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## Behavioral Therapies for Drug Abuse

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### Abstract

The past three decades have been marked by tremendous progress in behavioral therapies for drug abuse and dependence, as well as advances in the conceptualization of approaches to development of behavioral therapies. Cognitive behavior therapy, contingency management, couples and family therapy, and a variety of other types of behavioral treatment have been shown to be potent interventions for several forms of drug addiction, and scientific progress has also been greatly facilitated by the articulation of a systematic approach to the development, evaluation, and dissemination of behavioral therapies. The authors review recent progress in strategies for the development of behavioral therapies for drug and alcohol abuse and dependence and discuss the range of effective behavioral therapies that are currently available.

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Before the advent of research on treatments derived from operant and classic behaviorism, there was little indication that any form of psychosocial treatment was effective for any type of mental disorder (1-3). Research on behavioral therapies flourished with the adoption of the technology model (4, 5), which sought to systematize these therapies and the experimental methods through which they could be evaluated to achieve a level of methodological rigor on a par with the standards for pharmacological research (6, 7). By the mid to late 1980s, there were a number of behavioral treatments that had been shown to be efficacious in the treatment of a variety of mental disorders, including depressive, panic, and obsessive-compulsive disorders. However, the methodological rigor and specificity that were characteristic of these studies were not yet apparent in drug abuse treatment studies, with a few exceptions (8). Although behavioral approaches were universally available in drug abuse treatment programs by the late 1980s (9), there was continued pessimism in the field regarding the efficacy of behavioral therapies for drug use disorders (10, 11).

In the early 1990s, studies in which behavioral therapies, therapist training, study populations, and objective outcome measures were carefully specified and in which participants were randomly assigned to experimental and control or comparison conditions began to appear more frequently in the drug abuse treatment literature. The technology model facilitated the identification of effective behavioral treatments for substance use disorders as it enhanced the internal validity and replicability of research on behavioral therapies. However, the technology model also had the unanticipated effect of restricting the development of novel therapies. The stringent methodological requirements associated with the technology model (e.g., requiring investigators to have fully developed treatment manuals, therapist training protocols, and fidelity rating procedures) limited the therapies eligible for efficacy evaluation to those already developed for drug abuse and to those which could easily be adapted from other areas (e.g., alcohol and depression treatments). This restriction created bottlenecks not only in the introduction of new treatments but also in

output, as it limited research on the dissemination of behavioral treatments. That is, once efficacious treatments were identified, no articulated research strategy was available to determine how those treatments might best be transferred to and administered effectively in clinical settings.

## The Stage Model and Reconceptualization of Behavioral Therapies Development

In 1992, the National Institute on Drug Abuse (NIDA) began to offer comprehensive support for a broader range of scientific activity in behavioral treatment development, spanning from origination and initial testing of novel behavioral therapies to their dissemination in community settings (12). Three stages were defined: 1) Stage I, which consists of pilot/feasibility testing for new and untested treatments, including preparation of treatment manuals, development of a training program, and development of adherence/competence measures for new and untested treatments, as well as translation of findings from basic science to clinical applications; 2) Stage II, which consists principally of efficacy testing to evaluate treatments that are fully developed and have shown promise or efficacy in earlier studies; and 3) Stage III, which is aimed principally at issues of transportability of approaches to community settings (13). By providing a scientific framework and support not only for efficacy testing at Stage II but for the development of novel approaches at Stage I and a wide range of dissemination/diffusion research at Stage III, this program expanded both the range and the rigor of clinical behavioral science.

Stage I is particularly innovative in that it permits greater creativity by allowing investigators to develop entirely new therapies or to adapt or improve existing therapies. Another critical component of Stage I research is the translation of ideas and concepts from basic or clinical science/neuroscience to treatment development. Hence, Stage I allows for cross-disciplinary research and also for the entry of higher-risk/higher-yield projects into the field. Additional goals of Stage I research include the identification of effective change principles and strategies through a focus on potential mechanisms of action, even at the earliest stages of treatment development.

Efficacy testing, including dose-response and dismantling studies, occurs in Stage II (principles and methods of which have been described in detail elsewhere [14]). Although research in Stage II can determine if a treatment can be effective, clarify how and why it works, and identify its essential components, it does not address whether a treatment *will* work in clinical practice. Hence, the goal of Stage III research is to produce all of the necessary knowledge to proceed to and conduct what is usually considered traditional “effectiveness” research, that is, an evaluation of whether an approach is effective when implemented by community-based clinicians in clinical settings. Stage III research addresses, at the therapy and therapist level, issues involved in ensuring that a treatment can work in a community setting. In Stage III research, investigators attempt to produce a treatment that shows efficacy in a community setting, as well as knowledge about how to implement the treatment effectively. Thus, in Stage III, research on questions of transportability, implementation, and acceptability (e.g., What is needed to train clinicians to learn to use an efficacious treatment?) are encouraged (15). For example, a Stage III study might include the development of therapist training procedures, followed by a randomized clinical trial to determine the effectiveness of those procedures. Alternatively, a Stage III study might simply determine the effectiveness of a therapy in a community setting or might compare, in a community setting, the effectiveness of a therapy in an individual format with the same therapy modified to a group format.

