

CHAPTER 1

INTRODUCTION

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Substance use disorders (SUDs) represent a highly prevalent and costly public health problem in almost all modern societies. In the United States, for example, approximately 18% of the population experiences an SUD at some point in their lifetime (e.g., Anthony & Chen, 2004), with the economic costs due to lost productivity and increased morbidity and mortality estimated to be approximately \$500 billion annually (Office of National Drug Control Policy, 2004).

There has been excellent progress in overcoming the social stigma associated with SUDs and recognizing them as chronic medical disorders and also in developing effective, scientifically based treatments. Nevertheless, much work remains to be done. Many who have an SUD still fail to seek formal treatment. Among those who do seek treatment, premature treatment termination, ongoing drug use, and relapse back to drug use following treatment termination remain common problems. While such recalcitrance is not unique to SUDs and is also seen with other chronic medical disorders such as diabetes and hypertension, the serious adverse consequences associated with SUDs demand an ongoing and concerted effort to develop more effective interventions to prevent and treat them (McLellan, Lewis, O'Brien, & Kleber, 2000).

CONTINGENCY MANAGEMENT FOR SUDs

One strong need in the area of treatment development for SUDs is for interventions that motivate individuals to change their behavior. Indeed, a waxing and waning commitment to and ambivalence about change are common characteristics of SUDs. Contingency management (CM) is one effective approach to addressing this need. CM interventions are based on operant conditioning and involve the systematic application of behavioral consequences to promote changes in drug use or other therapeutic goals such as attendance at therapy sessions and medication compliance, among others. This volume provides detailed reviews on the most creative and efficacious approaches to using CM to treat SUDs. Nationally and internationally recognized experts authored each of the chapters, and they cover a strikingly wide range of different types of SUDs, patient populations, and treatment settings. Indeed, this breadth of CM is an impressive feature of this treatment approach that we fully anticipate will be underscored further in the future as still others among the myriad individual and societal problems associated with SUDs are tackled using CM.

Scientific Rationale

The scientific rationale for CM is rooted in an extensive scientific literature demonstrating a robust role for operant conditioning in the genesis and maintenance of drug use, including repeated use, abuse, and dependence. Among the most fundamental scientific observations regarding the role of operant conditioning in SUDs was the revelation that most commonly abused drugs serve as unconditioned positive reinforcers in laboratory animals (Deneau, Yanagita, & Seevers, 1969). For example, normal laboratory animals will learn arbitrary operant responses like pressing a lever or pulling a chain when the only consequence for doing so is the receipt of an injection of a prototypical drug of abuse such as an amphetamine, barbiturate, cocaine, or morphine. When we substitute a drug that humans rarely abuse (e.g., antipsychotic medication), the animals discontinue lever pressing. The animals need not be made physically dependent on abused drugs for them to function as reinforcers. Indeed, relatively little training of any sort is necessary. The animals appear to be biologically prepared for the neuropharmacological effects of most commonly abused drugs to function as positive reinforcers in much the same way as they are prepared for food, water, and sex to do so. Physical dependence, tolerance, and withdrawal influence patterns of drug consumption in these arrangements, but the evidence shows that those states are best understood as consequences of drug use rather than necessary conditions for voluntary drug use to emerge. Perhaps even more striking than the fact that these otherwise normal animals will voluntarily ingest drugs is that they will engage in repeated use that re-

sults in serious adverse consequences (Aigner & Balster, 1978). When given unconstrained access to drugs like cocaine and opiates, for example, laboratory animals will consume sufficiently large doses to overdose and will also consume them to the exclusion of basic sustenance and eventual death in the absence of experimenter intervention.

Respondent conditioning, another basic behavioral process, comes into play when an environmental stimulus (person, place, or thing) reliably predicts drug availability and administration. Previously neutral environmental events that predict drug availability and use eventually acquire discriminative stimulus functions (i.e., they become occasion setters) for urges to use drugs as well as drug seeking and use. They also acquire conditioned reinforcing effects that work in concert with the unconditioned reinforcing effects of abused drugs to sustain the often extraordinary efforts of dependent individuals to obtain and consume drugs (e.g., Schindler, Panlilio, & Goldberg, 2002).

