MASSACHUSETTS GENERAL HOSPITAL
PSYCHIATRY ACADEMY

Clinical Management in Cannabis Use Disorder

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Disclosures

I have the following relevant financial relationship with a commercial interest to disclose:

- I receive or have received research support from NIMH, NIDA, and the Klingenstein Third Generation Foundation
- I have ownership equity in WISER Systems, LLC as a partner.

Agenda

- Clinical considerations - comorbidity
- Pharmacological approach to cannabis use disorder
- Psychosocial approaches to cannabis use disorder
- Example of one approach: contingency management
  - What is contingency management and why should it work?
  - Laboratory evidence suggesting that CM does work
  - Demonstration of a type of community reinforcement program
  - Demonstration of real world application of a CM program
  - Things to consider when developing a CM program

Comorbidity

Table 2. Cannabis Use in the Past 12 Months in Wave 1 and Incident Psychiatric Disorders in Wave 2 of the NESARC[a]

Incident Psychiatric Disorders in Wave 2	Wave 1, % (No.)[b]			
	Cannabis Use in Past 12 mo (n = 1279)	No Cannabis Use in Past 12 mo (n = 33 364)	OR (95% CI)	Adjusted OR (95% CI)
Any disorder (n1 = 606; n2 = 7981)[c]	93.1 (606)	36.9 (7891)	23.0 (16.5-32.1)	4.4 (2.8-6.9)
Any substance use disorder (n1 = 458; n2 = 3795)	86.3 (458)	17.4 (3795)	29.9 (22.3-40.0)	6.2 (4.1-9.4)
Any alcohol use disorder (n1 = 248; n2 = 2008)	51.5 (248)	8.6 (2008)	11.3 (9.0-14.3)	2.7 (1.9-3.8)
Abuse (n1 = 153; n2 = 1149)	16.8 (153)	4.4 (1149)	4.4 (3.4-5.5)	1.5 (1.1-2.0)
Dependence (n1 = 95; n2 = 859)	14.7 (95)	3.0 (859)	5.5 (4.2-7.3)	1.9 (1.4-2.7)
Any cannabis use disorder (n1 = 120; n2 = 260)	25.0 (120)	0.9 (260)	35.4 (26.5-47.3)	9.5 (6.4-14.1)
Abuse (n1 = 73; n2 = 187)	14.1 (73)	0.7 (187)	24.2 (17.2-34.0)	7.4 (4.9-11.3)
Dependence (n1 = 47; n2 = 73)	5.1 (47)	0.2 (73)	22.2 (14.0-35.1)	6.9 (3.1-15.1)
Any other drug use disorder (n1 = 112; n2 = 339)	13.9 (112)	1.1 (339)	14.0 (10.4-18.8)	2.6 (1.6-4.4)
Abuse (n1 = 69; n2 = 199)	8.3 (69)	0.7 (199)	13.3 (9.3-18.8)	3.4 (2.1-5.4)
Dependence (n1 = 57; n2 = 155)	5.3 (57)	0.5 (155)	11.4 (7.6-17.0)	2.7 (1.6-4.5)
Nicotine dependence (n1 = 118; n2 = 1743)	17.3 (118)	6.6 (1743)	3.0 (2.2-3.9)	1.7 (1.2-2.4)
Any mood disorder (n1 = 152; n2 = 2423)	16.9 (152)	8.3 (2423)	2.3 (1.8-2.9)	1.1 (0.8-1.4)
Major depression (n1 = 55; n2 = 1442)	4.6 (55)	4.8 (1442)	1.0 (0.7-1.3)	0.9 (0.6-1.3)
Bipolar I disorder (n1 = 63; n2 = 617)	6.1 (63)	1.8 (617)	3.5 (2.5-4.9)	1.3 (0.9-1.9)
Bipolar II disorder (n1 = 23; n2 = 230)	1.5 (23)	0.6 (230)	2.5 (1.4-4.2)	1.0 (0.5-1.9)
Bipolar disorder (n1 = 86; n2 = 847)	8.0 (86)	2.5 (847)	3.4 (2.6-4.6)	1.3 (0.9-1.8)
Dysthymia (n1 = 12; n2 = 241)	1.1 (12)	0.6 (241)	1.7 (0.9-3.5)	1.2 (0.6-2.6)
Any anxiety disorder (n1 = 203; n2 = 3715)	20.0 (203)	12.4 (3715)	1.8 (1.5-2.1)	0.9 (0.7-1.1)
Panic disorder (n1 = 52; n2 = 785)	4.5 (52)	2.4 (785)	2.0 (1.4-2.8)	1.0 (0.6-1.5)
Social anxiety disorder (n1 = 53; n2 = 674)	5.2 (53)	1.9 (674)	2.8 (2.0-3.9)	1.4 (0.9-2.1)
Specific phobia (n1 = 82; n2 = 1998)	7.7 (82)	6.2 (1998)	1.3 (1.0-1.7)	0.8 (0.5-1.1)
Generalized anxiety disorder (n1 = 74; n2 = 1163)	5.9 (74)	3.6 (1163)	1.7 (1.3-2.3)	1.0 (0.7-1.5)

