewards as a key intervention component. While outcomes were not robust, the study provides a thoughtful discussion of the potential feasibility and utility of using CM approaches to impact private behaviors associated with sexual risk.

3.4. Multi-target CM interventions in health care

The protocol described in this issue by Stitzer and colleagues (2017) provides an example of the adaptation of contingent incentives for use in complex high-risk populations to improve health care outcomes that are mediated by multiple intervening behaviors. The parent study, conducted under auspices of the National Drug Abuse Treatment Clinical Trials Network, randomized 801 hospitalized HIV positive drug users currently out of compliance with their HIV medical regimens to receive usual care referral to HIV and SUD services or to one of two strength-based Patient Navigation interventions that differed by the inclusion (or not) of a contingent financial incentives component (PN vs PN+CM). The goal was to encourage re-engagement with HIV care and address substance use as an interfering factor; primary outcome was HIV viral load suppression. Participants could earn a total of $1160 over 6 months for meeting 8 health care compliance and substance abuse abatement targets with bonuses for achieving HIV viral suppression. The paper describes in detail the structure and content of the incentive program and considerations that went into its design. Backed by data from the main outcome paper (Metsch et al., 2016) that shows short-term efficacy of the PN + CM intervention on some key outcome measures, the paper provides an example of the types of interventions that may be useful in the future for addressing complex health care issues of at-risk populations.

Another paper in this special issue by Brolin et al. (2017) describes a study conducted in Massachusetts that had a similar intent - in this case to improve outcomes for SUD patients with multiple prior detoxification admissions. The paper examines cost and behavior outcomes for participants assigned to receive a care support intervention with and without incentives. In this real world setting, however, implementation of the incentive program encountered organizational and attitudinal barriers that may have reduced its effectiveness. The two papers together provide some important lessons learned for future multi-target efforts of this type within the health care environment.

4. Technological adaptations

Abstinence-based CM protocols have most often focused on stimulants and opiates, short-acting drugs that require frequent urine testing for detection. This focus has been feasible in part due to availability of convenient on-site urine testing kits that provide a platform for twice or thrice weekly CM visits sufficient to detect most instances of use for these substances. In contrast, assessment of alcohol and nicotine use pose challenges to the

development of CM protocols. Breath samples for each of these substances have relatively short detection windows (i.e., hours), which translates to more frequent, expensive, and burdensome testing schedules. To detect most instances of use for alcohol and nicotine, daily or twice daily breath samples would be needed. Nicotine can be assessed using urine tests at a lower frequency (e.g., twice weekly), but urine testing precludes the use of the most common form of pharmacotherapy, NRT.

These challenges have likely slowed growth and application of CM for these commonly used substances. However, recent technological advancements (e.g., transdermal alcohol monitoring; Barnett, Tidey, Murphy, Swift, & Colby, 2011) address some of the issues related to staffing and participant burden. Web-based CM procedures have moved the field forward by supporting remote objective monitoring of patients as they provide breath samples for alcohol or tobacco smoke detection using web cameras. Negative samples earn vouchers, which can be exchanged in person for goods or services or paid online with internet vendors. Several studies (Dallery et al., 2007; Dallery, Meredith, Jarvis, & Nuzzo, 2015; Dallery, Raiff, & Grabinski, 2013; Reynolds et al., 2015, 2008; Stoops et al., 2009) demonstrate the feasibility and efficacy of these procedures with smokers.

The use of cell- and smart-phone technology in CM interventions has also been explored. Compliance with procedures is high and good outcomes were found with heavy drinkers (Alessi & Petry, 2013) and smokers (Alessi, Rash, & Petry, in press; Carpenter et al., 2015; Hertzberg et al., 2013). In this issue, Alessi and Rash (2017) report high levels of treatment satisfaction among participants using phone-based breath monitoring, with those in the CM condition reporting the highest levels of satisfaction. In addition, those in the CM condition achieved longer durations of smoking abstinence compared to controls, which in turn was associated with higher treatment satisfaction. This study is one of the first to evaluate treatment satisfaction in cellphone-based CM smoking cessation interventions, and it suggests that these procedures are well tolerated and meet patients' expectations for smoking cessation interventions. Collectively, the feasibility and patient satisfaction data reported by these technology-based studies is highly encouraging, particularly given the expectations for frequent breath sample submission (e.g., 1–3 samples per day).

Another consideration related to mobile technologies is the cost savings. Budney et al. (2015) compared a therapist- or computer-delivered cognitive behavioral therapy plus abstinence-based CM to reduce marijuana use to a brief intervention control. Both intensive intervention formats were efficacious in terms of marijuana abstinence, but the computer-delivered format saved $175 on average per participant. These cost savings offset the costs incurred by the CM program. Thus, not only can these technologies reduce participant burden, but they may also be appealing from a public health perspective as a method of delivering efficacious treatment at lower costs.

5.0 Real-world clinical implementation

While CM's efficacy is well established, and technology may in the future advance feasibility and reach, its application in real world clinical settings is currently limited. CM consistently receives one of the lowest rankings among evidence-based non-pharmacological

addictions interventions in terms of routine clinical use (Herbeck, Hser, & Teruya, 2008; McGovern, Fox, Xie, & Drake, 2004; Willenbring et al., 2004). SUD treatment providers' use of and perceptions about CM's global effectiveness and effectiveness if implemented in their program are more in line with harmful approaches (i.e., verbal confrontation) than other evidence-based treatments (Benishek, Kirby, Dugosh, & Padovano, 2010). These studies (Benishek et al., 2010; Herbeck et al., 2008; McGovern et al., 2004; Willenbring et al., 2004) and others (Bride, Abraham, & Roman, 2010; Kirby, Benishek, Dugosh, & Kerwin, 2006; Rash et al., 2012; Sinclair, Burton, Ashcroft, & Priebe, 2011) highlight potential barriers to adoption, including lack of awareness of CM's efficacy, concerns about long-term efficacy, philosophical objections, and practical concerns about implementation. Fortunately, many of these issues are amenable to change with education (Benishek et al., 2010), CM-related training (Aletraris, Shelton, & Roman, 2015; Bride et al., 2010; Rash, DePhilippis, McKay, Drapkin, & Petry, 2013), and familiarity with other clinicians' use of CM (Bride et al., 2010; Ducharme, Knudsen, Abraham, & Roman, 2010; Kirby et al., 2012).

CM is making some progress in terms of clinical implementation (Hartzler, 2015; Kellogg et al., 2005; Lott & Jencius, 2009; Petry, Dephilippis, Rash, Drapkin, & McKay, 2014; Sigmon & Stitzer, 2005; Squires, Gumbley, & Storti, 2008; Walker et al., 2010). However, continued studies of implementation strategies are vital to the progress of CM as a clinical tool and could speed such efforts. Two studies (Hartzler, Beadnell, & Donovan, 2017; Kropp, Lewis, & Winhusen, 2017) in this issue provide additional perspective on real-world implementation efforts. Kropp et al. (2017) described the impact of an ultra-low cost CM program targeting patient attendance to clinician-led therapy sessions and patient-led Methadone Anonymous groups within a methadone clinic. The CM program was a clinical effort, without research support, and due to clinic budget constraints, the cost of the incentive program was limited to about $15 per week. Results suggested a significant positive impact on attendance to the patient-led Methadone Anonymous groups, that was sustained throughout the 12-month intervention phase and was still evident 1- and 3-months post-intervention. This relatively simple CM program successfully addressed two commonly raised barriers related to costs and staff burden.