Thus, the stage model provides a conceptual framework and the necessary structure to produce treatments that are both efficacious and practical while at the same time fostering continued systematic improvements in those treatments through scientific advances.

## Behavioral Therapies for Drug Abuse and Dependence

The following sections present a brief overview of progress made in the development of effective behavioral treatments for drug abuse and dependence, with a primary focus on the broader categories of treatment that have been found to be effective in Stage II randomized clinical trials (including contingency management, cognitive behavior approaches, motivational interviewing, and family/couples approaches) and on the major categories of drug dependence (opioids, cocaine, and marijuana dependence). Space limitations preclude a more comprehensive review of this burgeoning literature; hence, a number of important studies, populations (e.g., adolescents, smokers), and approaches (e.g., combined therapies, harm reduction) will not be highlighted here.

### Contingency Management Therapies

Contingency management, in which patients receive incentives or rewards for meeting specific behavioral goals (e.g., verified abstinence), has particularly strong, consistent, and robust empirical support across a range of types of drug use. Contingency management approaches are based on principles of behavioral pharmacology and operant conditioning, in which behavior that is followed by positive consequences is more likely to be repeated. For example, allowing a patient the privilege of taking home methadone doses, contingent on the patient's providing drug-free urine specimens, is associated with significant reductions in illicit drug use, and this strategy can be used address a number of other problems, such as benzodiazepine use, that are common in methadone maintenance programs (16, 17). This body of work also supports the view that positive incentives (e.g., rewards for desired behaviors) are more effective in producing improved substance use outcomes and in retaining patients in treatment than negative consequences (such as methadone dose reductions, restriction of clinic privileges, or termination of treatment) (18-21).

Despite consistent findings of the efficacy of contingent take-home privileges in methadone maintenance programs, contingency management procedures proved difficult to implement outside of methadone programs until the early 1990s, when Budney, Higgins, and their colleagues (22) demonstrated the efficacy of vouchers redeemable for goods and services, contingent on the patient's providing cocaine-free urine specimens, in reducing targeted drug use and enhancing retention in treatment. A series of studies by Higgins and his colleagues indicated that the initiation of abstinence facilitated by contingent vouchers is associated with durable reductions in drug use (23, 24) and that the addition of the community reinforcement approach, which encompasses skills training, a job club, disulfiram therapy, and relationship counseling, can enhance treatment benefits (25).

Voucher-based incentives have been shown to be effective in improving retention and abstinence in outpatient opioid detoxification (26), in reducing smoking as well as illicit substance use among opioid addicts in a methadone maintenance program (27), in reducing the frequency of marijuana use (28), and in improving medication compliance among opioid-dependent individuals treated with naltrexone maintenance (29-31). Iguchi et al. (32) expanded voucher-based contingency management to outcomes other than drug-negative urine specimens, demonstrating that reinforcement of tasks outlined in an individualized, verifiable treatment plan was associated with greater reductions in illicit drug use than reinforcement of drug-free urine specimens. Voucher-based contingency management has also been shown to reduce cocaine (33, 34) and opioid (35) use in the context of methadone maintenance, thus extending the availability of contingency management procedures to

methadone programs where the ability to offer take-home privileges is restricted. Silverman and colleagues (36, 37) demonstrated the efficacy of a therapeutic workplace for pregnant and postpartum drug-abusing women in a methadone maintenance program. Access to the therapeutic workplace, which provided job training and a salary, was linked to abstinence and was contingent on the participants' producing drug-free urine specimens.

Despite these findings, questions have arisen regarding the applicability and sustainability of contingency management in clinical practice, especially in community-based treatment programs where the cost of the vouchers and the need for frequent urine monitoring can be prohibitive. These issues have been addressed in part by the work of Petry et al. (38), who developed a lower-cost contingency management procedure in which vouchers are not given but participants receive the opportunity to draw prizes of varying value, contingent on verifiable target behaviors such as provision of drug-free urine specimens. This approach has been effective in reducing drug use among methadone maintenance patients (39), as well as cocaine-dependent outpatients (40).