Abbreviations: NESARC, National Epidemiological Survey on Alcohol and Related Conditions; OR, odds ratio.

[a] Results from multiple regressions were adjusted for risk factors (see eTable 3 in the Supplement) and sociodemographic characteristics.

[b] Percentages are based on sample weights.

[c] n1 Denotes sample size with cannabis use in the past 12 mo and without index psychiatric disorder at wave 1; n2 denotes size with no cannabis use in the past 12 mo and without index psychiatric disorder at wave 1.

Pharmacological Options

- Currently, the FDA has not approved any medications for the treatment of cannabis use disorder
- Some studies have examined the usefulness of sleep aids due to problems with sleep in early cannabis withdrawal
- Other medications that have been studied, but are inconclusive:
  - Buspirone
  - Gabapentin
  - N-acetylcysteine

Source: National Institute on Drug Abuse; National Institutes of Health; U.S. Department of Health and Human Services.

Psychotherapeutic Options

- **Cognitive-behavioral therapy:** A form of psychotherapy that teaches people strategies to identify and correct problematic behaviors in order to enhance self-control, stop drug use, and address a range of other problems that often co-occur with them.

- **Motivational enhancement therapy:** A systematic form of intervention designed to produce rapid, internally motivated change; the therapy does not attempt to treat the person, but rather mobilize his or her own internal resources for change and engagement in treatment.

- **Contingency management:** A therapeutic management approach based on frequent monitoring of the target behavior and the provision (or removal) of tangible, positive rewards when the target behavior occurs (or does not).

Source: National Institute on Drug Abuse; National Institutes of Health; U.S. Department of Health and Human Services.