Hartzler et al. (2017) assessed clinician skill in implementing CM in a single site sample of 19 opiate treatment providers. The CM program was developed in collaboration with the site director to fit the needs and budget of the clinic (Hartzler, Jackson, Jones, Beadnell, & Calsyn, 2014). The researchers conducted the 16-hour CM training and assessed clinician skill post-training using expert ratings of standardized patient scenarios. Clinician skill in these rated scenarios was significantly associated with patient outcomes. Mediation analyses found that CM-specific skillfulness fully mediated the relationship between general therapeutic effectiveness and patient outcomes, suggesting that skill-based training and specific clinical competencies may be particularly important in CM training.

Given that clinician skill is related to patient outcome in CM programs (Hartzler et al., 2017; Petry, Alessi, & Ledgerwood, 2012b), well-developed training programs will be increasingly important as CM moves from research to routine clinical practice. Relatively little is known about effective methods of CM training, and additional implementation research is needed to determine best formats (e.g., web-based) in which to deliver such training. Supervision does

appear to be important to CM fidelity in the short- and long-term (Petry, Alessi, & Ledgerwood, 2012a, 2012b), and how best to offer such supervision in a sustainable, cost-effective manner is a question that will need to be addressed, particularly if clinical uptake increases. Best practices from other therapeutic approaches, such as motivational interviewing (Madson, Loignon, & Lane, 2009; Walters, Matson, Baer, & Ziedonis, 2005), may be helpful in guiding research on training and supervision practices for CM. In addition, technological adaptations, discussed above, may help automate some aspects of CM procedures such as keeping track of earnings/draws, and these platforms may reduce staff burden and need for oversight.

6.0 Conclusions

CM research continues to develop and refine over time, yet many questions remain unaddressed. Central among these issues is the transportability and sustainability of CM. Currently, CM faces poor uptake in routine clinical practice (Benishek et al., 2010), and clinics struggle to find ways to fund CM as part of their practice. Alternate funding models may be needed that will involve policy change and payer agreement (Roll, Madden, Rawson, & Petry, 2009). For example, changes in restrictions on frequency of billable urine drug testing to be in line with research standards (i.e., more than once a week) may abate some costs associated with abstinence-based CM interventions. In the meantime, researchers can continue to develop and evaluate CM interventions that take into account the limits of clinic constraints. Examples of responsive designs are detailed in this issue, including Kropp et al.'s (2017) ultra low-cost approach and Tuten et al.'s (2017) discussion of housing and other non-monetary reinforcers.

Data from real-world implementation efforts are likely to be particularly compelling for providers deliberating whether CM is appropriate for their clinics. Effectiveness data are vital, but detailed reports on the challenges of implementing within clinic settings without research support and the cost-effectiveness of these efforts are also needed. Although several studies have reported on the cost-effectiveness of CM (Olmstead & Petry, 2009; Olmstead, Sindelar, Easton, & Carroll, 2007; Sindelar, Elbel, & Petry, 2007; Sindelar, Olmstead, & Peirce, 2007), the cost perspective from clinics implementing CM might be particularly convincing to clinic administrators. Fitzsimons et al. (2015) and Lott and Jenicus (2009) provide an example of clinic-based implementation resulting in increased program revenues that offset the costs of the CM intervention. Fitzsimons and colleagues (2015) estimated an additional $24,000 in reimbursement possible for the CM group relative to the comparison condition, attributed to increased attendance among patients receiving CM. Notably, the CM intervention was in effect for only 1 week and low cost ($25 maximum per patient), yet effects on attendance persisted well after the end of the CM program.

Overall, CM is an efficacious SUD intervention that is generalizable to a variety of SUD populations with few exceptions. The studies included in this special issue highlight advancements in several domains and suggest directions for future research. Among the most pressing of these needs is evaluation of training methods and continued advancement and evaluation of CM protocols that are responsive to clinic operational and budgetary constraints yet maintain efficacy. Adoption within large healthcare systems, such as the US

Veterans Affairs Health Care System and the UK National Health Service, is ongoing; these and similar efforts can inform training practices and provide valuable data on real world effectiveness. Technological adaptations also appear to be a promising avenue for increasing dissemination. These adaptations address many of the barriers to CM's routine clinical use, and they appear well received by patients. In addition, research related to sustaining the benefits of CM following withdrawal of contingencies is needed. Finally, better understanding of the mechanisms of action underlying CM's efficacy may help us improve and tailor CM programs to further increase benefits. Continued research efforts in these directions is likely to further build the powerful evidence base supporting CM's application to the treatment of SUD.

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References

Alessi SM, Badger GJ, Higgins ST. An experimental examination of the initial weeks of abstinence in cigarette smokers. Experimental and Clinical Psychopharmacology. 2004; 12(4):276–287. http://doi.org/10.1037/1064-1297.12.4.276. [PubMed: 15571445]

Alessi SM, Hanson T, Wieners M, Petry NM. Low-cost contingency management in community clinics: Delivering incentives partially in group therapy. Experimental and Clinical Psychopharmacology. 2007; 15(3):293–300. http://doi.org/10.1037/1064-1297.15.3.293. [PubMed: 17563216]

Alessi SM, Petry NM. A randomized study of cellphone technology to reinforce alcohol abstinence in the natural environment. Addiction. 2013; 108(5):900–909. http://doi.org/10.1111/add.12093. [PubMed: 23279560]

Alessi SM, Petry NM. Smoking reductions and increased self-efficacy in a randomized controlled trial of smoking abstinence- contingent incentives in residential substance abuse treatment patients. Nicotine and Tobacco Research. 2014; 16(11):1436–1445. http://doi.org/10.1093/ntr/ntu095. [PubMed: 24935755]

Alessi SM, Petry NM, Urso J. Contingency management promotes smoking reductions in residential substance abuse patients. Journal of Applied Behavior Analysis. 2008; 41(4):617–622. http://doi.org/10.1901/jaba.2008.41-617. [PubMed: 19192865]

Alessi SM, Rash CJ. Treatment satisfaction in a randomized clinical trial of mHealth smoking abstinence reinforcement. Journal of Substance Abuse Treatment 72C. 2017 http://doi.org/10.1016/j.jsat.2016.06.013 This issue.

Alessi SM, Rash CJ, Petry NM. A randomized trial of adjunct mHealth abstinence reinforcement with trandermal nicotine and counseling for smoking cessation. Nicotine & Tobacco Research. (in press).