Such studies provide compelling evidence for a primary role of operant conditioning in the nonprescription use of drugs that is amply supported by parallel laboratory studies conducted with humans with SUDs. For example, a series of studies was conducted in the 1970s examining the sensitivity of alcohol consumption to environmental consequences among severe alcoholics (e.g., Bigelow, Griffiths, & Liebson, 1975). In these studies, the alcoholics resided on a residential hospital unit where they were permitted to consume alcohol under monitored conditions. Abstinence from voluntary drinking increased when access to an alternative reinforcer (i.e., an enriched environment) was available for doing so, by increasing the amount of work required to obtain alcohol, by providing monetary reinforcement contingent on abstinence, and by imposing brief periods of social isolation contingent upon drinking. Each of these outcomes conformed to predictions based on drug use being a form of operant responding. Results in subsequent studies with cigarette smokers, marijuana abusers, and cocaine and opioid abusers have similarly conformed to predictions based on operant conditioning. In studies in which cocaine users were permitted to make exclusive choices between drug use and money, for example, drug use decreased as an orderly function of increases in the amount of monetary reinforcement offered as an alternative (e.g., Higgins, Heil, & Lussier, 2004; Silverman, Kaminski, Higgins, & Brady, in press).

Overall, these studies confirmed that operant conditioning plays an important role in the genesis and maintenance of drug use, abuse, and dependence. Importantly, though, the research also showed that like other forms of operant responding, drug use even among highly dependent individuals is malleable and sensitive to environmental consequences. The many successful applications of CM to the wide range of different types of SUDs, populations, and settings outlined in this volume are consistent with those conclusions.

A Brief History of the Use of CM to Treat SUDs

The history of using CM to treat SUDs can be traced back to uncontrolled studies in the 1960s where, for example, smokers earned back portions of a monetary deposit contingent upon remaining abstinent from smoking (Elliott & Tighe, 1968). A more programmatic series of controlled studies conducted in the 1970s and 1980s by Stitzer, Bigelow, and colleagues firmly established the efficacy of using contingent access to clinic privileges, medication adjustments, and cash payments among other consequences for increasing abstinence from drug use among opioid-dependent patients enrolled in methadone treatment (see Stitzer & Higgins, 1995, for a review) and also the efficacy of cash payments to increase abstinence from cigarette smoking (e.g., Stitzer & Bigelow, 1982). Recognition of CM as a formal treatment for SUDs was substantially bolstered in the 1990s when a variation that has come to be known as voucher-based reinforcement therapy (VBRT) was demonstrated in randomized controlled trials to be one of few interventions that can reliably increase abstinence from cocaine use among dependent outpatients (e.g., Higgins et al., 1991). Interest and research activity on VBRT as a treatment for SUDs over the 15 years since the first publication on that topic have led to two scientific conferences, with the first conference held on September 14 and 15, 1995, in Bethesda, Maryland, and the second on October 7 and 8, 2004, in Burlington, Vermont. The first conference spurred the publication of an edited volume on the use of CM to treat SUDs (Higgins & Silverman, 1999) and the second conference set the occasion for this volume. A recently published quantitative review of VBRT identified more than 60 reports of controlled studies published in peer-reviewed journals examining VBRT as a treatment for SUDs, with robust evidence supporting its efficacy (Lussier, Heil, Mongeon, Badger, & Higgins, 2006).