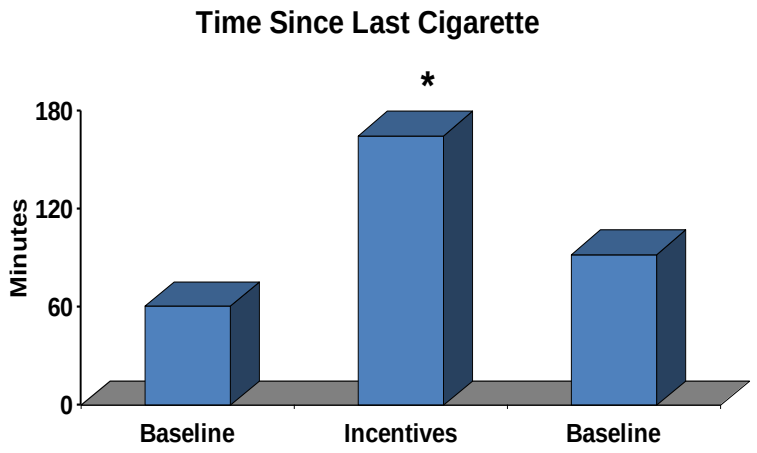
Theoretical Underpinnings of CM

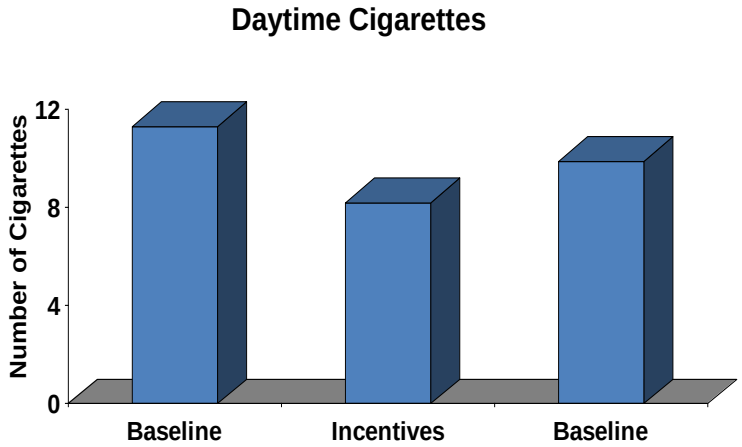
- CM based in psychology, specifically in operant conditioning
- Operant conditioning: occurs whenever a behavior's consequences influence that behavior; that is, future expression of a behavior is contingent on what happens after the behavior is emitted

  - Consequences that  the behavior = reinforcers

  - Consequences that  the behavior = punishers

Scientific Evidence Supporting CM - Laboratory Research





Methods:

- Cigarette smokers in an outpatient lab study
- 3-week study with breath CO assessed daily (M-F)
- Weeks 1 & 3: no incentives available
- Week 2: $5 available for each negative CO reading that was half their average value during the first week

- Contingent incentives were associated with
  - Significantly longer intervals between cigarettes
  - Significantly fewer cigarettes smoked

Conclusion

- Monetary incentives can reduce smoking.

Stitzer & Bigelow, 1982

Why use money as a reinforcer?

- Conditioned reinforcer -- no intrinsic value, but from experience we quickly learn that it can be used to get things that are themselves reinforcing
- Generalizable reinforcer -- everyone can get whatever it is that they find reinforcing

Community Reinforcement Approach Counseling (24 weeks)

- Vouchers, reciprocal relationship counseling, functional analysis, vocational assistance, after recreational/social practices, monitored antabuse therapy

- **Weeks 1-12:** Twice weekly counseling and thrice weekly urinalysis
- **Weeks 13-24:** Once weekly counseling and twice weekly urinalysis
- **Months 7-12:** Aftercare--once monthly check-in with counselor and random urinalysis.

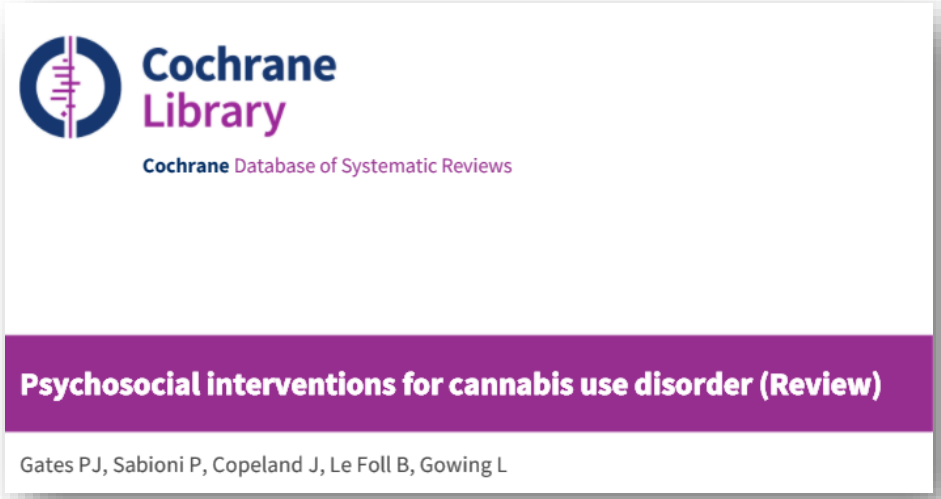
Voucher Program (Weeks 1-12 only)

