

# contingency management

## Foundations and Principles

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### *Introduction and background*

The goal of this chapter is to provide an overview of the basic principles and significant issues connected to the use of contingency management interventions in the treatment of addictive disorders. In many respects, this effort can be seen as a companion piece to Petry's (2000) and Kirby, Amass, and McLellan's (1999) excellent guides to the use of reinforcement models in community-based addiction treatment settings.

The structuring of consequences to help shape and change behavior has been used throughout history. Examples include military honors, athletic prizes, progressive educational interventions, and prison reform (Kazdin, 1978). While aversive or punitive methods have been used in order to reach goals, the systematic use of positive reinforcements or pleasurable consequences has been associated with humanistic efforts to improve problematic individual or social conditions. For example, Alexander Maconochie was able to humanely transform part of the prison complex in Australia in the mid-19th century by developing a system based on positive reinforcements and points (Kazdin, 1978; ElectricScotland, 2005). Previously, the Australian jails had been known for their brutality.

While many of these people used rewards or incentives in an intuitive or nonsystematic way, the scientific foundation of the work rests primarily on the efforts of Thorndike (Dewsbury, 1998; Thorndike, 1998) and Skinner (1983). Both of these scientists tried to understand the basic principles of learning through experiments involving animal behavior. Beginning in the late 1940's and 1950's, students of Skinner began to apply his principles for the treatment of a variety of serious conditions that affect humans. They worked with long-term schizophrenic patients in state hospitals, developmentally-delayed individuals, and juvenile delinquents (Kazdin, 1978). These efforts would take the form of what became known as the "token economy."

The addictive disorders would begin to be a focal point for this work in the 1960's. From an operant or Skinnerian perspective, drug use is seen as a form of "drug self administration" (Bigelow, Stitzer, & Liebson, 1984, p. 37). In essence, drug use is maintained by the effects of the substance, and use can be seen as a form of conditioned behavior. Treatment would involve changing the reinforcement structure currently operating in the patient's life in which drug reinforcement is dominant to one which, in most cases, will involve the reinforcement of abstinence or behaviors that are thought to compete with drug use. Ultimately, the intent is to reduce and eliminate drug use through a shift in the overall reward structure of the individual's life (Bigelow et al., 1984). The application of these principles resulted in a series of exciting studies done with alcohol-dependent patients by Cohen, Liebson, and Bigelow at Johns Hopkins University (Bigelow & Silverman, 1999; Cohen, Liebson, Faillace, & Allen, 1971) and by Miller (1975) in Mississippi. The studies by Cohen et al. (1971) demonstrated that alcoholics could maintain control over their drinking if appropriate contingencies were in place that supported non-alcoholic patterns of alcohol ingestion. In the 1970's, Dr. Maxine Stitzer, also at Johns Hopkins, began to use the principles of operant conditioning with methadone patients (Stitzer, Iguchi, Bigelow, & Kidorf, 1993) and demonstrated that during-treatment use of opiate and sedative drugs could be reduced by offering desirable rewards based on drug abstinence. Despite the success of these early studies, the addiction treatment field did not widely embrace these interventions in practice (Bigelow & Silverman, 1999; Higgins, Heil, & Lussier, 2004).

It is interesting to note as a historical footnote that the early methadone studies at The Rockefeller University, which took place in the early 1960's, did embody many of the desirable aspects of the therapeutic milieu that is associated with contingency management (Kellogg et al., 2005; Kirby et al., 1999). In contrast to the harshness found in other drug treatment programs at that time, the staff and physicians approached the patients in manner that was supportive and concerned. Progress was reinforced and setbacks were treated with encouragement. Take-home doses of methadone were available to patients who were maintaining abstinence from heroin. There was a culture of positive reinforcement; however, it was not a formally-instituted program of operant conditioning (Dole, Nyswander, & Kreek, 1966; M. J. Kreek, personal communication, March 13, 2006).

The next phase began in the late 1980's when the paradigm was applied to users of cocaine and "crack" cocaine by Dr. Stephen Higgins at the University of Vermont. The extraordinary effectiveness of reinforcement programs in helping patients curtail the use of these drugs led to a major revitalization of interest in operant approaches (Higgins et al., 2004). Higgins' work was further developed by Dr. Ken Silverman, also at Johns Hopkins, who used it extensively with inner-city populations (Silverman et al., 1996). He also did important work on incentive magnitude (Silverman, Chutuape, Bigelow, & Stitzer, 1999), extended duration incentive program (Silverman, Robles, Mudric, Bigelow, & Stitzer, 2004), and on the translation of incentive programs into a novel employment-based model (Silverman, Svikis, Robles, Stitzer, Bigelow, 2001).