Alessi SM, Rash C, Petry NM. Contingency management is efficacious and improves outcomes in cocaine patients with pretreatment marijuana use. Drug and Alcohol Dependence. 2011; 118(1):62–67. http://doi.org/10.1016/j.drugalcdep.2011.03.001. [PubMed: 21440999]

Aletraris L, Shelton JS, Roman PM. Counselor attitudes toward contingency management for substance use disorder: Effectiveness, acceptability, and endorsement of incentives for treatment attendance and abstinence. Journal of Substance Abuse Treatment. 2015; 57:41–48. http://doi.org/10.1016/j.jsat.2015.04.012. [PubMed: 26001821]

Barnett NP, Tidey J, Murphy JG, Swift R, Colby SM. Contingency management for alcohol use reduction: A pilot study using a transdermal alcohol sensor. Drug and Alcohol Dependence. 2011; 118(2–3):391–399. http://doi.org/10.1016/j.drugalcdep.2011.04.023. [PubMed: 21665385]

Barry D, Sullivan B, Petry NM. Comparable efficacy of contingency management for cocaine dependence among African American, Hispanic, and White methadone maintenance clients. Psychology of Addictive Behaviors. 2009; 23(1):168–174. http://doi.org/10.1037/a0014575. [PubMed: 19290703]

Benishek LA, Dugosh KL, Kirby KC, Matejkowski J, Clements NT, Seymour BL, Festinger DS. Prize-based contingency management for the treatment of substance abusers: A meta-analysis. Addiction. 2014; 109(9):1426–1436. http://doi.org/10.1111/add.12589. [PubMed: 24750232]

Benishek LA, Kirby KC, Dugosh KL, Padovano A. Beliefs about the empirical support of drug abuse treatment interventions: A survey of outpatient treatment providers. Drug and Alcohol Dependence. 2010; 107(2–3):202–208. http://doi.org/10.1016/j.drugalcdep.2009.10.013. [PubMed: 19959299]

Bride BE, Abraham AJ, Roman PM. Diffusion of contingency management and attitudes regarding its effectiveness and acceptability. Substance Abuse. 2010; 31(3):127–135. http://doi.org/10.1080/08897077.2010.495310. [PubMed: 20687001]

Brolin M, Torres M, Hodgkin D, Horgan C, Lee M, Merrick E, Lane N. Implementation of client incentives within a recovery navigation program. Journal of Substance Abuse Treatment, 72C. 2017 This issue.

Budney AJ, Stanger C, Tilford JM, Scherer EB, Brown PC, Li Z, Walker DD. Computer-assisted behavioral therapy and contingency management for cannabis use disorder. Psychology of Addictive Behaviors. 2015; 29(3):501–511. http://doi.org/10.1037/adb0000078. [PubMed: 25938629]

Burch AE, Morasco BJ, Petry NM. Patients undergoing substance abuse treatment and receiving financial sssistance for a physical disability respond well to contingency management treatment. Journal of Substance Abuse Treatment. 2015; 58:67–71. http://doi.org/10.1016/j.jsat.2015.06.006. [PubMed: 26184649]

Burch AE, Rash CJ, Petry NM. Sex effects in cocaine-using methadone patients randomized to contingency management interventions. Experimental and Clinical Psychopharmacology. 2015; 23(4):284–290. http://doi.org/10.1037/pha0000034. [PubMed: 26237326]

Businelle MS, Kendzor DE, Kesh A, Cuate EL, Poonawalla IB, Reitzel LR, Wetter DW. Small financial incentives increase smoking cessation in homeless smokers: A pilot study. Addictive Behaviors. 2014; 39(3):717–720. http://doi.org/10.1016/j.addbeh.2013.11.017. [PubMed: 24321696]

Campbell AN, Nunes EV, Matthews AG, Stitzer M, Miele GM, Polsky D, Ghitza UE. Internet-delivered treatment for substance abuse: A multisite randomized controlled trial. American Journal of Psychiatry. 2014; 171(6):683–690. http://doi.org/10.1176/appi.ajp.2014.13081055. [PubMed: 24700332]

Carpenter VL, Hertzberg JS, Kirby AC, Calhoun PS, Moore SD, Dennis MF, Beckham JC. Multicomponent smoking cessation treatment including mobile contingency management in homeless veterans. The Journal of Clinical Psychiatry. 2015; 76(7):959–964. http://doi.org/10.4088/JCP.14m09053. [PubMed: 25699616]

Cooney J, Cooper S, Grant C, Sevarino K, Krishnan-Sarin S, Gutierrez I, Cooney N. A randomized trial of contingency management for smoking cessation during intensive outpatient alcohol treatment. Journal of Substance Abuse Treatment 72C. 2017 This issue.

Cunningham C, Stitzer M, Campbell ANC, Pavlicova M, Hu M-C, Nunes EV. Contingency management abstinence incentives: Cost and implications for treatment tailoring. Journal of Substance Abuse Treatment 72C. 2017 http://doi.org/10.1016/j.jsat.2015.08.010 This issue.

Dallery J, Glenn IM, Raiff BR. An internet-based abstinence reinforcement treatment for cigarette smoking. Drug and Alcohol Dependence. 2007; 86(2–3):230–238. http://doi.org/10.1016/j.drugalcdep.2006.06.013. [PubMed: 16930854]

Dallery J, Meredith S, Jarvis B, Nuzzo PA. Internet-based group contingency management to promote smoking abstinence. Experimental and Clinical Psychopharmacology. 2015; 23(3):176–183. http://doi.org/10.1037/pha0000013. [PubMed: 25821915]

Dallery J, Raiff BR, Grabinski MJ. Internet-based contingency management to promote smoking cessation: A randomized controlled study. Journal of Applied Behavior Analysis. 2013; 46(4):750–764. http://doi.org/10.1002/jaba.89. [PubMed: 24114862]

Donatelle R, Hudson D, Dobie S, Goodall A, Hunsberger M, Oswald K. Incentives in smoking cessation: Status of the field and implications for research and practice with pregnant smokers. Nicotine & Tobacco Research. 2004; 6(2):163–179. http://doi.org/10.1080/14622200410001669196.

Dougherty DM, Lake SL, Hill-Kapturczak N, Liang Y, Karns TE, Mullen J, Roache JD. Using contingency management procedures to reduce at-risk drinking in heavy drinkers. Alcoholism: Clinical and Experimental Research. 2015; 39(4):743–751. http://doi.org/10.1111/acer.12687.