Basic Elements of CM

The basic elements that comprise all CM interventions for SUDs have been outlined elsewhere and need not be repeated in detail here (e.g., Higgins, 1999; Petry, 2000). Briefly, CM interventions promote behavior change through the use of one of the following generic types of contingencies administered alone or in combination: positive reinforcement, which involves the delivery of a reinforcing consequence (e.g., monetary-based voucher) contingent upon meeting a therapeutic goal (e.g., abstinence from recent drug use); negative reinforcement, which involves the removal, or a reduction in the intensity, of an aversive event (e.g., job suspension) contingent upon meeting a therapeutic goal (successful completion of treatment); positive punishment, which involves the delivery of an aversive event (e.g., social reprimand) contingent upon evidence of the occurrence of a therapeuti-

cally undesirable response (failure to attend therapy sessions); and negative punishment, which involves the removal of a positive condition (forfeiture of clinic privileges) contingent upon the occurrence of an undesirable response (e.g., resumption of drug use).

Reinforcement and punishment interventions are effective, but, by definition, the latter are disliked by patients and often staff and can inadvertently increase treatment dropout. As is amply illustrated in the interventions described in this volume, CM interventions that are comprised of high rates of positive reinforcement and judicious use of negative punishment can be very effective at retaining patients in treatment, reducing drug use, and improving other therapeutic outcomes. To be maximally effective, contingencies need to involve objective verification that the therapeutic target response has occurred, relatively minimal delay in delivering the designated consequence once the response has been verified, and a consequence of sufficient magnitude or intensity to function as a reinforcer or punisher. In a recent meta-analysis of the use of VBRT with SUDs, moderators of treatment effects size were examined (Lussier et al., 2006). Two significant moderators were identified: more immediate delivery of the incentive and greater monetary value of the incentive predicted larger treatment effects. Objective monitoring of the target response in applications with SUDs typically involves some form of testing of biological markers of recent drug use. Delivering the consequence on the same day that testing occurs results in larger effect sizes than waiting until the next day or later. The magnitude of reinforcement or punishment necessary to change behavior will depend on the nature of the behavior change involved, patient population, and so on. The interventions outlined in the different chapters in this volume provide direction in choosing appropriate magnitudes for the various populations and types of therapeutic targets with which one may be working.

THE PRESENT VOLUME

This volume is structured first to address the application of CM to the treatment of SUDs in formal substance abuse treatment clinics and with the major types of SUDs, then to outline the immensely important application of CM with special populations of individuals with SUDs who are especially vulnerable and for whom effective treatments are sorely needed, and wrapping up with a section reviewing a range of creative projects relevant to the dissemination of CM beyond research settings. Each of the chapters characterizes the scope of the specific problem being addressed; provides a detailed review of relevant research findings; discusses ethical or other issues of interest to clinicians, policymakers, and others interested in using CM; and comments on the promise of CM in that particular application.

Applications in Outpatient Substance Abuse Treatment Clinics

Chapter 2 (Higgins, Heil, Rogers, & Chivers) focuses on treating cocaine dependence with VBRT. VBRT was initially developed as one element in a multielement intervention for outpatient treatment of cocaine dependence (Higgins et al., 1991). The chapter traces the development of the use of VBRT to treat cocaine-dependent outpatients enrolled in drug-free and methadone-maintenance clinics starting from the seminal studies up to the more recent multisite trials conducted as part of the National Institute on Drug Abuse's (NIDA) Clinical Trials Network (CTN) (Peirce et al., 2006; Petry et al., 2005; see Stitzer & Kellogg, Chapter 13, this volume). Although there are many remaining issues to be addressed in the successful development and dissemination of VBRT for the treatment of cocaine dependence, the chapter outlines a great deal of success. The positive outcomes obtained in the multisite trials mentioned earlier can be expected to have a positive influence on the dissemination of CM interventions into community treatment clinics. Because of the budgetary constraints under which most community substance abuse treatment clinics must operate, there is strong interest in the type of lower-cost interventions that were used in those multisite trials. The multisite trials demonstrated that lower-cost CM can be efficacious, although as might be expected based on the meta-analysis mentioned previously (Lussier et al., 2006), the size of the treatment effects appeared to be proportionately lower as well (Peirce et al., 2006; Petry et al., 2005).