Dr. Nancy Petry, of the University of Connecticut Health Center, went on to create the "fishbowl" method of incentive delivery, a model that reduces cost by reinforcing patients some, but not all, of the time, and by varying the value of reinforcements that they can receive (Petry, 2000; Petry, Martin, Cooney, & Kranzler, 2000). The importance of this work was that it allowed for a significant reduction in cost without a corresponding loss in effectiveness. This was also a major breakthrough in terms of making these incentives more acceptable to community-based treatment programs.

In 2000, the National Institute on Drug Abuse (NIDA) formed the Clinical Trials Network. This was a nationwide collaboration between scientific researchers in the addictions and community-based treatment programs. One of the first interventions approved for study was an abstinence-incentive protocol based on Petry's (Petry et al., 2000) work. Labeled MIEDAR (Motivational Incentives to Enhance Drug Abuse Recovery), this study was aimed at reducing cocaine use in patients receiving treatment in either methadone or medication-free community-based clinics. The success of this study (Peirce et al., 2006; Petry et al., 2005b) led to the launch of a national dissemination effort in collaboration with the network of Addiction Technology Transfer Centers (ATTC) supported by the Substance Abuse and Mental Health Services Administration.

### *Reinforcements and punishments*

Incentives or contingencies can be divided into two types – reinforcements and punishments. The goal of reinforcement is to increase the occurrence of a behavior while the goal of punishment is to decrease the occurrence of a behavior. Not infrequently, punishment involves the presentation of some kind of aversive stimuli when the undesired behavior occurs. An example of this would be receiving a ticket for speeding.

There are two kinds of reinforcements – positive and negative. Positive reinforcement involves the presentation of stimuli after a behavior occurs, while negative reinforcement involves the removal of stimuli once a behavior has occurred. Another version of negative reinforcement is what is called Avoidance Learning. In this situation, patients act to avoid a potentially aversive or undesirable consequence. An example of this would be when patients provide the methadone clinic with a copy of their pay stub to avoid losing a preferential medication time.

The core difference between reinforcement and punishment is not whether it is pleasant or unpleasant; it is whether the goal is to increase or to decrease the likelihood of a behavior occurring. While all kinds of models have been tried in addiction treatment settings, positive reinforcement schedules are increasingly the norm. In large part, this is the case because they are therapeutic and enjoyable for both patients and staff. Negative reinforcements and punishments, while effective at times, are unpleasant to use and may result in patient dropout (Stitzer et al., 1984) and other forms of resistance (Kazdin, 1994). Punishment, in general, has not been a very effective method in substance abuse treatment (McLellan, 2001).

### *Principle-based dissemination*

In what may be seen as an example of principle-based dissemination, one of the central goals of the NIDA/ATTC awareness project is to familiarize clinicians and administrators with the core principles involved in designing and implementing a motivational incentives program. The concept is that if treatment centers are willing to design interventions that incorporate the seven principles described below, then they are on a path toward creating an effective program.

### *Seven principles of contingency management*

Building on the work of Kazdin (1994), there are seven core issues that all behavior modification or token economy systems will need to address as they are created in terms of altering substance use behavior (Petry, 2000). These are: (1) the target behavior; (2) the target population; (3) the type of reinforcer or incentive; (4) the magnitude or amount of incentive; (5) the frequency of the incentive distribution; (6) the timing of the distribution of the reinforcement; and (7) the duration of the reinforcement intervention.

1. *Target behavior:* The target behavior is typically something that is problematic and in need of change. It is, however, vital that it be observable and measurable. The target behavior is the centerpiece of the behavioral contract, which, in turn, provides the framework within which incentives can be successfully used (Petry, 2000). Through the use of a contract, both patients and staff can be clear about what is required to receive an incentive. The ultimate behavior change that most treatment programs strive for is the cessation of drug use, and this goal has consistently been a central focus of research studies using this method. In many cases, abstinence has been demanded outright for reinforcer delivery, while in others, a gradual reduction in the use of a substance such as cocaine or nicotine has been reinforced (Lamb, Morral, Kirby, Iguchi, & Galbicka, 2004; Preston, Umbricht, Wong, & Epstein, 2001).

While drug abstinence is an excellent target for incentive intervention, some treatment programs have found this process to be difficult to implement. A major reason is that to be effective, the urine toxicology testing must be done in a manner that provides immediate or rapid results. Sending a specimen off to a laboratory and giving the reinforcements several days later has been shown to be an ineffective treatment (Petry, 2000).