- Specimens that were negative for THC earned vouchers.
- 1st neg. test = $2.50. Value of vouchers for each subsequent consecutive negative test increased by $1.25; e.g., 2nd = $3.75, 3rd = $5.00, etc.
- $10 bonus earned for every 3 consecutive negative tests.
- Positive tests or failure to give a specimen reset vouchers back to initial value
- 5 consecutive negative tests returned vouchers back to the value preceding reset
- Vouchers were exchangeable for retail items in community; max. earnings possible = $997.50
- No cash was ever given to patients
- All purchases were made by staff and had to be deemed by therapists to be consistent w/ CRA treatment goals

Why use CM for Cannabis?

- An estimated 17.5% of substance abuse treatment admissions designate cannabis as their primary substance of abuse (SAMHSA, 2014)
- It works: when abstinence can be obtained earlier in treatment, there is a higher likelihood of sustained response
- CM increases the likelihood of early abstinence (Litt et al 2013)

Why use CM for Cannabis?



Authors' conclusions

Included studies were heterogeneous in many aspects, and important questions regarding the most effective duration, intensity and type of intervention were raised and partially resolved. Generalisability of findings was unclear, most notably because of the limited number of localities and homogeneous samples of treatment seekers. The rate of abstinence was low and unstable although comparable with treatments for other substance use. Psychosocial intervention was shown, in comparison with minimal treatment controls, to reduce frequency of use and severity of dependence in a fairly durable manner, at least in the short term. Among the included intervention types, an intensive intervention provided over more than four sessions based on the combination of MET and CBT with abstinence-based incentives was most consistently supported for treatment of cannabis use disorder.

Example

ELSEVIER

Drug and Alcohol Dependence
Volume 167, 1 October 2016, Pages 199-206

Full length article

A contingency management method for 30-days abstinence in non-treatment seeking young adult cannabis users

Randi Melissa Schuster [a, b], Ailish Hanly [a], Jodi Gilman [a, b], Alan Budney [c], Ryan Vandrey [d], A. Eden Evins [a, b]

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https://doi.org/10.1016/j.drugalcdep.2016.08.622

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Highlights

- Contingency management may be useful for studying the effects of cannabis in youth.
- Nearly 90% of the sample attained biochemically confirmed 30-day abstinence.
- Abstinence was associated with reduction in concentrations of cannabis metabolites.