Methadone and other opioid-replacement therapies are highly effective in treating opioid dependence, but outcomes are enhanced further when pharmacological treatments are combined with behavioral interventions (McLellan, Arndt, Metzger, Woody, & O'Brien, 1993). CM is one behavioral intervention that has extensive empirical support for its efficacy among opioid-dependent patients (Silverman et al., in press). Indeed, many of the seminal studies demonstrating the efficacy of CM in the treatment of illicit drug abuse were conducted with patients enrolled in methadone clinics. Chapter 3 (Epstein & Preston) provides a detailed and insightful overview of this important area of application, covering the use of medication take-home privileges, VBRT, and other efficacious CM interventions.

Recognition of the need for effective treatments for marijuana abuse and dependence is growing (e.g., Budney, Hughes, Moore, & Vandrey, 2004). Chapter 4 (Budney & Stanger) reviews the empirical support for and future promise of CM interventions for addressing that need. The use of VBRT in the treatment of marijuana abuse and dependence among adults, adolescents, and individuals with co-occurring serious mental illness are carefully reviewed. The chapter also discusses important practical issues in the use of CM with marijuana, including the challenge of objectively

monitoring recent use given the relatively long metabolic half-life of delta-9-tetrahydrocannabinol and other cannabinoids.

Effective treatments are sorely needed for the growing problem in the United States and elsewhere of methamphetamine use disorders (e.g., Romanelli & Smith, 2006). Chapter 5 (Roll & Newton) provides evidence indicating that, consistent with the positive results obtained with cocaine and other psychomotor stimulants, VBRT is efficacious in treating methamphetamine abuse and dependence. Particularly impressive is that a subset of patients in NIDA's CTN studies mentioned earlier abused methamphetamine. When results from those patients were analyzed they also supported the efficacy of CM (Roll et al., 2006). Based on those findings, CM can be expected to have a substantive role in future efforts to curtail the growing and disturbing problem of methamphetamine use disorders. This is welcome news for a problem that is spreading within the United States and elsewhere and is the focus of much concern among law enforcement and public health officials.

The high rates of morbidity and mortality attributable to tobacco use and dependence are well known. Tremendous headway has been made in the development and dissemination of effective pharmacological and behavioral interventions to promote smoking cessation. That said, the vast majority of patients who attempt to quit smoking fail within the initial days and weeks of the cessation effort. Clearly, improvements in treatment outcome are needed, with a clear role for the use of behavioral interventions (e.g., Stitzer, 1999). Chapter 6 (Sigmon & Lamb) provides a detailed review of the potential of CM to improve smoking-cessation outcomes in the general population of smokers as well as special populations of smokers, including adolescents, pregnant women, individuals with serious mental illness, and opioid- and other drug-dependent individuals. The chapter also provides an informed discussion of the contributions of CM to an experimental analysis of smoking by allowing for effective experimental control over smoking. Also discussed is the potentially useful role that CM may play in promoting sustained abstinence during the initial weeks of a cessation effort. There is extensive evidence among the general population of smokers (Kenford et al., 1994) as well as special populations of smokers (Higgins et al., 2006) that any smoking during the initial 2 weeks of a cessation effort is associated with poor longer-term outcomes.

Efforts to use CM in the treatment of alcohol abuse and dependence began in the early 1970s but did not develop thereafter as well as one might have expected considering the promising initial results (Higgins & Petry, 1999; Silverman et al., in press). Difficulties identifying a reliable method to bioverify abstinence is one obstacle that continues to hamper development in this important area. Chapter 7 (Wong, Silverman, & Bigelow) provides an insightful overview of the use of CM with problem drinking, including results from recent efforts to extend the VBRT-based

Therapeutic Workplace to severely dependent drinkers (Silverman et al., 2005).