Sometimes programs may opt to target behaviors that they hope will conflict or be incompatible with drug use (Kazdin, 1994). These alternative targets could include group attendance (Petry, Martin, & Simcic, 2005a; Kellogg et al., 2005), working on treatment plan goals (Kirby et al., 1999; Petry, Tedford, & Martin, 2001a), and following up on needed medical care (Elk, 1999; Sorenson, Masson, & Coperland, 1999).

*Reward versus reinforcement:* An important consideration in choosing target behaviors for incentives programs is the question of the level of difficulty involved in exhibiting that behavior. Sometimes when programs consider using incentives, they begin by trying to acknowledge “good” behavior. The reward approach typically involves creating a system in which the “bar” is set very high. The criteria could include accomplishments like maintaining abstinence for one month, getting a high school equivalency diploma, or maintaining employment for six months.

These are all major accomplishments and are worthy of celebration in the treatment setting. These models have been labeled “reward” models (Kellogg et al., 2005) because they seek to acknowledge change and achievement. The problem is that they are often not powerful enough to motivate behavior change in severely addicted patients. The risk is that only the most motivated patients, those who are probably least in need of external reinforcement, will receive an incentive, while the more troubled or addicted patients do not. In a sense, these models rely on the internal motivation of the patients for their success.

The “reinforcement” model (Kellogg et al., 2005) emphasizes breaking the goal down into very small steps and then reinforcing each of the steps as they occur. Especially early in treatment and during the change process, it is desirable to give reinforcements with great frequency. In short, the intention, at least initially, is to make it easy to earn an incentive.

*Shaping and successive approximations:* In a number of successful contingency management studies (i.e., Peirce et al., 2006), a significant number of patients never received a reinforcer because they were unwilling to exhibit the target behavior. This is clearly a significant problem. There are two ways that this can be approached. One is to increase the amount of reinforcement (and this will be discussed below), and the other is to initially lower the requirements for earning a reinforcement; in other words, alter the target behavior.

Shaping or the use of successive approximations (Kazdin, 1994) is a commonly-used behavioral strategy to help elicit and sustain rarely-occurring behavior, and this kind of intervention has been utilized successfully with substance-dependent patients. Preston et al. (2001) used a reinforcement strategy in which cocaine-dependent patients were initially reinforced for modest reductions in the level of cocaine metabolites found in their urine toxicology samples. The level required to receive a reinforcement was gradually decreased until abstinence was the criteria for earning an incentive. The use of shaping proved to be a very effective way to intervene with patients.

Lamb et al. (2004) have used several models building on the same principle to reduce tobacco use in smokers. On a more clinical level, one New York City Health and Hospitals Corporation counselor reported that she reinforced a patient for reducing his drug use from two drugs to one drug (see also Budney et al., 1991). These kinds of interventions can fit well within a “gradualist” framework (Kellogg, 2003; Kellogg & Kreek, 2005) and help facilitate the kind of affirming therapeutic climate that is favored by contingency management proponents (Kirby et al., 1999).

2. *Choice of target population.* While it might be ideal to provide reinforcements for all of the patients in a program, this may not be feasible or even necessary. This means that choices will need to be made as to which group or subpopulation to target with reinforcement-based interventions. For example, clinicians could target those who are not responding to treatment, regardless of drug of choice. Another would be to target new patients so as to help increase the likelihood that they would stay in treatment. A third would be to target the users of a specific substance. Given the highly destructive nature of methamphetamine use and addiction (Shoptaw et al., 2005), only providing reinforcement for methamphetamine abstinence could be an important clinical intervention. This is not to say that concomitant

marijuana or alcohol use are not serious problems, it is just that, given limitations in resources, it is perhaps wisest to go after the drug that is having the most immediate deleterious effect – not only to the patient, but also to their family and community. Lastly, one could work with particularly vulnerable populations, such as dually-diagnosed patients or pregnant women (Elk, 1999; Shaner, Tucker, Roberts, & Eckman, 1999).

*3. Choice of reinforcer:* The choice of reinforcer or reinforcers is, of course, a crucial element in the design of a motivational incentives program. Incentives that are perceived as desirable are likely to have a much greater impact on behavior than those that are perceived as being of less value or use. Three basic types of incentive programs have been used: (a) contingent access to clinic privileges; (b) on-site prize distribution; and (c) vouchers or other token economy systems.

