
Behavioral Therapies for Methamphetamine Use

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Behavioral Therapy Development Program

Goals:

- Produce efficacious behavioral treatments for substance use disorders (SUDs)
- Produce treatments that are implementable and self-sustaining
- Develop optimal behavioral strategies to promote medication and SUD treatment adherence

Methamphetamine Use (MA): What Do We Know?

Effective Therapies for MA

- Behavioral approaches are the therapeutic mainstay, such as cognitive-behavioral and contingency-management interventions

Comorbidity

- Many individuals who use MA have other comorbidities including other addictions and a range of psychiatric conditions (e.g., depression, anxiety)

HIV-Risk, Concomitant Behaviors and Treatment

- Research has found that MA users can change HIV risk behaviors
- High-risk behaviors, such as needle sharing and unsafe sexual practices can be reduced and lower risk of exposure to HIV and other infectious diseases

Recovery

- Prolonged abstinence shows recovery of brain dopamine transporters

Available Behavioral Therapies for MA

Contingency Management (CM)

- Highly efficacious; patients receive incentives or rewards for meeting specific behavioral goals (verified abstinence, attendance)

Cognitive Behavioral Therapy (CBT)

- Well-established treatment for MA use with demonstrated effectiveness; Emphasis on specific behaviors to enhance executive control over behavior

Physical Activity (Exercise-based Treatments)

- Evidence of supervised aerobic and resistance exercise program in sustaining abstinence from MA after discharge from treatment

Treatment Approaches Targeting Cognition

- Building on growing evidence to suggest MA and other stimulant use is associated with cognitive deficits

Contingency Management (CM)

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CM is an effective intervention that provides tangible incentives in exchange for tx engagement and abstinence

- Motivational Incentives for Enhancing Drug Abuse Recovery (MIEDAR), an incentive-based method for promoting cocaine and MA abstinence

CM effectively used to promote drug abstinence—

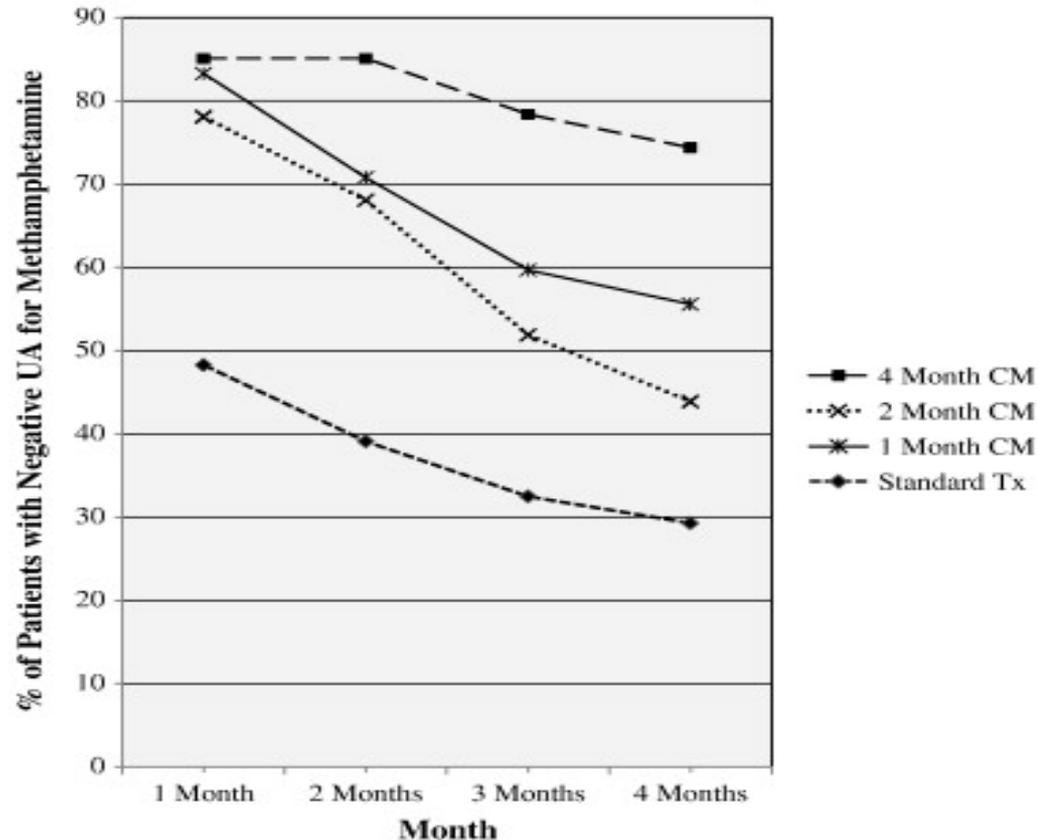
- Drug class: MA, cocaine, etoh, nicotine, marijuana, opioids, benzodiazepines
- Types of reinforcer, schedules, delay, magnitude, and across populations