Although the consistent findings of effectiveness in contingency management interventions are compelling, some limitations have been noted. First, the effects tend to weaken after the contingencies are terminated. This problem might be addressed by evaluating combinations of contingency management with approaches that have more enduring effects, for example, by transferring rewards from monetary reinforcers to behaviors that are, in and of themselves, reinforcing or by exploring novel discontinuation strategies, such as lengthening periods between reinforcement or offering more intermittent reinforcements. Second, the cost of providing rewards and administering contingency management systems has been a barrier to the adoption of these approaches by the clinical community (41). Lower-cost contingency management approaches that use reinforcers without monetary value and that reinforce behaviors other than provision of drug-free urine samples are promising strategies, but there are no cost-effectiveness data that might persuade policy makers and third-party payers to support these approaches in clinical practice (15). Finally, because a substantial proportion of substance abusers does not respond to contingency management, there is a need to understand and address individual differences in response to these approaches.

### **Cognitive Behavior and Skills Training Therapies**

Cognitive behavior approaches, such as relapse prevention, are grounded in social learning theories and principles of operant conditioning. The defining features of these approaches are 1) an emphasis on functional analysis of drug use, i.e., understanding drug use within the context of its antecedents and consequences, and 2) skills training, through which the individual learns to recognize the situations or states in which he or she is most vulnerable to drug use, avoid those high-risk situations whenever possible, and use a range of behavioral and cognitive strategies to cope effectively with those situations if they cannot be avoided (42, 43). Meta-analyses and extensive reviews of the literature have established that cognitive behavior approaches have strong empirical support for use in treatment of alcohol use disorders (44, 45) and several non-substance-related psychiatric disorders (46) and that these approaches have been demonstrated to be effective in drug-using populations as well (47). Several research groups have demonstrated the efficacy of cognitive behavior therapy in the treatment of cocaine-dependent outpatients, particularly depressed and more severely dependent cocaine users (48-54), and have shown that cognitive behavior therapy is compatible and possibly has additive effects when combined with pharmacotherapies such as disulfiram (55, 56).

Furthermore, cognitive behavior therapy is characterized by an emphasis on the development of skills that can be used initially to foster abstinence but can also be applied to a range of co-occurring problems. This feature may be a factor in emerging evidence for the

long-term durability of the effects of cognitive behavior therapy. Several studies have demonstrated that cognitive behavior therapy's effects are durable and that continuing improvement may occur even after the end of treatment (57, 58). These findings are consistent with evidence that cognitive behavior therapy may have enduring effects for other disorders, such as panic disorder and depression (59, 60). Delayed emergence of the effects of cognitive behavior therapy was highlighted in two studies that directly compared group cognitive behavior therapy and contingency management among cocaine-dependent patients in a methadone maintenance program (61, 62). Although end-of-treatment outcomes favored contingency management over cognitive behavior therapy, 1-year follow-up indicated significant continuing improvement for patients assigned to cognitive behavior therapy, in contrast to weakening effects for contingency management, which resulted in comparable, or slightly better, outcomes for cognitive behavior therapy at the end of follow-up. Extending the work on cognitive behavior therapy's durability to panic disorder patients, two studies found that the addition of group cognitive behavior therapy to slow tapering of alprazolam or clonazepam for patients who were attempting to discontinue the benzodiazepine resulted in higher rates of successful discontinuation, compared with the use of slow tapering alone (63, 64).

Cognitive behavior interventions have also been evaluated as a component of multimodal treatment packages. For example, in a multisite study evaluating psychosocial treatments for methamphetamine-dependent individuals, the matrix model (a cognitive behavior approach that included group and individual treatment) was found to be more effective overall than standard treatment (65). Another multisite study involving 450 marijuana-dependent individuals demonstrated that a nine-session individual approach that integrated cognitive behavior therapy and motivational interviewing (66) was more effective than a two-session motivational interviewing approach, which was in turn more effective than a delayed-treatment control condition (67).

Despite the emerging empirical support for use of cognitive behavior therapy in drug-dependent populations, additional research is needed to address its limitations. Cognitive behavior therapy is a comparatively complex approach, and training clinicians to implement this approach effectively can be challenging. Strategies for addressing these issues include greater emphasis on understanding the mechanisms of action of cognitive behavior therapy so that ineffective components can be removed and treatment delivery can be simplified and shortened and perhaps even accomplished by computer or other automated means. Strategies for enhancing acceptance and effective implementation of cognitive behavior therapy by the clinical community are also needed.