The first type of incentive program involves the utilization of privileges that already exist within a clinic setting. Stitzer and colleagues (1993) have focused on this approach in methadone clinics where their studies showed that methadone take-homes privileges can serve as a powerful reinforcer. A variant of this approach is to take the goods and services that patients are already receiving on a noncontingent basis, and, instead, distribute them on a contingent basis. Miller (1975), in a classic study, found that making access to social services and employment contingent upon sobriety led to significant decreases in alcohol consumption and arrests.

The advantages of using existing clinic privileges as reinforcers are that the incentive program can be implemented with virtually no added cost. Further, there is research showing that these types of rewards can lead to decreases in drug use. However, a privilege-based system may not be sufficiently powerful to help everyone who is having difficulty initiating and maintaining abstinence.

The second type of reinforcement that can be used for incentive programs involves the actual distribution of tangible or material goods when a desired behavior is exhibited. This is exemplified in Petry's (Petry et al., 2000) fishbowl model. After an abstinent patient has drawn a chit from the fishbowl that denotes a prize, they are allowed to select their incentive reward immediately from the prize cabinet. This can be a powerful and salient way to offer reinforcements. Recognizing that the potency of a reinforcer is based on how desirable it is to patients, one way of maximizing the impact of this approach is to do a survey of the patients and find out what prizes they would see as desirable. A related way is to ask patients who are offered the intervention what they might want to work for and make sure that these items are available in the prize cabinet.

A third model involves the use of tokens or their derivatives. Pickens and Thompson (1984) described an in-patient program that ran on a point system. Points were given for engaging in activities on the ward as well as for meeting specific treatment plan goals, including completion of a sedative detoxification program, and the points could then be redeemed for goods or privileges. The point system was also organized to increase the frequency of therapeutic encounters between patients and staff. The point system was initiated on the ward and then continued after they had left the facility. In an interesting twist, not only the patient, but also their partner received reinforcements when a treatment plan goal was achieved.

An equivalent model involves the use of vouchers. Vouchers function the same way as money, and they can be exchanged for goods and services. This approach is represented in the work of Higgins (Higgins et al., 2004) and Silverman (Silverman et al., 1996). In a voucher-based system, patients essentially build up a bank account. When they decide to cash it in for goods and services, they must negotiate this with their counselor. While they do not have unlimited choice, they do have a variety of options and this, presumably, helps to increase the power of the incentives (Higgins et al., 1994; 2004).

A wide range of specific reinforcers has been used in research and treatment settings. Some of the lower-cost items that have been used in prize systems (Petry et al., 2000, 2004, 2005a, b) and the applied model utilized by the New York City Health and Hospitals Corporation programs included "movie passes, transportation vouchers ("metro cards"), McDonald's coupons, calendars, gift certificates for major department stores and music outlets, date books, tools, clothes, books, tee-shirts, microwaves, water bottles, sunglasses, things for children, toiletries, food, and candy" (Kellogg et al., 2005, p. 61). Other reinforcers have included money, services, recreational activities, and the payment of bills. A recent paper (Petry, Alessi, Marx, Austin, & Tardif, 2005) provided evidence that prizes are at least equally reinforcing to vouchers in changing behavior.

Anecdotal reports support the idea that reinforcement desirability may change over time; that is, prizes or vouchers that are seen as desirable in the early stages of the recovery process may seem less so later on. One clinical program found that, at first, patients were happy getting reinforcements as soon as they had attended a group, but over time, they became interested in developing a banking system in which they could build up a balance and then cash it in for a higher value reinforcement. It is possible that a program would want to start with a prize system and then switch to a voucher system or give the patients a choice as to which they would prefer to use as a reinforcement method.

It is critical to remember that the prizes or vouchers chosen need to be attractive to the patients; they do not have to be attractive to the staff. The appeal of the reinforcer taps into what Kazdin (1994) has referred to as the quality or desirability of a reinforcer. Anecdotal clinical reports indicated that one program got into a conflict because some of the staff felt that the patients would respond well to coupons for a fast-food restaurant. Other staff members wanted the patients to receive coupons for health food instead. In a situation like this, it might be useful to survey the patients and see which they would prefer, or, alternatively to offer both as options. It is possible that as the healing process continues and the capacity for self-care improves (Brehm & Khantzian, 1997), patients will begin to make healthier choices from among the available options.