CM has shown the lowest drop-out rate (29.4%) and has been used in conjunction with CBT for improved retention

Duration Effects in CM Treatment of MA

Roll et al., randomized MA users to 16-weeks of TAU or CM (1-, 2-, or 4m)

- Attendance over time increased as CM duration increased
- MA abstinence increased over time as CM duration increased
- Attendance/abstinence trends were stronger among those who completed treatment
- Attendance rates in the CM conditions were higher than TAU



Cognitive Behavioral Therapy (CBT)

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Efficacy through the teaching of specific coping strategies

- Some models view CBT as a cognitive control therapy—increase one's capacity to enhance executive control over behavior

Study effect sizes in the low-moderate range

High drop-out rates among MA users (40 to 45%)

Most effective therapy for MA—

- **Matrix Model**, a 16-week of weekly group sessions (3x/week) that combines CBT, family education, individual counseling, social support, drug testing, and encouragement for non-drug-related activities

CBT (Matrix Model)

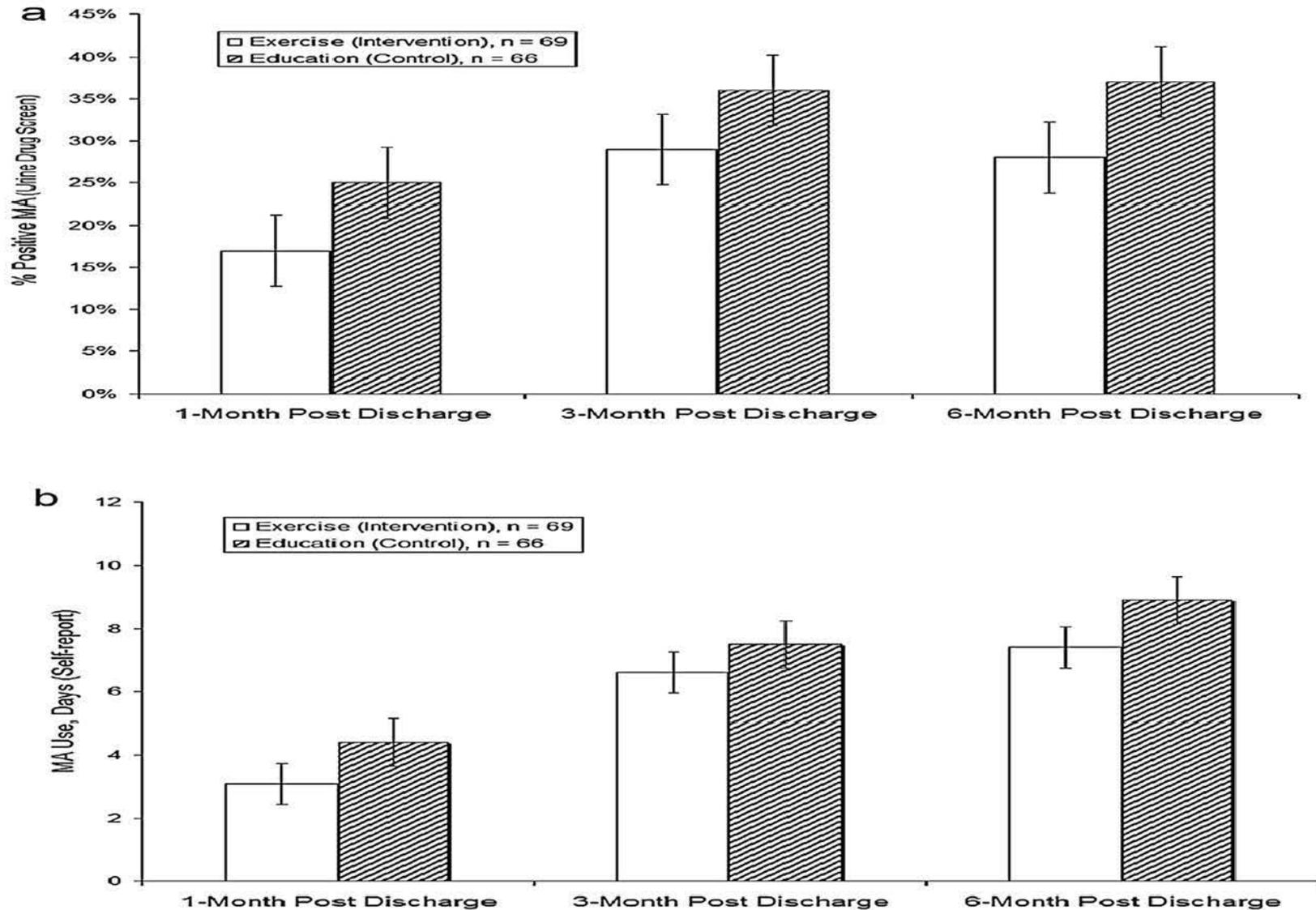


Physical Activity (Exercise-based Therapies)

Physical Activity (Exercise-based Therapies)

- Rawson et al., compared an 8-week exercise intervention on posttreatment MA use following residential tx
 - 135 MA-dependent adults in residential treatment
 - Random assignment to exercise intervention or health education control
- Differential effects on MA were measured after program discharge, reflecting benefits sustained post-intervention
 - Decrease in MA use among lower severity MA users at 1-, 3-, and 6m posttx