Ducharme LJ, Knudsen HK, Abraham AJ, Roman PM. Counselor attitudes toward the use of motivational incentives in addiction treatment. American Journal on Addictions. 2010; 19(6):496–503. http://doi.org/10.1111/j.1521-0391.2010.00081.x. [PubMed: 20958844]

Dunn KE, Sigmon SC, Reimann EF, Badger GJ, Heil SH, Higgins ST. A contingency-management intervention to promote initial smoking cessation among opioid-maintained patients. Experimental and Clinical Psychopharmacology. 2010; 18(1):37–50. http://doi.org/10.1037/a0018649. [PubMed: 20158293]

Dunn KE, Sigmon SC, Thomas CS, Heil SH, Higgins ST. Voucher-based contingent reinforcement of smoking abstinence among methadone-maintained patients: a pilot study. Journal of Applied Behavior Analysis. 2008; 41(4):527–538. http://doi.org/10.1901/jaba.2008.41-527. [PubMed: 19192857]

Dutra L, Stathopoulou G, Basden SL, Leyro TM, Powers MB, Otto MW. A meta-analytic review of psychosocial interventions for substance use disorders. The American Journal of Psychiatry. 2008; 165(2):179–187. http://doi.org/10.1176/appi.ajp.2007.06111851. [PubMed: 18198270]

Festinger DS, Dugosh KL, Kirby KC, Seymour BL. Contingency management for cocaine treatment: Cash vs. vouchers. Journal of Substance Abuse Treatment. 2014; 47:168–174. http://doi.org/10.1016/j.jsat.2014.03.001. [PubMed: 24746956]

Fitzsimons H, Tuten M, Borsuk C, Lookatch S, Hanks L. Clinician-delivered contingency management increases engagement and attendance in drug and alcohol treatment. Drug and Alcohol Dependence. 2015; 152:62–67. http://doi.org/10.1016/j.drugalcdep.2015.04.021. [PubMed: 25982007]

Ford JD, Hawke J, Alessi S, Ledgerwood D, Petry N. Psychological trauma and PTSD symptoms as predictors of substance dependence treatment outcomes. Behaviour Research and Therapy. 2007; 45(10):2417–2431. http://doi.org/10.1016/j.brat.2007.04.001. [PubMed: 17531193]

García-Fernández G, Secades-Villa R, García-Rodríguez O, Peña-Suárez E, Sánchez-Hervás E. Contingency management improves outcomes in cocaine-dependent outpatients with depressive symptoms. Experimental and Clinical Psychopharmacology. 2013; 21(6):482–489. http://doi.org/10.1037/a0033995. [PubMed: 24080020]

Golin CE, Liu H, Hays RD, Miller LG, Beck CK, Ickovics J, Wenger NS. A prospective study of predictors of adherence to combination antiretroviral medication. Journal of General Internal Medicine. 2002; 17(10):756–765. http://doi.org/10.1046/j.1525-1497.2002.11214.x. [PubMed: 12390551]

Griffith JD, Rowan-Szal GA, Roark RR, Simpson DD. Contingency management in outpatient methadone treatment: A meta-analysis. Drug and Alcohol Dependence. 2000; 58(1–2):55–66. http://doi.org/10.1016/S0376-8716(99)00068-X. [PubMed: 10669055]

Gruber K, Chutuape MA, Stitzer ML. Reinforcement-based intensive outpatient treatment for inner city opiate abusers: A short-term evaluation. Drug and Alcohol Dependence. 2000; 57(3):211–223. http://doi.org/10.1016/S0376-8716(99)00054-X. [PubMed: 10661672]

Hartzler B. Building a bonfire that remains stoked: Sustainment of a contingency management intervention developed through collaborative design. Substance Abuse Treatment, Prevention, and Policy. 2015; 10(1):30. http://doi.org/10.1186/s13011-015-0027-0.

Hartzler B, Beadnell B, Donovan D. Predictive validity of addiction treatment clinicians' post-training contingency management skills for subsequent clinical outcomes. Journal of Substance Abuse Treatment 72C. 2017 http://doi.org/10.1016/j.jsat.2015.11.010. This issue.

Hartzler B, Garrett S. Interest and preferences for contingency management design among addiction treatment clientele. The American Journal of Drug and Alcohol Abuse. 2016; 42(3):287–295. http://doi.org/10.3109/00952990.2015.1096365. [PubMed: 26646619]

Hartzler B, Jackson TR, Jones BE, Beadnell B, Calsyn DA. Disseminating contingency management: Impacts of staff training and implementation at an opiate treatment program. Journal of Substance Abuse Treatment. 2014; 46(4):429–438. http://doi.org/10.1016/j.jsat.2013.12.007. [PubMed: 24462242]

Heil SH, Higgins ST, Bernstein IM, Solomon LJ, Rogers RE, Thomas CS, Lynch ME. Effects of voucher-based incentives on abstinence from cigarette smoking and fetal growth among pregnant women. Addiction. 2008; 103(6):1009–1018. http://doi.org/10.1111/j.1360-0443.2008.02237.x. [PubMed: 18482424]

Herbeck DM, Hser YI, Teruya C. Empirically supported substance abuse treatment approaches: A survey of treatment providers' perspectives and practices. Addictive Behaviors. 2008; 33(5):699–712. http://doi.org/10.1016/j.addbeh.2007.12.003. [PubMed: 18207334]

Herrmann ES, Matusiewicz AK, Stitzer ML, Higgins ST, Sigmon SC, Heil SH. Contingency management interventions for HIV, tuberculosis, and hepatitis control among individuals with substance use disorders: A systematized review. Journal of Substance Abuse Treatment 72C. 2017 http://doi.org/10.1016/j.jsat.2016.06.009. This issue.

Hertzberg JS, Carpenter VL, Kirby AC, Calhoun PS, Moore SD, Dennis MF, Beckham JC. Mobile contingency management as an adjunctive smoking cessation treatment for smokers with posttraumatic stress disorder. Nicotine and Tobacco Research. 2013; 15(11):1934–1938. http://doi.org/10.1093/ntr/ntt060. [PubMed: 23645606]

Hicks PL, Mulvey KP, Chander G, Fleishman JA, Josephs JS, Korthuis PT. Network HIVR. The impact of illicit drug use and substance abuse treatment on adherence to HAART. AIDS Care. 2007; 19(9):1134–1140. http://doi.org/10.1080/09540120701351888. [PubMed: 18058397]

Higgins ST, Badger GJ, Budney AJ. Initial abstinence and success in achieving longer term cocaine abstinence. Experimental and Clinical Psychopharmacology. 2000; 8(3):377–386. http://doi.org/10.1037/1064-1297.8.3.377. [PubMed: 10975629]

Higgins ST, Budney AJ, Bickel WK. Applying behavioral concepts and principles to the treatment of cocaine dependence. Drug & Alcohol Dependence. 1994; 34:87–97. [PubMed: 8026305]

Higgins ST, Sigmon SC, Wong CJ, Heil SH, Badger GJ, Donham R, Anthony S. Community reinforcement therapy for cocaine-dependent outpatients. Archives of General Psychiatry. 2003; 60(10):1043–1052. http://doi.org/10.1001/archpsyc.60.9.1043. [PubMed: 14557150]

Higgins ST, Washio Y, Lopez AA, Heil SH, Solomon LJ, Lynch ME, Bernstein IM. Examining two different schedules of financial incentives for smoking cessation among pregnant women. Preventive Medicine. 2014; 68:51–57. http://doi.org/10.1016/j.ypmed.2014.03.024. [PubMed: 24704135]

Higgins ST, Wong CJ, Badger GJ, Ogden DE, Dantona RL. Contingent reinforcement increases cocaine abstinence during outpatient treatment and 1 year of follow-up. Journal of Consulting and Clinical Psychology. 2000; 68(1):64–72. http://doi.org/10.1037/0022-006X.68.1.64. [PubMed: 10710841]

Hunt YM, Rash CJ, Burke RS, Parker JD. Smoking cessation in recovery: Comparing two different cognitive behavioral treatments. Addictive Disorders & Their Treatment. 2010; 9:64–74. http://doi.org/10.1097/ADT.0b013e3181bf0310.