### Motivational Interviewing

Motivational interviewing is based on principles of motivational psychology and is intended to enhance the individual's intrinsic motivation for change (66). Motivational interviewing approaches have strong empirical support for use in treating alcohol users, with several studies showing significant and durable effects (68-70). More recently, motivational interviewing has been evaluated as treatment for drug users. For example, marijuana-dependent adults who received motivational interviewing had significant reductions in marijuana use, compared to a delayed-treatment control group (71). A combination of motivational interviewing with behavioral skills training was found to reduce HIV risk behaviors among low-income urban women (72, 73).

However, several clinical trials have not supported the efficacy of motivational interviewing as an engagement strategy for general populations of substance users. These trials include studies of the effects of motivational interviewing on drug use outcomes among inpatients and outpatients entering community-based treatment (74), on attrition among individuals on

a waiting list for publicly funded drug treatment (75), on treatment entry among intravenous drug users (76), and on engagement in a specialized substance misuse program among psychiatric inpatients (77). The mixed results of these studies and of smaller pilot studies in other populations suggest that single-session motivational interviewing may not greatly enhance engagement or outcome in general populations of illicit drug users. There is stronger support for motivational interviewing combined with other evidence-based therapies for drug abusers, although the combination of treatments precludes attribution of benefit to any single component. More work is needed to identify the populations that best respond to motivational interviewing and to determine how motivational interviewing enhances change among users of illicit drugs.

### Couples and Family Treatments

The defining feature of couples and family treatments is that they treat drug-using individuals in the context of family and social systems in which substance use may develop or be maintained. The engagement of the individual's social networks in treatment can be a powerful predictor of change, and thus the inclusion of family members in treatment may be helpful in reducing attrition (particularly among adolescents) and addressing multiple problem areas (78, 79). Meta-analyses have strongly supported the efficacy of these approaches for both adult (80) and adolescent substance users (81-83). It is important to note that family-based approaches are quite diverse, and it is unlikely that all are equally effective. Moreover, many family-based approaches combine a variety of techniques, including family and individual therapies, skills training, and communication training (84).

Behavioral couples therapy and behavioral family counseling combine abstinence contracts and behavioral principles to reinforce abstinence from drugs; these approaches require the participation of a non-substance-abusing spouse or cohabitating partner (85). Among men entering methadone maintenance treatment, behavioral couples therapy was more effective than equally intensive individual services in reducing the frequency of cocaine- or opioid-positive urine tests during treatment; behavioral couples therapy was also associated with better ratings of happiness in the relationship and fewer family and social problems (86). A study evaluating the addition of behavioral family counseling to individual treatment for men entering naltrexone treatment found that behavioral family counseling was associated with better retention and naltrexone compliance, as well as better substance use outcomes during treatment and through a 1-year followup (87). Moreover, even though the children of participants were not directly targeted by the intervention, the children of the adults who received behavioral couples therapy had meaningful improvements in psychosocial functioning, relative to the children of parents assigned to the control condition (88). These findings highlight the possibility that effective treatment of substance-using parents may ameliorate and conceivably prevent problems in their children.

Several family therapies have been demonstrated to be effective among drug-using adolescents. Azrin's family behavior therapy, which combines behavioral contracting with contingency management, was found to be more effective than supportive counseling in a series of comparisons involving adolescents with substance use disorders with and without conduct disorder (89). Multisystemic therapy is a manual-based approach that addresses multiple determinants of drug use and antisocial behavior and is intended to promote more family involvement by engaging family members as collaborators in treatment, emphasizing the strengths of youths and their families, and addressing a broad and comprehensive array of barriers to attaining treatment goals (90). Henggeler and colleagues (78, 91-94) have demonstrated the efficacy and durability of multisystemic therapy in retaining patients and broadly improving outcomes among substance-using juvenile offenders, compared with similar juvenile offenders who received the usual community treatment services. Brief strategic family therapy (95) has also received a substantial level of empirical support. In

contrast to the other family therapies for adolescents reviewed here, brief strategic family therapy is somewhat less intensive, as it targets fewer systems and can be delivered through once-a-week office visits. Brief strategic family therapy has been associated with improved retention (96-98), as well as significant reductions in the frequency of externalizing behaviors (aggression, delinquency) (99). Multidimensional family therapy is a multicomponent, staged family therapy that incorporates both individual and family formats and targets the substance-abusing youth, the family members, and their interactions (81). Liddle et al. (79) demonstrated that multidimensional family therapy was more effective than group therapy or multifamily education among substance-abusing adolescents who were referred to treatment by the criminal justice system or by schools.