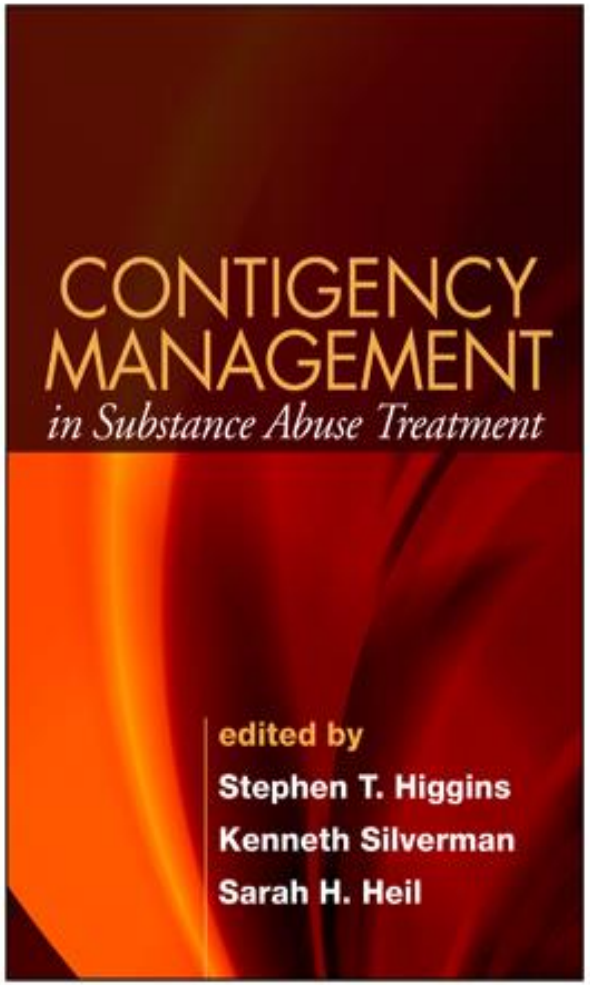
Replications

Across Substances

- *Cocaine – Higgins, Heil, Rogers, and Chivers*
- *Opioids – Epstein and Preston*
- *Marijuana – Budney and Stanger*
- *Methamphamines – Roll and Newton*
- *Tobacco – Sigmon, Lamb and Dallery*
- *Alcohol – Wong, Silverman and Bigelow*
- *Medication – Rounsaville, Rosen, and Carroll*

Across Populations

- *Homeless – Milby and Schumacker*
- *Pregnant women – Heil, Yoon, and Higgins*
- *People with mental illness – Tidey and Ries*
- *Adolescents – Krishnan-Sarin, Duhig Cavallo*
- *Criminal justice – Marlow and Wong*
- *Employees – Donlin, Knealing, Silverman*
- *Veterans – Drebing, Rounsaville, Rosenheck*



Replications

- Meta-Analysis of Voucher-Based Reinforcement

  Lussier et al. (2006). Addiction, 101, 192-203

  – Calculated effect sizes for 30 controlled studies targeting drug abstinence
  – r=0.32, 95% CI-0.26-0.38, moderate-low ES

- Meta-Analysis of Psychosocial Treatments

  Dutra et al. (2008). Am J Psychiatry, 165, 179-187

  - Calculated effect sizes for various types of behavioral treatment for SUDs
  - CM (n=14 studies), d = 0.58, 95%CI=0.25 to 0.90; moderate-high ES
  - Cognitive behavior therapy (n=13 studies), d=0.28, 95%CI=0.06 to 0.51; moderate-low ES
  - Relapse prevention (n=5 studies), d=0.32, 95%CI=0.06 to 0.56; moderate-low ES