Jones HE, Wong CJ, Tuten M, Stitzer ML. Reinforcement-based therapy: 12-Month evaluation of an outpatient drug-free treatment for heroin abusers. Drug and Alcohol Dependence. 2005; 79(2):119–128. http://doi.org/10.1016/j.drugalcdep.2005.01.006. [PubMed: 16002021]

Kellogg SH, Burns M, Coleman P, Stitzer M, Wale JB, Kreek MJ. Something of value: The introduction of contingency management interventions into the New York City Health and Hospital Addiction Treatment Service. Journal of Substance Abuse Treatment. 2005; 28(1):57–65. http://doi.org/10.1016/j.jsat.2004.10.007. [PubMed: 15723733]

Kiluk BD, Buck MB, Devore KA, Babuscio TA, Nich C, Carroll KM. Performance-based contingency management in cognitive remediation training: A pilot study. Journal of Substance Abuse Treatment, 72C. 2017 This issue.

Kirby KC, Benishek LA, Dugosh KL, Kerwin ME. Substance abuse treatment providers' beliefs and objections regarding contingency management: Implications for dissemination. Drug and Alcohol Dependence. 2006; 85(1):19–27. http://doi.org/10.1016/j.drugalcdep.2006.03.010. [PubMed: 16650657]

Kirby KC, Carpenedo CM, Stitzer ML, Dugosh KL, Petry NM, Roll JM, Sterling RC. Is exposure to an effective contingency management intervention associated with more positive provider beliefs? Journal of Substance Abuse Treatment. 2012; 42(4):356–365. http://doi.org/10.1016/j.jsat.2011.09.004. [PubMed: 22116009]

Krishnan-Sarin S, Duhig AM, McKee SA, McMahon TJ, Liss T, McFetridge A, Cavallo DA. Contingency management for smoking cessation in adolescent smokers. Experimental and Clinical Psychopharmacology. 2006; 14(3):306–310. http://doi.org/10.1037/1064-1297.14.3.306. [PubMed: 16893273]

Kropp F, Lewis D, Winhusen T. The effectiveness of ultra-low magnitude reinforcers: Findings from a "real-world" application of contingency management. Journal of Substance Abuse Treatment 72C. 2017 http://doi.org/10.1016/j.jsat.2016.06.012. This issue.

Lamb RJ, Morral AR, Kirby KC, Iguchi MY, Galbicka G. Shaping smoking cessation using percentile schedules. Drug and Alcohol Dependence. 2004; 76(3):247–259. http://doi.org/10.1016/j.drugalcdep.2004.05.008. [PubMed: 15561476]

Ledgerwood DM, Arfken CL, Petry NM, Alessi SM. Prize contingency management for smoking cessation: A randomized trial. Drug and Alcohol Dependence. 2014; 140:208–212. http://doi.org/10.1016/j.drugalcdep.2014.03.032. [PubMed: 24793364]

Letourneau E, McCart M, Sheidow A, Mauro PM. First evaluation of a contingency management intervention addressing adolescent substance use and sexual risk behaviors: Risk reduction therapy for adolescents. Journal of Substance Abuse Treatment, 72C. 2017 This issue.

Lott DC, Jencius S. Effectiveness of very low-cost contingency management in a community adolescent treatment program. Drug and Alcohol Dependence. 2009; 102(1–3):162–165. http://doi.org/10.1016/j.drugalcdep.2009.01.010. [PubMed: 19250774]

Lucas GM, Gebo K, Chaisson RE, Moore RD. Longitudinal assessment of the effects of drug and alcohol abuse on HIV-1 treatment outcomes in an urban clinic. AIDS. 2002; 16(5):767–774. [PubMed: 11964533]

Lussier JP, Heil SH, Mongeon JA, Badger GJ, Higgins ST. A meta-analysis of voucher-based reinforcement therapy for substance use disorders. Addiction. 2006; 101(2):192–203. http://doi.org/10.1111/j.1360-0443.2006.01311.x. [PubMed: 16445548]

Madson MB, Loignon AC, Lane C. Training in motivational interviewing: A systematic review. Journal of Substance Abuse Treatment. 2009; 36(1):101–109. http://doi.org/10.1016/j.jsat.2008.05.005. [PubMed: 18657936]

McGovern MP, Fox TS, Xie H, Drake RE. A survey of clinical practices and readiness to adopt evidence-based practices: Dissemination research in an addiction treatment system. Journal of Substance Abuse Treatment. 2004; 26(4):305–312. http://doi.org/10.1016/j.jsat.2004.03.003. [PubMed: 15182895]

McKay JR. Making the hard work of recovery more attractive for those with substance use disorders. Addiction. 2016 http://doi.org/10.1111/add.13502.

Metsch LR, Feaster DJ, Gooden L, Matheson T, Stitzer M, Das M, del Rio C. Effect of patient navigation with or without financial incentives on viral suppression among hospitalized patients with HIV infection and substance use. Journal of the American Medical Association. 2016; 316(2):156. http://doi.org/10.1001/jama.2016.8914. [PubMed: 27404184]

Milby JB, Schumacher JE, Wallace D, Freedman MJ, Vuchinich RE. To house or not to house: The effects of providing housing to homeless substance abusers in treatment. American Journal of Public Health. 2005; 95(7):1259–1265. http://doi.org/10.2105/AJPH.2004.039743. [PubMed: 15983278]

Miller WR, Walters ST, Bennett ME. How effective is alcoholism treatment in the United States? Journal of Studies on Alcohol. 2001; 62(2):211–220. [PubMed: 11327187]

Mitchell MS, Goodman JM, Alter DA, John LK, Oh PI, Pakosh MT, Faulkner GE. Financial incentives for exercise adherence in adults: Systematic review and meta-analysis. American Journal of

Preventive Medicine. 2013; 45(5):658–667. http://doi.org/10.1016/j.amepre.2013.06.017. [PubMed: 24139781]

Moos RH, Moos BS. Rates and predictors of relapse after natural and treated remission from alcohol use disorders. Addiction. 2006; 101(2):212–222. http://doi.org/10.1111/j.1360-0443.2006.01310.x. [PubMed: 16445550]