The body of work on family and couples approaches is marked by the consistency of positive findings regarding the efficacy of these approaches. However, because most of these approaches include multiple components, it has not yet been possible to isolate the components that are associated with the treatment effects or to determine if some components can be eliminated without weakening outcomes overall. The efficacy of several of these approaches has not yet been replicated by other investigators, and whether there are meaningful differences in outcome across the various family approaches is not yet clear. Finally, these approaches have been evaluated in comparatively small groups of individuals who have appropriate family members (i.e., family members who are not abusing substances) who are willing to participate in treatment. Evaluation of the effectiveness of these approaches in the general population is needed.

### **Drug Counseling**

Another major development of the past 10 years has been efforts to rigorously evaluate approaches similar to those widely used in clinical practice. For example, researchers have specified the elements of drug counseling approaches in detailed manuals for therapists and have evaluated these approaches in clinical trials. A multisite randomized clinical trial of psychotherapeutic treatments for cocaine dependence (100) provided evidence of the effectiveness of a manual-guided individual drug counseling approach that combined drug counseling and relapseprevention techniques (101). Data from this study also indicated that the reductions in cocaine use were associated with sharp decreases in the frequency of HIV risk behaviors (102), underscoring the view that effective drug abuse treatment constitutes effective HIV prevention (103).

### **HIV Risk Reduction**

Behavioral therapies have been demonstrated to be effective in reducing HIV risk behaviors and promoting health in intravenous drug users enrolled in methadone maintenance programs. Two randomized clinical trials found that the Holistic Harm Reduction Program, developed to reduce HIV risk behaviors, illicit drug use, and transmission of infectious diseases (e.g., HIV, hepatitis B and C), reduced illicit drug use and risky sexual behavior and, among HIV-positive participants, improved adherence to antiretroviral treatment (104, 105). Although these findings are promising, this approach has been evaluated in a fairly narrow range of populations and requires replication in other settings and other groups of drug users.

### **Future Directions**

The findings of research on behavioral treatments have been positive, but there is still a great deal more to be done. Even the most powerful behavioral therapies are not universally effective, nor do all individuals who benefit from these treatments improve as quickly or as

completely as desired. There are many ways to improve behavioral therapies at all three stages of treatment development.

Stage I research provides the opportunity for clinical creativity and innovation in clinical behavioral science. Research at this stage has the potential for a high yield from evaluation of clinical strategies that have not yet been subject to empirical evaluation, from the adaptation of effective treatments used for other disorders, and from translation of concepts from basic science to clinical applications. Basic neuroscience and basic research on behavioral, cognitive, affective, and social factors offer rich and relatively untapped sources of information on behavior and behavior change. With the development of new technologies of brain imaging, behavioral treatments based on a new understanding of the brain could be on the horizon.

At Stage II, renewed emphasis is needed on improving understanding of the mechanisms of action in treatments with established efficacy, not only to enhance their effectiveness but also to increase the efficiency of treatment delivery. Currently underutilized strategies for investigating mechanisms of action include 1) evaluating novel combinations of behavioral therapies or psychotherapy/pharmacotherapy combinations, both to enhance treatment efficacy and to offset weaknesses of a single approach; 2) investigating individual differences in treatment response and in treatment moderators by using novel methods that may in the near future include subtyping and predictor analyses involving neuroimaging, stress-response paradigms, and genetics; and 3) developing strategies to investigate sequenced interventions, in which treatments or treatment components are delivered on the basis of the individual drug user's characteristics, including previous treatment response, neurocognitive functioning, and family history. Finally, greater emphasis is needed on enhancing adherence and response to existing behavioral and pharmacological approaches.

At Stage III, promising strategies include evaluation of the means by which efficacious treatments can be reduced in duration, complexity, and cost. Projects to make behavioral treatments more "community friendly" are needed for treatments that show efficacy but are not deemed feasible for use by treatment providers or the treatment system. For example, individual treatments could be transformed into group-based approaches that would have wider acceptability in clinical practice. Simplified training procedures should be developed for treatments that are difficult for practitioners to learn. New information technologies should be considered, both as a means to improve treatment efficacy and as a way to make treatments more readily available and easier for patients and practitioners to use.

In summary, the level of progress in the behavioral treatment of drug abuse in recent years has exceeded what many researchers and practitioners had believed possible. Efficacious behavioral treatments exist, and conditions for which efficacious medications exist can be treated with combinations of behavioral and pharmacological treatments that have even greater potency than either type of treatment alone. More work can be done to improve effect sizes in research on behavioral treatments and to develop strategies to help drug users who do not respond to existing treatments. Work on the mechanisms of action of behavioral treatments, in addition to translational efforts to link basic science and neuroscience with treatment development, promises to yield new insights that will help to make drug abuse not only treatable but treated.

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