*Money as a reinforcer:* The use of financial reinforcements or money sometimes causes concern among both treatment providers and researchers. Money is what is known as a universal reinforcer, that is, it is a reinforcer that is likely to appeal to the vast majority of participants. In surveys of drug users (Kirby et al., 1999; Stitzer et al., 1984; see also Rosado, Sigmon, Jones, & Stitzer, 2005), money ranked among the most favored incentives. Money has, in fact, been used successfully in a number of studies. This has included studies targeting cocaine use (Elk, 1999), compliance with medical treatment (Elk, 1999), and integrating oneself into aftercare and the larger community following an in-patient treatment (Pickens & Thompson, 1984). It has also been used to reduce drug use in severely-ill psychiatric patients (Shaner et al., 1999; Sigmon, Steingard, Badger, Anthony, & Higgins, 2000). Money is also one of easiest reinforcers to use. However, counselors and treatment providers are typically wary of the use of money because they fear that it will serve as a trigger for a relapse. While this makes some clinical sense when a patient is getting a large benefit or paycheck, it makes less sense in a contingency management situation. In this setting, the amount of money received at any one time is small. In studies in which drug use is a targeted behavior, if patients use the money for the purposes of intoxication, it is self-defeating because it prevents them from receiving further payments. In addition, the vast majority of drug-using and addicted patients are used to handling money in everyday life to meet basic needs. Ironically, in some situations, it is a lack of money that interferes with treatment success as patients do not have the resources to cope with the ordinary and extraordinary crises that they may encounter.

Looking at the research on this issue, Rothfleisch and colleagues (1999) surveyed participants in a contingency management study on the way that they used their money. Patients were encouraged to be honest and there were no consequences for saying that they spent it on drug use. The result was that 98% of the time, the money was used for purposes unrelated to drug use. A reason why this issue is so important is, given a situation of limited resources, financial incentives will provide the greatest impact per dollar spent (Petry, 2000). Programs may want to try introducing cash reinforcers cautiously, and switching patients who are having difficulty with it to alternate models (i.e., vouchers). In addition, they could ask patients which they prefer as some may see money as a trigger and prefer to receive vouchers (Rosado et al., 2005). Although the use of money as a reinforcer needs to be approached with clinical sensitivity, the power and flexibility of this kind of model should not, however, be discarded lightly.

*4. Incentive magnitude:* Interwoven within the discussion as to which reinforcer to use is the question of how much reinforcement to provide. The classic work of Higgins (Higgins et al., 1994; Higgins et al., 2004) showed that reinforcements could have very powerful effects on drug use in cocaine-dependent patients. These studies utilized higher magnitude reinforcements such that each patient had the possibility of earning approximately \$1000 over a six-month period of time. Petry's (Petry et al., 2000) "fishbowl" or abstinence bowl model has been very popular because it allows for the use of low-cost incentives using an intermittent reinforcement schedule. This was an extremely creative approach that helped to dramatically reduce costs while retaining efficacy and effectiveness (Peirce et al., 2006; Petry et al., 2005b).

Nevertheless, both of these incentive approaches fall short of universal efficacy and effectiveness, especially in methadone maintenance programs, where a substantial percentage of patients may not respond with decreased during-treatment drug use when offered abstinence-based reinforcement. Silverman and colleagues have conducted studies to determine whether this can be addressed by increasing reinforcement magnitude. Drawing upon a subsample of cocaine-using, heroin-dependent patients who had failed to respond to a voucher incentive in a previous study that offered \$1155 over a 3-month intervention (Silverman et al., 1996), Silverman examined the impact of offering no reinforcements, low-level reinforcements (1/3 that used in the first study), and high-magnitude reinforcement (three times that used in the first study) on cocaine use. All patients underwent all each of the three conditions, and the order in which they went through them was randomized.

The results clearly demonstrated the importance of incentive magnitude in this treatment-resistant group. During the three nine-week intervention sessions, with no reinforcements 8% of the samples were cocaine negative, with low-magnitude reinforcement, 14% were cocaine negative, and with high-magnitude reinforcement, 46% were cocaine negative. In terms of periods of sustained cocaine abstinence, with no incentives, 0% provided cocaine-free samples for four weeks or more, with low-magnitude incentives, 5% provided cocaine-free samples for four weeks or more, and with high-magnitude incentives, 45% achieved 4 to 8 weeks of sustained cocaine abstinence. As Silverman and colleagues (1999) noted, the magnitude of the reinforcement will determine the degree to which the intervention is effective.

Additional research demonstrated that there were limits as to how low the reinforcement levels could go before they were no longer effective. In a study of low (\$240 over three months), very low (\$80 over three months), and no reinforcement conditions, the low \$80 incentive group did no better than the no-reinforcement group in terms of positive behaviors and abstinence (Petry et al., 2004). An approach that does not appear to have been studied is the use of the abstinence bowl or another intermittent reinforcement model with high-magnitude incentives. Further research may examine the relationships between probabilities and magnitudes of reinforcement and outcomes.