Olmstead TA, Petry NM. The cost-effectiveness of prize-based and voucher-based contingency management in a population of cocaine- or opioid-dependent outpatients. Drug and Alcohol Dependence. 2009; 102(1–3):108–115. http://doi.org/10.1016/j.drugalcdep.2009.02.005. [PubMed: 19324501]

Olmstead TA, Sindelar JL, Easton CJ, Carroll KM. The cost-effectiveness of four treatments for marijuana dependence. Addiction. 2007; 102(9):1443–1453. http://doi.org/10.1111/j.1360-0443.2007.01909.x. [PubMed: 17645430]

Paxton R. The effects of a deposit contract as a component in a behavioural programme for stopping smoking. Behaviour Research and Therapy. 1980; 18(1):45–50. http://doi.org/10.1016/0005-7967(80)90068-6. [PubMed: 7369987]

Peirce JM, Petry NM, Stitzer ML, Blaine J, Kellogg S, Satterfield F, Kolodner K. Effects of lower-cost incentives on stimulant abstinence in methadone maintenance treatment - A National Drug Abuse Treatment Clinical Trials Network study. Archives of General Psychiatry. 2006; 63(2):201–208. http://doi.org/10.1001/archpsyc.63.2.201. [PubMed: 16461864]

Penedo FJ, Dahn JR. Exercise and well-being: A review of mental and physical health benefits associated with physical activity. Current Opinion in Psychiatry. 2005; 18(2):189–193. http://doi.org/10.1097/00001504-200503000-00013. [PubMed: 16639173]

Petry NM, Alessi SM, Hanson T, Sierra S. Randomized trial of contingent prizes versus vouchers in cocaine-using methadone patients. Journal of Consulting and Clinical Psychology. 2007; 75(6):983–991. http://doi.org/10.1037/0022-006X.75.6.983. [PubMed: 18085914]

Petry NM, Alessi SM, Ledgerwood DM. A randomized trial of contingency management delivered by community therapists. Journal of Consulting and Clinical Psychology. 2012a; 80(2):286–298. http://doi.org/10.1037/a0026826. [PubMed: 22250852]

Petry NM, Alessi SM, Ledgerwood DM. Contingency management delivered by community therapists in outpatient settings. Drug and Alcohol Dependence. 2012b; 122(1–2):86–92. http://doi.org/10.1016/j.drugalcdep.2011.09.015. [PubMed: 21981991]

Petry NM, Alessi SM, Marx J, Austin M, Tardif M. Vouchers versus prizes: Contingency management treatment of substance abusers in community settings. Journal of Consulting and Clinical Psychology. 2005; 73(6):1005–1014. http://doi.org/10.1037/0022-006X.73.6.1005. [PubMed: 16392974]

Petry NM, Barry D, Alessi SM, Rounsaville BJ, Carroll KM. A randomized trial adapting contingency management targets based on initial abstinence status of cocaine-dependent patients. Journal of Consulting and Clinical Psychology. 2012; 80(2):276–285. http://doi.org/10.1037/a0026883. [PubMed: 22229758]

Petry NM, Dephilippis D, Rash CJ, Drapkin M, McKay JR. Nationwide dissemination of contingency management: The Veterans Administration initiative. American Journal on Addictions. 2014; 23(3):205–210. http://doi.org/10.1111/j.1521-0391.2014.12092.x. [PubMed: 24724876]

Petry NM, Martin B. Low-cost contingency management for treating cocaine- and opioid-abusing methadone patients. Journal of Consulting and Clinical Psychology. 2002; 70(2):398–405. http://doi.org/10.1037/0022-006X.70.2.398. [PubMed: 11952198]

Petry NM, Martin B, Simcic F. Prize reinforcement contingency management for cocaine dependence: Integration with group therapy in a methadone clinic. Journal of Consulting and Clinical Psychology. 2005; 73(2):354–359. http://doi.org/10.1037/0022-006X.73.2.354. [PubMed: 15796645]

Petry NM, Peirce JM, Stitzer ML, Blaine J, Roll JM, Cohen A, Li R. Effect of prize-based incentives on outcomes in stimulant abusers in outpatient psychosocial treatment programs: A National Drug Abuse Treatment Clinical Trials Network study. Archives of General Psychiatry. 2005; 62:1148–1156. http://doi.org/10.1001/archpsyc.62.10.1148. [PubMed: 16203960]

Petry NM, Rash CJ, Byrne S, Ashraf S, White WB. Financial reinforcers for improving medication adherence: Findings from a meta-analysis. American Journal of Medicine. 2012; 125(9):888–896. http://doi.org/10.1016/j.amjmed.2012.01.003. [PubMed: 22800876]

Prendergast M, Podus D, Finney J, Greenwell L, Roll J. Contingency management for treatment of substance use disorders: A meta-analysis. Addiction. 2006; 101(11):1546–1560. http://doi.org/10.1111/j.1360-0443.2006.01581.x. [PubMed: 17034434]

Rash CJ, Alessi SM, Petry NM. Cocaine abusers with and without alcohol dependence respond equally well to contingency management treatments. Experimental and Clinical Psychopharmacology. 2008a; 16(4):275–281. http://doi.org/10.1037/a0012787. [PubMed: 18729681]

Rash CJ, Alessi SM, Petry NM. Contingency management is efficacious for cocaine abusers with prior treatment attempts. Experimental and Clinical Psychopharmacology. 2008b; 16(6):547–554. http://doi.org/10.1037/a0014042. [PubMed: 19086775]

Rash CJ, Alessi SM, Petry NM. Substance abuse treatment patients in housing programs respond to contingency management interventions. Journal of Substance Abuse Treatment 72C. 2017 http://doi.org/10.1016/j.jsat.2016.07.001. This issue.

Rash, CJ.; Alessi, SM.; White, WB.; Petry, NM. Contingency Management for Smoking Cessation in the Homeless. In: Rash, CJ.; Weinstock, J., editors. Developing and Disseminating Contingency Management Interventions for Behavior Change. Symposium presented at the annual meeting of the Association for Behavioral and Cognitive Therapy (ABCT). Philadelphia, PA: 2014 Nov.