- Exercise may help MA users reduce or discontinue use but also carryover benefits of MA tx over time

Physical Activity (as Relapse Prevention)



Treatment Approaches Targeting Cognition

Why Target Cognition for MA Use?

- Studies have examined cognitive deficits associated with stimulant use disorders
 - A meta-analysis comparing MA users (N=487) to controls (N=464) found moderate effect sizes ($0.8 > d \geq 0.5$) for learning, executive function, memory, and speed of information processing domains
 - Small effect sizes ($0.5 > d \geq 0.2$) for motor skills, attention, working memory, visuo-construction, and language domains
- As one example, attentional bias toward drug-related stimuli is particularly salient among MA users
 - Among patients undergoing MA withdrawal, the magnitude of bias toward MA-related stimuli has predicted retention in tx and relapse potential
 - Training to modify attentional bias has shown effective for other SUDs

Cognition: A Trans-diagnostic Treatment Target?

Cognitive Enhancement Treatments

- Pharmacotherapy
- Cognitive rehabilitation

Cognitive Behavioral Therapy (CBT)

Cognitive Function

Executive Control

- Sustained Attention
- Response Inhibition
- Working Memory

Automatic Processes

- Attentional bias
- Approach bias

Individual Vulnerability Factors

- Comorbid psychiatric disorders
- Comorbid substance use disorders
 - Genetics
 - Psychosocial factors

Cognitive Bias Modification (CBM)

Drug Craving and/or Use

Working Memory Training Decreases Delay Discounting (DD) Among Stimulant Addicts (Bickel)

- DD is measured by assessing preferences for a sooner, smaller reward or a later, larger reward
 - *Drug dependence, HIV-risk, alcohol dependence, gambling, obesity*

Sample:

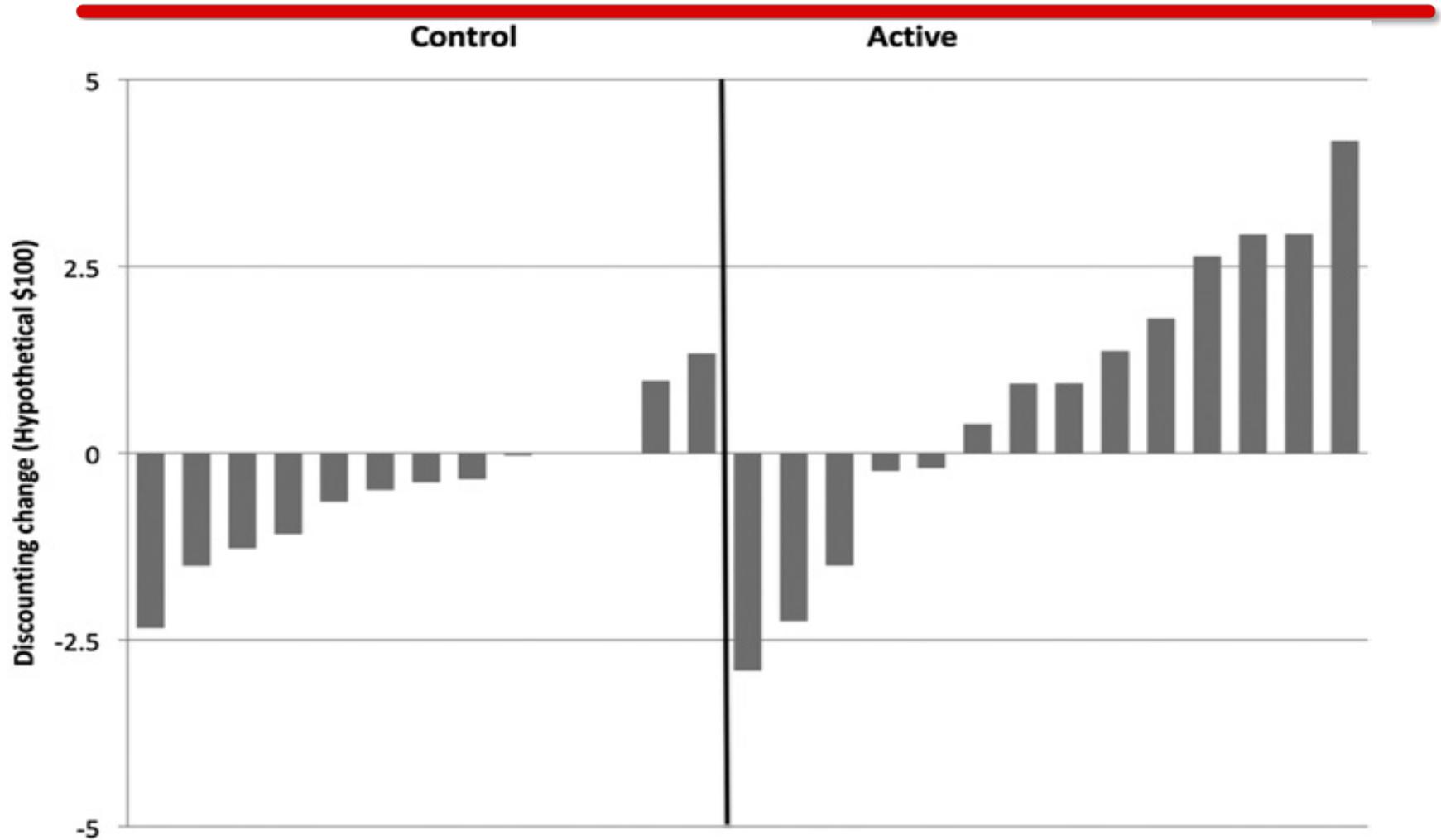
27 adults (20 male, 7 female) being treated for stimulant use at a substance abuse facility

Study Design:

Active training: Working memory tasks with monetary reinforcement for performance –versus–

Control training: Identical working memory tasks and cueing the correct response (yoked to active training)