In many respects, naltrexone represents one of the most, if not the most, elegant drugs available for treatment of substance use disorders. Naltrexone is well tolerated, largely without agonist effects, and blocks the effects of opioid agonists with once-daily administration. Yet naltrexone's promise as a treatment for opioid dependence has largely gone unrealized save for use with highly motivated subpopulations of abusers such as health care workers. The overarching problem is medication compliance. Naltrexone lacks the reinforcing effects that methadone and comparable agonists have and patients will not reliably comply with the recommended medication regimen in the absence of naturalistic contingencies such as those operating with the health care workers mentioned above. Chapter 8 provides an intriguing and creative overview of efforts to use VBRT to address this problem of compliance with naltrexone, but also with other medications important to the drug-dependent population, including aversive agents (disulfiram), antiretroviral medications, psychotropics, and antibiotics. The strengths and potential weaknesses of CM in addressing the challenges of medication compliance among individuals with SUDs are thoroughly and insightfully discussed.

Applications with Special Populations

There is no question that identifying effective treatments for special populations is an important priority in efforts to develop efficacious interventions for SUDs. This is an area in which CM is showing a striking degree of success and in which the potential for future growth and successful dissemination is particularly promising. Chapter 9 (Milby & Schumacher) reviews efforts to employ CM in developing effective treatments for homeless substance abusers. Of particular interest in this chapter is the description of a programmatic effort to effectively treat homeless cocaine-dependent individuals through contingent access to housing and employment (e.g., Milby, Schumacher, Wallace, Freedman, & Vuchinich, 2005). Homelessness and drug dependence are each daunting problems and when they co-occur the clinical challenges are enormous. Chapter 9 does an excellent job of characterizing those problems and outlining methods for surmounting them.

Pregnant substance abusers represent an especially important and in many ways unique subgroup of substance abusers due to the direct involvement of an innocent and highly vulnerable third party, the fetus. As Chapter 10 (Heil, Yoon, & Higgins) ably illustrates, VBRT has tremendous potential for improving treatment outcomes among pregnant and recently postpartum women with SUDs. One notable program is the Therapeutic Workplace mentioned earlier, which uses VBRT to increase abstinence from cocaine and opioid use while also improving basic academic and vocational

skills among pregnant and recently postpartum drug-dependent, inner-city women (Silverman et al., 2005). Also promising are programs using VBRT to increase smoking cessation among pregnant and recently postpartum cigarette smokers (Donatelle, Prows, Champeau, & Hudson, 2000; Higgins, Heil, Solomon, et al., 2004). Cigarette smoking is one of the leading preventable causes of poor pregnancy outcomes in the United States (Cnattingius, 2004). This is a population with whom CM interventions have tremendous potential for providing cost-effective improvements in treatment outcome.

Treating patients with co-occurring serious mental illness and SUDs is as daunting a clinical challenge as any of the others already mentioned. Chapter 11 (Tidey & Ries) provides an excellent overview of the magnitude and complexities of this public health problem (also see Budney & Stangel, Chapters 4; Sigmon, Lamb, & Dallery, Chapter 6; and Drebing, Rounsaville, & Rosenheck, Chapter 16). Among several very promising interventions discussed, Chapter 11 reviews an important effort to develop a self-sustaining CM intervention involving patient disability payments. In this program, the treatment clinic serves as the designated payee for patients with SUDs and serious mental illness who are receiving disability payments (Ries et al., 2004). Disability payments cannot be legally withheld, but in this program constraints are placed on their use while patients are using drugs and those constraints are systematically relaxed contingent on objective evidence of abstinence from recent drug use. The intervention is creative and holds great promise as a model for how to more effectively treat SUDs among those with co-occurring serious mental illness.

Chapter 12 (Krishnan-Sarin, Duhig, & Cavallo) addresses the challenge of treating SUDs among adolescents, a population also addressed to a more limited extent in Chapters 4 and 6. CM interventions have great promise with this population who are often especially ambivalent or indifferent to the need for formal substance abuse treatment but are likely to be motivated by the opportunity to earn material incentives contingent upon behavior change. An important point of focus in Chapter 12 is a creative and groundbreaking program wherein VBRT is being used to promote smoking cessation in a public school setting (Krishnan-Sarin et al., 2006). Here, too, the potential for CM to make a substantive contribution to improving treatment outcomes is clear.