Rash CJ, Andrade LF, Petry NM. Income received during treatment does not affect response to contingency management treatments in cocaine-dependent outpatients. Drug and Alcohol Dependence. 2013; 132(3):528–534. http://doi.org/10.1016/j.drugalcdep.2013.03.020. [PubMed: 23631869]

Rash CJ, Burki M, Montezuma-Rusca JM, Petry NM. A retrospective and prospective analysis of trading sex for drugs or money in women substance abuse treatment patients. Drug and Alcohol Dependence. 2016; 162:182–189. http://doi.org/10.1016/j.drugalcdep.2016.03.006. [PubMed: 27020748]

Rash CJ, DePhilippis D, McKay JR, Drapkin M, Petry NM. Training workshops positively impact beliefs about contingency management in a nationwide dissemination effort. Journal of Substance Abuse Treatment. 2013; 45(3):306–312. http://doi.org/10.1016/j.jsat.2013.03.003. [PubMed: 23856601]

Rash CJ, Olmstead TA, Petry NM. Income does not affect response to contingency management treatments among community substance abuse treatment-seekers. Drug and Alcohol Dependence. 2009; 104(3):249–253. http://doi.org/10.1016/j.drugalcdep.2009.05.018. [PubMed: 19586727]

Rash CJ, Petry NM. Contingency management treatments are equally efficacious for both sexes in intensive outpatient settings. Experimental and Clinical Psychopharmacology. 2015; 23(5):369–376. http://doi.org/10.1037/pha0000035. [PubMed: 26167714]

Rash CJ, Petry NM, Kirby KC, Martino S, Roll J, Stitzer ML. Identifying provider beliefs related to contingency management adoption using the contingency management beliefs questionnaire. Drug and Alcohol Dependence. 2012; 121(3):205–212. http://doi.org/10.1016/j.drugalcdep.2011.08.027. [PubMed: 21925807]

Reid MS, Fallon B, Sonne S, Flammino F, Nunes EV, Jiang H, Rotrosen J. Smoking cessation treatment in community-based substance abuse rehabilitation programs. Journal of Substance Abuse Treatment. 2008; 35(1):68–77. http://doi.org/10.1016/j.jsat.2007.08.010. [PubMed: 17951021]

Reynolds B, Dallery J, Shroff P, Patak M, Leraas K. A web-based contingency management program with adolescent smokers. Journal of Applied Behavior Analysis. 2008; 41(4):597–601. http://doi.org/10.1901/jaba.2008.41-597. [PubMed: 19192862]

Reynolds B, Harris M, Slone SA, Shelton BJ, Dallery J, Stoops W, Lewis R. A feasibility study of home-based contingency management with adolescent smokers of rural Appalachia. Experimental and Clinical Psychopharmacology. 2015; 23(6):486–493. http://doi.org/10.1037/pha0000046. [PubMed: 26280592]

Richter KP. Good and bad times for treating cigarette smoking in drug treatment. Journal of Psychoactive Drugs. 2006; 38(3):311–315. http://doi.org/10.1080/02791072.2006.10399857. [PubMed: 17165374]

Richter KP, Hunt JJ, Cupertino AP, Garrett S, Friedmann PD. Understanding the drug treatment community's ambivalence towards tobacco use and treatment. International Journal of Drug Policy. 2012; 23(3):220–228. http://doi.org/10.1016/j.drugpo.2011.11.006. [PubMed: 22280918]

Robles E, Crone CC, Whiteside-Mansell L, Conners Na, Bokony Pa, Worley LLM, McMillan DE. Voucher-based incentives for cigarette smoking reduction in a women's residential treatment program. Nicotine & Tobacco Research. 2005; 7(1):111–117. http://doi.org/10.1080/14622200412331328448. [PubMed: 15804683]

Rohsenow DJ, Tidey JW, Martin RA, Colby SM, Sirota AD, Swift RM, Monti PM. Contingent vouchers and motivational interviewing for cigarette smokers in residential substance abuse treatment. Journal of Substance Abuse Treatment. 2015; 55:29–38. http://doi.org/10.1016/j.jsat.2015.02.010. [PubMed: 25805668]

Rohsenow D, Martin R, Tidey JW, Colby SM, Monti PM. Treating smokers in substance treatment with contingent vouchers, nicotine replacement, and brief advice adapted for sobriety settings. Journal of Substance Abuse Treatment 72C. 2017 This issue.

Roll JM, Higgins ST. A within-subject comparison of three different schedules of reinforcement of drug abstinence using cigarette smoking as an exemplar. Drug and Alcohol Dependence. 2000; 58:103–109. [PubMed: 10669060]

Roll JM, Higgins ST, Badger GJ. An experimental comparison of three different schedules of reinforcement of drug abstinence using cigarette smoking as an exemplar. Journal of Applied Behavior Analysis. 1996; 29(4):495–505. [PubMed: 8995832]

Roll JM, Madden GJ, Rawson R, Petry NM. Facilitating the adoption of contingency management for the treatment of substance use disorders. Behavior Analysis in Practice. 2009; 2(1):4–13.

Roll JM, Reilly MP, Johanson CE. The influence of exchange delays on cigarette versus money choice: A laboratory analog of voucher-based reinforcement therapy. Experimental and Clinical Psychopharmacology. 2000; 8(3):366–370. http://doi.org/10.1037/1064-1297.8.3.366. [PubMed: 10975627]

Secades-Villa R, García-Fernández G, Peña-Suárez E, García-Rodríguez O, Sánchez-Hervás E, Fernández-Hermida JR. Contingency management is effective across cocaine-dependent outpatients with different socioeconomic status. Journal of Substance Abuse Treatment. 2013; 44(3):349–354. http://doi.org/10.1016/j.jsat.2012.08.018. [PubMed: 22999380]

Shoptaw S, Jarvik ME, Ling W, Rawson RA. Contingency management for tobacco smoking in methadone-maintained opiate addicts. Addictive Behaviors. 1996; 21(3):409–412. [PubMed: 8883490]

Shoptaw S, Landovitz RJ, Reback CJ. Contingent vs. non-contingent rewards: Time-based intervention response patterns among stimulant-using men who have sex with men. Journal of Substance Abuse Treatment, 72C. 2017 This issue.

Shoptaw S, Rotheram-Fuller E, Yang X, Frosch D, Nahom D, Jarvik ME, Ling W. Smoking cessation in methadone maintenance. Addiction. 2002; 97:1317–1328. [PubMed: 12359036]

Sigmon SC, Miller ME, Meyer AC, Saulsgiver K, Badger GJ, Heil SH, Higgins ST. Financial incentives to promote extended smoking abstinence in opioid-maintained patients: A randomized trial. Addiction. 2016; 111(5):903–912. http://doi.org/10.1111/add.13264. [PubMed: 26638126]

Sigmon SC, Stitzer ML. Use of a low-cost incentive intervention to improve counseling attendance among methadone-maintained patients. Journal of Substance Abuse Treatment. 2005; 29(4):253–258. http://doi.org/10.1016/j.jsat.2005.08.004. [PubMed: 16311177]

Sinclair JMA, Burton A, Ashcroft R, Priebe S. Clinician and service user perceptions of implementing contingency management: A focus group study. Drug and Alcohol Dependence. 2011; 119(1–2):56–63. http://doi.org/10.1016/j.drugalcdep.2011.05.016. [PubMed: 21680110]

Sindelar J, Elbel B, Petry NM. What do we get for our money? Cost-effectiveness of adding contingency management. Addiction. 2007; 102(2):309–316. http://doi.org/10.1111/j.1360-0443.2006.01689.x. [PubMed: 17222286]

Sindelar JL, Olmstead TA, Peirce JM. Cost-effectiveness of prize-based contingency management in methadone maintenance treatment programs. Addiction. 2007; 102(9):1463–1471. http://doi.org/10.1111/j.1360-0443.2007.01913.x. [PubMed: 17645428]