Reinforcement magnitude studies have clear implications for treatment and these can be approached in a number of ways. First, programs could use low-cost incentive systems with the knowledge that they will not improve treatment outcome for all patients, but with the belief that this was a good start and that it might be possible to build on this using psychosocial or pharmacological interventions. They could also take the stance that psychostimulant dependence, for example, is a difficult problem to work with, and that they will do the best they can with what they have, knowing that they will not be universally successful.

Another way to approach this through the choice of target behavior. This is because the magnitude of reinforcement needed to sustain change may differ for different behavior targets. For example, Petry et al. (2005a) found that, using the same reinforcements, their combined group attendance/cocaine use intervention resulted in 90% of the patients attending groups, while only 50% of them provided a cocaine-free urine toxicology sample. A related idea would be the use of different levels of reinforcement for reinforcing different behavior patterns. For example, one treatment program used reinforcements to encourage patients to attend groups. The clinical staff realized, however, that groups like dance therapy might lead patients to feel more vulnerable or self-conscious, so they gave higher magnitude incentives for attendance at those groups than for groups that focused on drug use and relapse. If incentives were going to be provided to increase the numbers of patients who are addressing their hepatitis C issues, it might be wise to provide higher levels of reinforcement for agreeing to a liver biopsy than for having the initial blood test done.

The cost of behavior change may also vary across different sub-populations within a clinic may vary. Polysubstance users, for example, may need greater amounts of reinforcement than patients who using only a single substance.

Lastly, there may be significant difference among patients that contribute to a greater or lesser response to incentive programs. Stitzer et al. (1984) felt that such factors could include: (1) the level of past and present drug use; (2) the patient's history of success or failure at stopping the use of drugs; (3) the presence or absence of Antisocial Personality Disorder; (4) the nature and vitality of their social networks; and (5) their own personal historical responsiveness to reinforcements and punishments as motivators for behavior change. Thus, stable methadone patients who work, provide for their family, and who use drugs on occasion might not need the same level of intervention as chronic users with chaotic lifestyles. For some patients, it may be necessary to design individualized treatment plans (Pickens & Thompson, 1984).

At its core, the issue of reinforcement magnitude may be closely tied to the overall goal and philosophy of the program. What do we want to accomplish? With which patients? What level of success are we willing to accept? How important is it in the overall picture. For example, pregnant women using substances might be a group that would be particularly well-suited for higher-magnitude reinforcements based on public health gains expected from successful interventions (Higgins et al., 1994).

*5. Frequency of incentive distribution:* Another factor that is intertwined with the choice and magnitude of the incentive is the frequency of its distribution. This is also known as the schedule of reinforcement (Kazdin, 1994; Petry, 2000). The decision about reinforcement frequency is likely to be connected to such factors as the target behavior, the resources available, and the amount of clinical contact desired. This means that programs would need to wrestle with the question of whether to reinforce a behavior every time that it occurs, or only some of the time that it occurs. For example, a fixed ratio of 1 (FR1) means that each time a behavior occurs, it will be rewarded with an incentive. An FR3 means that 3 behaviors have to occur before an incentive is received. In the case of group attendance, in the first model, patients would receive a reinforcer after each group; in the second, they would need to attend 3 groups before getting anything. A variable ratio (VR) model refers to an average rate of reinforcement. The Clinical Trials Network MIEDAR study used a schedule in which every negative sample was reinforced with a draw from the prize bowl, but on average only every other draw resulted in a tangible item. Sometimes they would receive a prize more frequently and sometimes less, but on average it would be every other time. This model works well in part because the patients receive a secondary reinforcer (the chance to draw chits) every time they exhibit the desired behavior. In general, it may be useful to begin by reinforcing patients frequently and then, when the behavior change is well established, the frequency of reinforcement can be reduced (see Kirby et al., 1999).

*6. Timing of the incentive:* The question of the timing of the presentation of the reinforcement is crucial because poor timing can severely undermine even the most well-planned intervention. The core principle here is that the reinforcement needs to follow the exhibition of the target behavior as closely as possible. Giving the reinforcement before the behavior appears will not be reinforcing, nor will giving a reinforcement a week later (Kirby et al., 1999). In the studies using methadone take-home doses (Stitzer et al., 1993), it was important that the patients received the doses

as immediately as possible – perhaps within 24 to 48 hours at the outside. In models using points and vouchers, the actual goods and services are delivered at a later date, but the token, point, or voucher is delivered when the target behavior is exhibited.