Results



Study Conclusions

WM training in stimulant-dependent patients resulted in decrease in discounting of delayed rewards

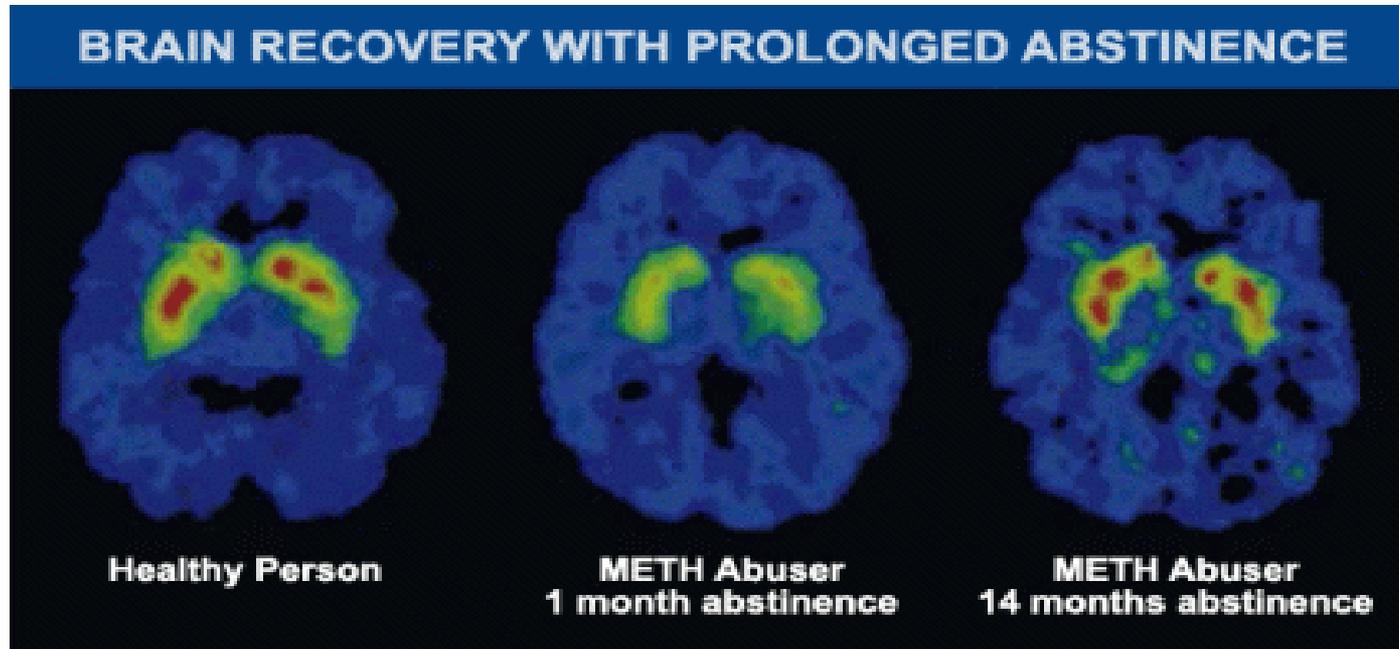
Change in DD resulted from reinforced working memory training

Future Questions:

Durability of the effects? Does the change in DD persist or dissipate?

If the effects decay over time, can booster WM sessions continue the effect?

Role of Recovery: Brain Dopamine Transporters



MA use greatly reduces the binding of dopamine to dopamine transporters (highlighted in red and green) in the striatum (region important for memory and movement)

With prolonged abstinence, dopamine transporters in this area showed restoration

Function in other brain regions did not recover even after 14 months of abstinence, indicating that some MA-induced changes are very long lasting

Summary

Effective Therapies for MA

- Behavioral approaches are the therapeutic mainstay (CM, CBT, PA)
- Most robust effects found with CM on MA outcomes, retention and tx attendance

Comorbidity

- Cognitive deficits and cognitive biases could be potential trans-diagnostic treatment targets for MA use and comorbid disorders

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