Disseminating CM Interventions Beyond Formal Research Settings

Obviously, a fundamental purpose in developing treatments is to move them into settings in which they can eventually become mainstream treatments, and CM is no exception. The typical sequence is first to conduct efficacy tests, often in well-controlled research settings, then onto effective-

ness tests in settings in which the treatment will ultimately be used, and finally onto dissemination in everyday clinical use. Chapter 13 (Stitzer & Kellogg) reviews two major developments in effectiveness testing and dissemination of VBRT into community substance abuse treatment clinics. The effectiveness testing related to the two CTN multisite trials mentioned previously (Peirce et al., 2006; Petry et al., 2005). The chapter provides important new behind-the-scenes insights into the rationales for different aspects of those trials and how researchers and community clinicians worked together in preparing for them. Regarding dissemination, Chapter 13 discusses an important collaborative effort between CM researchers and officials at the New York City Health and Hospitals Corporation, one of the largest municipal providers of substance abuse treatment services in New York City, to establish CM interventions in a number of their community substance abuse treatment clinics. Much has been learned from these two large-scale efforts that should be quite helpful to future efforts to disseminate CM and other interventions.

As was noted earlier, the issue of costs is an obvious and substantive barrier to disseminating VBRT into community substance-abuse treatment clinics. Community substance abuse treatment clinics generally operate on tight budgets that have little room for additional costs in the form of monetary-based incentives or the regular urine toxicology testing needed to implement CM. Chapters 14 (Petry & Alessi) and 15 (Amass & Kamien) describe efforts to reduce costs associated with CM. Chapter 14 reviews several different strategies related to this overarching goal of reducing the costs of CM, but mostly focuses on the creative and programmatic work that went into the development of prize-based CM. Prize-based CM uses a lower-magnitude and less frequent delivery of reinforcement than conventional VBRT interventions. This practice reduces the cost of the intervention while retaining efficacy. That is, the intervention produces discernible improvements in treatment outcome relative to a control condition. As expected, though, the size of the treatment effects obtained with these lower-cost interventions are discernibly smaller than those obtained in comparable populations using more conventional VBRT interventions (see Lussier et al., 2006). Chapter 14 summarizes a compelling body of evidence supporting the efficacy and effectiveness of CM interventions in community substance abuse treatment clinics.

Chapter 15 revisits a practice used in some of the earliest efforts to use CM in the treatment of SUDs, namely, deposit contracting and fee rebates along with obtaining donations from the local community to support VBRT. In the deposit arrangements, patients make a monetary deposit at the start of treatment that is earned back over time contingent upon meeting predetermined therapeutic goals. Similarly, with fee rebates, patients earn partial return of clinic fees that they have already paid contingent upon meeting therapeutic goals. Finally, Chapter 15 details the success of

several different projects where donations from community businesses were used to fund VBRT interventions. Programs to treat pregnant women appear to be especially successful in garnering such community support.

Another approach to financing CM interventions has been to identify reinforcers and punishers that are available in community settings outside the drug abuse treatment clinic and to harness those reinforcers and punishers for use in CM interventions. Chapters 16 (Drebing et al.), 17 (Donlin, Knealing, & Silverman), and 18 (Marlowe & Wong) review research designed to integrate CM interventions into three settings that routinely provide relatively high magnitude reinforcers and/or punishers: the U.S. Department of Veterans Affairs' Compensated Work Therapy (CWT) program (Chapter 16), workplace settings (Chapter 17), and the drug court system (Chapter 18).