Bickel and associates (Bickel & Marsch, 2001; Bickel, Madden, & Petry, 1998; Petry, Bickel, & Arnett, 1998) have extensively studied the problem of delay discounting in addicted populations. Delay discounting means that the value of a reinforcer diminishes as the time until it is received increases. While this is true for all people, it is much more dramatically true for those who are drug dependent. For example, in a controlled study, opioid-dependent subjects would be willing to accept \$400 now as a replacement for \$1000 one year from now. Normal volunteers, however, would only accept \$400 now if they would have to wait five years to get the \$1000 (Bickel & Marsch, 2001). This kind of pattern has been found to be true for those using a variety of substances, and it speaks to the level of impulsivity found in this population. The conclusion is that the more rapidly the incentives are distributed, whether material or symbolic, the more effective they will be.

*7. Duration of the intervention:* The last factor that must be considered is the duration of the intervention or how long to continue to provide the incentives for desirable behavior. The prizes and vouchers provided in these projects are external contingencies. Ultimately, patients will need to internalize the recovery process and find or develop naturally-occurring reinforcers that will support their recovery-based and nonaddict identities (Biernacki, 1986; Kellogg, 1993; see also Lewis & Petry, 2005). Many of the recent studies, including the NIDA Clinical Trials Network, have provided patients with three months of reinforcements. Although consistently effective while in place, three months appears to be an insufficient amount of intervention time to create lasting change. The issue here may be that the psychosocial treatments that accompany the incentives are unable to address both the underlying addictive disorder and promote the appropriate behavior change needed for a lasting drug-free lifestyle within this time frame. A lengthier duration of incentive use would help make this happen.

The issue of incentive duration is connected to the issue of relapse. While the data are mixed (e.g., Higgins, Wong, Badger, Ogden, & Dantona, 2000), patients, after the removal of incentives, have at times returned to pre-intervention levels of drug use or to levels of drug use that were indistinguishable from those of the control group. Paradoxically, relapse under these circumstances may be a sign of a successful intervention (Bigelow et al., 1984; Stitzer et al., 1984). That is, if a treatment is effective, then its removal may lead to a previous behavior. The question is whether there are ways to change behavior during treatment and/or fadeout treatment in a way that can sustain lasting change. In many research studies, the distribution of incentives is terminated at a given point in time, regardless of the progress of the patient. Silverman et al. (1999) make the point that in a clinical setting it would be much better to adapt treatment duration to patient behavior. They suggest that this could be done by gradually increasing the requirements necessary to receive an incentive while lowering the level of magnitude of the incentive given. Eventually the whole intervention could be faded out (see Kirby et al., 1999).

Another possibility is to view contingency management as the psychosocial equivalent of methadone and to propose that treatment duration indefinite and determined by clinical need. Silverman et al. (2004) began to address this issue in a recent study focused on cocaine-dependent patients in methadone treatment. Patients were randomized to one of three groups – treatment as usual, treatment as usual plus an opportunity to receive a methadone take-home dose if the patient provided cocaine- and opiate-free urine samples, and treatment as usual plus take-home dose and vouchers for cocaine-free samples. This was a 12-month study, and the differences between the three groups were quite striking.

The voucher group achieved a mean of 19 weeks of continued abstinence from both substances. The take-home-only group achieved a mean of 6.3 weeks, and the control group achieved a mean of 2.3 weeks over a one-year period of time. In terms of patients reaching six months or more of continuous cocaine abstinence, 42% of the voucher group achieved this, 8% of the take-home only group also achieved this, and 0% of the treatment as usual group were able to maintain this level of abstinence. Thus the voucher intervention promoted very lengthy periods of illicit drug abstinence in a substantial percentage of participants. It was important to note, however, that these changes could not be maintained without incentives. At 26 and 52 weeks after the discontinuation of the incentives, there were no significant differences among the groups. Thus, if behavior change of this magnitude and duration is deemed desirable by treatment providers, it may be necessary to maintain interventions for long periods of time.

The theme that is emerging is that incentives are an extremely effective treatment for drug use and that they should increasingly be considered as a long-term, not a short-term, intervention. While this may appear daunting on the one hand, it actually affirms the fact that there is now a very effective treatment tool available. Future cost-benefit and cost-effectiveness analyses will help to shape clinical and policy decisions about the long-term use of incentive programs.