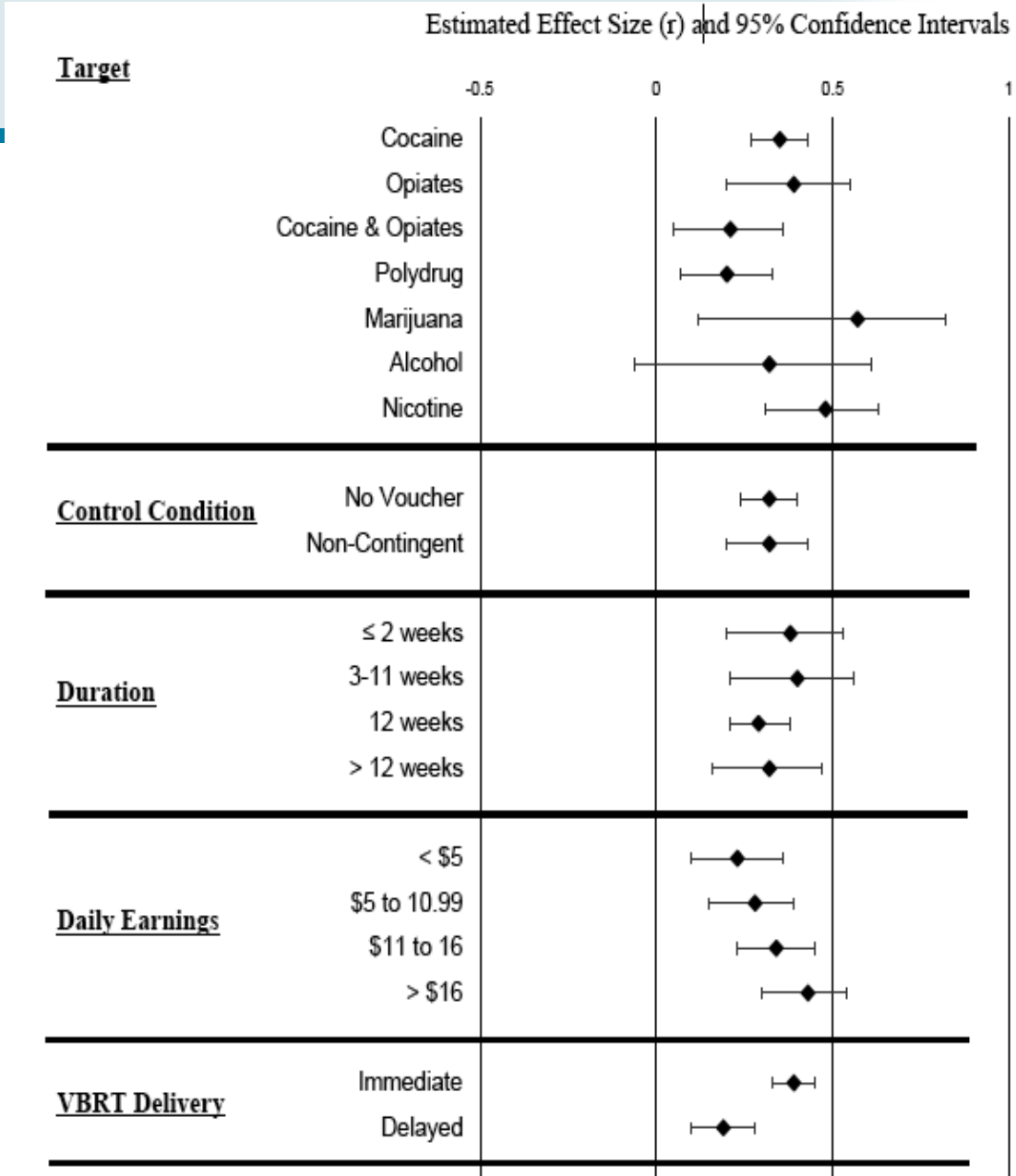
Things to Consider

- Choice of reinforcer
- Incentive magnitude
- Frequency of incentive distribution
- Timing of the incentive
- Duration of the incentive

Choice of Reinforcer

Three basic types of incentive programs have been researched:

- vouchers or other token economy systems - points or vouchers are given for engaging in activities as well as for meeting specific treatment plan goals; points are then redeemed for goods or privileges;
- contingent access to clinic privileges - utilization of privileges that already exist within a clinic setting;
- fee rebates - part of a patient's clinic fee is returned to them in the form of a cash rebate when specified behavioral requirements are met.


Estimated Effect Size (r) and 95% Confidence Intervals
Target
-0.5
0
0.5
1
Cocaine
Opiates
Cocaine & Opiates
Polydrug
Marijuana
Alcohol
Nicotine
Control Condition
No Voucher
Non-Contingent
Duration
≤ 2 weeks
3-11 weeks
12 weeks
> 12 weeks
Daily Earnings
< $5
$5 to 10.99
$11 to 16
> $16
VBRT Delivery
Immediate
Delayed

Other target behaviors among patients with SUDs

- Treatment attendance
- Achievement of treatment goals
- Medication adherence (naltrexone, HAART)
- Adherence with vaccination schedules (Hep B)
- Prenatal care visits

Challenges

Cost

- Incentives themselves
- On-site testing
- Program monitoring

Engagement but not persistence?

- Integration with other therapies?

Resistance from administration

Resistance from community

Summary

- There are no current FDA-indicated medications for cannabis use disorder.
- Comorbidities with other substances are common as are comorbidities with other psychiatric disorders.
- CBT, MET, and Contingency Management have been shown to be effective in the treatment of CUD.
  - Contingency management is a manualized therapy for substance use that uses the principles of reinforcement to help people gain and maintain sobriety
  - Relatively easy to operationalize, it has been effective for any number of conditions and targets
  - Keys are a focused target, immediate contingencies, substantial contingencies

Thank you!

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Image Credit: U.S. Department of Energy Human Genome Program