Sorensen JL, Haug NA, Delucchi KL, Gruber V, Kletter E, Batki SL, Hall S. Voucher reinforcement improves medication adherence in HIV-positive methadone patients: A randomized trial. Drug and Alcohol Dependence. 2007; 88(1):54–63. http://doi.org/10.1016/j.drugalcdep.2006.09.019. [PubMed: 17056206]

Squires DD, Gumbley SJ, Storti SA. Training substance abuse treatment organizations to adopt evidence-based practices: The Addiction Technology Transfer Center of New England Science to Service Laboratory. Journal of Substance Abuse Treatment. 2008; 34(3):293–301. http://doi.org/10.1016/j.jsat.2007.04.010. [PubMed: 17600652]

Stitzer M, Calsyn D, Matheson T, Sorensen J, Gooden L, Metsch L. Development of a multi-target contingency management intervnetion for HIV positive substance users. Journal of Substance Abuse Treatment, 72C. 2017 This issue.

Stitzer ML, Petry N, Peirce J, Kirby K, Killeen T, Roll J, Li R. Effectiveness of abstinence-based incentives: Interaction with intake stimulant test results. Journal of Consulting and Clinical Psychology. 2007; 75(5):805–811. http://doi.org/10.1037/0022-006X.75.5.805. [PubMed: 17907862]

Stitzer M, Petry N. Contingency management for treatment of substance abuse. Annual Review of Clinical Psychology. 2006; 2:411–434. http://doi.org/10.1146/annurev.clinpsy.2.022305.095219.

Stoops WW, Dallery J, Fields NM, Nuzzo PA, Schoenberg NE, Martin CA, Wong CJ. An Internet-based abstinence reinforcement smoking cessation intervention in rural smokers. Drug and Alcohol Dependence. 2009; 105(1–2):56–62. http://doi.org/10.1016/j.drugalcdep.2009.06.010. [PubMed: 19615830]

Thurgood SL, McNeill A, Clark-Carter D, Brose LS. A systematic review of smoking cessation interventions for adults in substance abuse treatment or recovery. Nicotine & Tobacco Research. 2016; 18(5):993–1001. http://doi.org/10.1093/ntr/ntv127. [PubMed: 26069036]

Tidey JW, Rohsenow DJ, Kaplan GB, Swift RM, Reid N. Effects of contingency management and bupropion on cigarette smoking in smokers with schizophrenia. Psychopharmacology. 2011; 217(2):279–287. http://doi.org/10.1007/s00213-011-2282-8. [PubMed: 21475970]

Tuten M, DeFulio A, Jones HE, Stitzer M. Abstinence-contingent recovery housing and reinforcement-based treatment following opioid detoxification. Addiction. 2012; 107(5):973–982. http://doi.org/10.1111/j.1360-0443.2011.03750.x. [PubMed: 22151478]

Tuten M, Shadur JM, Stitzer M, Jones HE. A comparison of reinforcement-based treatment (RBT) versus RBT plus recovery housing (RBT^{RH}). Journal of Substance Abuse Treatment, 72C. 2017 This issue.

Ussher M, West R, Doshi R, Sampuran AK. Acute effect of isometric exercise on desire to smoke and tobacco withdrawal symptoms. Human Psychopharmacology. 2006; 21(1):39–46. http://doi.org/10.1002/hup.744. [PubMed: 16389665]

Walker R, Rosvall T, Field CA, Allen S, McDonald D, Salim Z, Adinoff B. Disseminating contingency management to increase attendance in two community substance abuse treatment centers: Lessons learned. Journal of Substance Abuse Treatment. 2010; 39(3):202–209. http://doi.org/10.1016/j.jsat.2010.05.010. [PubMed: 20598838]

Walter KN, Petry NM. Patients with diabetes respond well to contingency management treatment targeting alcohol and substance use. Psychology, Health & Medicine. 2015; 20(8):916–926. http://doi.org/10.1080/13548506.2014.991334.

Walters ST, Matson SA, Baer JS, Ziedonis DM. Effectiveness of workshop training for psychosocial addiction treatments: A systematic review. Journal of Substance Abuse Treatment. 2005; 29(4): 283–293. http://doi.org/10.1016/j.jsat.2005.08.006. [PubMed: 16311181]

Wardle MC, Vincent JN, Suchting R, Green CE, Lane SD, Schmitz JM. Anhedonia is associated with poorer outcomes in contingency management for cocaine use disorder. Journal of Substance Abuse Treatment, 72C. 2017 This issue.

Weinstock J, Alessi SM, Petry NM. Regardless of psychiatric severity the addition of contingency management to standard treatment improves retention and drug use outcomes. Drug & Alcohol Dependence. 2007; 87(2–3):288–296. [PubMed: 17005329]

Weinstock J, Barry D, Petry NM. Exercise-related activities are associated with positive outcome in contingency management treatment for substance use disorders. Addictive Behaviors. 2008; 33:1072–1075. [PubMed: 18486352]

Weinstock J, Farney MR, Elrod NM, Henderson CE, Weiss EP. Exercise as a adjunctive treatment for substance use disorders: Rationale and intervention description. Journal of Substance Abuse Treatment, 72C. 2017 This issue.

Weinstock J, Rash CJ, Petry NM. Contingency management for cocaine use in methadone maintenance patients: When does abstinence happen? Psychology of Addictive Behaviors. 2010; 24(2):282–291. http://doi.org/10.1037/a0017542. [PubMed: 20565154]

Willenbring ML, Kivlahan D, Kenny M, Grillo M, Hagedorn H, Postier A. Beliefs about evidence-based practices in addiction treatment: A survey of Veterans Administration program leaders. Journal of Substance Abuse Treatment. 2004; 26(2):79–85. http://doi.org/10.1016/S0740-5472(03)00161-2. [PubMed: 15050084]

Winhusen TM, Brigham GS, Kropp F, Lindblad R, Gardin JG, Penn P, Ghitza U. A randomized trial of concurrent smoking-cessation and substance use disorder treatment in stimulant-dependent smokers. Journal of Clinical Psychiatry. 2014; 75(4):336–343. http://doi.org/10.4088/JCR.13m08449. [PubMed: 24345356]

Wiseman EJ, Williams DK, McMillan DE. Effectiveness of payment for reduced carbon monoxide levels and noncontingent payments on smoking behaviors in cocaine-abusing outpatients wearing nicotine or placebo patches. Experimental and Clinical Psychopharmacology. 2005; 13(2):102–110. http://doi.org/10.1037/1064-1297.13.2.102. [PubMed: 15943543]

Highlights

- Contingency management (CM) is an efficacious intervention for substance use disorders.
- Clinical uptake is not commensurate with evidence for efficacy.
- CM is appropriate for and generalizable to a wide range of patient characteristics.
- Technology and designs sensitive to clinic constraints may further speed adoption efforts.