The U.S. Department of Veterans Affairs' CWT program offers paid supported employment opportunities to chronically unemployed veterans, many of whom have SUDs. The availability of pay in this program provides a unique opportunity to use that pay, or some portion of it, for therapeutic purposes in CM interventions. Chapter 16 describes an effort to situate VBRT within a CWT. Specifically, the chapter focuses on a VBRT intervention designed to increase drug abstinence and vocational goals among veterans with co-occurring SUDs and mental illness enrolled in the Veterans Affairs (VA) CWT program. Evidence from two controlled studies is presented showing that VBRT increases abstinence from drug use and also the rate of obtaining competitive employment. This project offers hope for integrating VBRT into the VA hospital system's vocational rehabilitation program, one of the largest in the United States, which could eventually represent a huge dissemination success. The VA hospital system's drug abuse treatment programs also represent an important future home for contingency management. There is excellent financial support in the VA hospital system relative to other community clinics such that the added costs associated with CM should represent less of an obstacle. There also is excellent infrastructure in the VA settings in the form, for example, of Veteran's canteen services that offer food, beverages, and other retail items at reduced costs and that have the potential to be integrated into incentive programs.

For a variety of reasons, workplaces might be ideal contexts for the application of CM interventions for the treatment of SUDs. Most important, workplaces control high-magnitude reinforcers, most notably wages for work, which could be used to reinforce therapeutic behavior change (e.g., drug abstinence). To arrange employment-based reinforcement, a contingency can be implemented in which an employee is required to emit a desired target behavior (e.g., provide a drug-free urine sample or take a treatment medication) to gain access to work and to earn wages. Chapter 17 reviews the available uncontrolled and controlled research on employment-

based reinforcement to promote drug abstinence and medication compliance and then describes features of community workplaces that might facilitate or limit the application of employment-based reinforcement contingencies for the treatment of SUDs in society. Controlled research on employment-based reinforcement has only begun recently, but the data and information reviewed in this chapter illustrate how workplaces offer extremely promising contexts for dissemination of CM interventions.

Last, but certainly not least, the emergence of the U.S. drug court system holds tremendous promise for the successful dissemination of CM into mainstream rehabilitation for SUDs. As detailed in Chapter 18, drug courts are themselves an explicit CM program wherein reinforcers and punishers, termed *incentives* and *sanctions* within the drug court literature, are to be systematically used to leverage nonviolent criminals with SUDs to obtain the treatment that they need. Chapter 18 provides an excellent overview of this relatively new system and insights into how the information gleaned from CM research can inform and improve the efficacy of the drug court system. It is difficult to imagine a better setting for successfully disseminating CM practices.

CONCLUDING COMMENTS

Each of the chapters in this volume has been prepared to stand alone and needs no further introduction by us. As members of the community of researchers examining CM treatments for SUDs, we are heartened and amazed by the tremendous advances that have occurred in this area over the past several decades and proud to be associated with the excellent series of reviews that comprise this volume.

Taken together, the chapters in this volume demonstrate the relevance of basic principles of behavioral science to the treatment of SUDs; the remarkable effectiveness and versatility of CM interventions; and the feasibility of disseminating these interventions in society, both through community treatment clinics and through other settings like workplaces, the VA hospital system, and drug courts. Despite the promise of CM interventions suggested in this extensive body of research, the research reviewed in this volume also shows that more work is needed to find ways to increase the effectiveness of the interventions so that they will succeed with even more patients, to develop methods that will ensure longer-term maintenance of beneficial effects over time, and to continue to develop and refine practical applications that will be used widely in society. Thus, this volume is important because it outlines the great effectiveness and promise of CM interventions as well as the areas in which additional research and more development are needed. As is amply shown in the research in this volume, CM interventions are not a bag of arbitrary tricks but an orderly set of procedures based on fundamental principles of behavioral science. As such, the

further improvement and development of these procedures can be guided by the basic scientific principles on which the interventions are based. The broad success the field has achieved to date in applying these basic principles to treat SUDs across populations, drugs, and settings should give great confidence that we can continue to develop and improve these interventions to address the costly and devastating consequences of SUDs that affect virtually all modern societies.

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