#### *The importance of ambivalence and deprivation*

There are two other important issues to consider in a discussion of incentive-based treatment strategies. Contingency management shares at least one commonality with another popular, evidence-based treatment, Motivational

Interviewing (Miller, 2003). They both see the patient as existing in a state of ambivalence about their drug and alcohol use. On the one hand, the patient may be experiencing some negative consequences such as legal difficulties, family stress, and health problems, while on the other, their use of drugs may bring some pleasure and reduction of psychic or physical pain. In addition, for some, the drug-using lifestyle may provide its own pleasures and excitements. From a motivational interviewing perspective, the goal is to work with the ambivalence to create a sense of inner conflict or cognitive dissonance that would help the patient make a decision to pursue a path toward recovery (Miller, 2003).

Contingency management treatments have the same goal, but it seeks to reach this end by reducing the relative value of the contingencies that support drug use through increasing the incentives that support abstinence. As abstinence grows in attractiveness, drug-using behavior should diminish in desirability. A number of writers have emphasized the importance of making treatment attractive and reinforcing (Bickel et al., 1998; Marlatt & Kilmer, 1998). This may be particularly important if, as Greaves (1974) has argued, addictive people frequently have disturbances in their ability to feel and experience pleasure. For many, it may be a deficit in pleasure, not hedonism, that is the force that drives addictive behavior. Certainly patients seem to respond when a general culture of affirmation and support is integrated into a program that uses incentives (Kellogg et al., 2005).

One of the reasons why this is important is because the recovering person may, in fact, be in a state of deprivation. That is, many of the benefits of recovery do not immediately come to those who have stopped using. In fact, they may have given up what they perceived as the benefits of using, only to find that are now faced with a whole new array of difficulties.

Ultimately, the goal is for patients to find naturally-occurring reinforcers. Again, this may be easier said than done. As society continues to place barriers to the reintegration of those with addictions and criminal justice histories, access to nondrug reinforcers becomes more constricted, and the length of time that they may need therapeutically-supplied incentives may need to increase.

#### *Barriers to the adoption of incentive programs*

All innovations in the way things are done breed resistance (Backer & David, 2005). The use of incentives not infrequently elicits strong negative responses from treatment providers at all levels (Kellogg et al., 2005; Petry & Bohn, 2003). There are, perhaps, two factors that contribute to this. The first is that many providers are not intimately familiar with operant conditioning theory and do not understand that the process of recovery has, as a major component, a restructuring of the balance between drug-related and non-drug-related sources of pain and pleasure. In the past, disease models of addiction were actually seen as a major obstacle to the adoption of incentives in the field of alcohol treatment (Bigelow & Silverman, 1999). That said, as therapists become more comfortable with the concepts of reinforcement and punishment, they frequently realize that they are already using these principles informally at some level. They also begin to see how they can purposefully use them to find potential solutions to existing problems.

The second area of difficulty is that addictive disorders, unlike almost any other psychiatric diagnosis, are conceptualized not only along a continuum of health and illness, but also along a continuum of "good and evil" (Kellogg & Triffleman, 1998). This leads to covert and perhaps overt moral judgments about patients' behavior. This typically takes the form of questioning why a program should be giving things to patients "for doing things they should do anyway" (Petry et al., 2005a, p. 358).

Once staff members witness first-hand the positive impact of incentive programs on their patients, these objections and misgivings usually disappear (Kellogg et al., 2005; Petry & Bohn, 2003). Seeing patients decrease their drug use, increase their attendance at groups, and become more connected to the program speaks to the staff member's desire to promote healing in their patients. It is especially profound when very troubled or disturbed patients start to change (Kellogg et al., 2005; Petry et al., 2001b). On a clinical level, the use of incentives can be more than just the distribution of points, vouchers, and prizes; it can also be a way of developing a therapeutic culture centered on affirmation and celebration (Kellogg et al., 2005; Pickens & Thompson, 1984).

#### *Conclusions*

This chapter has provided an overview of the core principles involved in the use of contingency management along with a brief discussion of issues that may relate to the use of reinforcements in addiction treatment programs. While detailed treatment manuals models are available (Budney & Higgins, 1998; Petry & Stitzer, 2002), the field may be reaching a stage in which principle-based dissemination becomes the more useful approach. That is, as programs gain an understanding of the seven core concepts, they will be able to use their clinical creativity to develop interventions that will match the specific needs of their patients and the goals of their program (i.e., Kellogg et al., 2005). It is our hope that the NIDA/ATTC dissemination initiative will provide treatment programs with the motivation and the tools necessary to effectively utilize these powerful treatment interventions. As awareness of their utility and familiarity with the principles and methods underlying incentive-based interventions increases, this should result in the expanded adoption of these powerful interventions by community treatment providers.

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