Contingency Management Approaches to Adolescent Substance Abuse

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Objectives

- Describe the use of contingency management to treat adolescent substance abuse
- Review the timing of treatment response
- Review predictors and moderators of treatment outcome
What is Contingency Management?

• CM programs arrange the environment such that
  – target therapeutic behaviors are carefully monitored
    • drug abstinence, counseling attendance, and medication compliance
  – reinforcing or punishing events occur when the target behavior does or does not occur
    • tangible rewards or incentives, loss of privileges
Determining Characteristics of CM

- Target(s)
- Monitoring
- Schedule of Reinforcement
- Magnitude of Reinforcement
- Type of Consequence
CM for Adolescent Substance Abuse

• Target
  – Abstinence from MJ, alcohol, and other drugs

• Monitoring
  – 2x weekly monitoring: urine testing, self report, parent report

• Schedule of Reinforcement
  – Escalating schedule (incentives increase with consecutive periods of abstinence); Bonuses for each week of abstinence; Reset for use

• Magnitude of Reinforcement
  – $590 over 14 weeks

• Type of Consequence
  – Gift cards selected by teen
– Contract with teen for rewards and consequences based on substance use status

– Contract is implemented twice weekly, on same schedule as urine drug testing and clinic CM program
  • Same target, monitoring, and schedule as clinic CM
  • Individualized magnitude and type of reward/ consequence
All teens received:
  • Individual Motivational Enhancement Therapy/Cognitive Behavior Therapy
    • Manualized, tested in the CYT trial (Dennis et al., 2004)
    • Twice weekly urine drug testing (parents informed)
  • Randomized to receive:
    • Contingency Management + Parent Training (Dishion + Kavanaugh, 2003)
    or
    • Participation incentives + Parent Drug Education

Initial Trial (Vermont)
Stanger et al., 2009
N=69
Randomly Assigned

N=33
14 weeks MET/CBT
2x/week UA

Participation Incentives

Parent Drug Education

Post RX 12 weekly UAs

N=39
14 weeks MET/CBT
2x/week UA

Abstinence Based Incentives

Parent Substance Monitoring Contract

Parent Training

Post RX 12 weekly UAs
VT Study: Mean Weeks of Continuous Abstinence

CBT+CM > CBT+PDE, $p < .05$
Arkansas Trial Design

• 3 Condition, Randomized Trial
  – N=153 adolescents

• Designed to isolate the efficacy of CM vs. CM+Parent Training
N=153
Randomly Assigned

n=51
14 weeks MET/CBT
2x/week UA

Participation Incentives

Post RX 12 weekly UAs
Participation Incentives

N=51
14 weeks MET/CBT
2x/week UA

Abstinence Based Incentives

Post RX 12 weekly UAs
Abstinence Based CM
6 Parent Booster Sessions

N=51
14 weeks MET/CBT
2x/week UA

Abstinence Based Incentives

Post RX 12 weekly UAs
Abstinence Based CM
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N=51
14 weeks MET/CBT
2x/week UA

Parent Substance Monitoring Contract

Parent Training

Parent Substance Monitoring Contract

Parent Training
Inclusion/Exclusion Criteria

- DSM-IV Marijuana abuse or dependence
- MJ use in past 30 days OR THC positive urine drug test
- Age 12-18
- Not dependent on any other substance (except tobacco)
<table>
<thead>
<tr>
<th>Age</th>
<th>15.8 (1.2)</th>
<th>Days Cannabis Use (past 90)</th>
<th>35.0 (29.0)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>89%</td>
<td>Days Alcohol Use (past 90)</td>
<td>1.2 (2.2)</td>
</tr>
<tr>
<td>% two parent</td>
<td>35.3%</td>
<td>% Cigarette Users (past 90)</td>
<td>52%</td>
</tr>
<tr>
<td>Ethnicity/Race</td>
<td></td>
<td>Age first used MJ</td>
<td>13.5 (2.0)</td>
</tr>
<tr>
<td>Afr. Amer.</td>
<td>62%</td>
<td>% ODD/CD by Parent Report</td>
<td>45%</td>
</tr>
<tr>
<td>Caucasian</td>
<td>35%</td>
<td>Hollingshead 9-step SES</td>
<td>5.1 (2.4)</td>
</tr>
<tr>
<td>Other</td>
<td>03%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
During Treatment Marijuana Abstinence

Treatment effect was not significant....however......
Weeks of continuous abstinence is not normally distributed....
Zero Inflated Poisson model results – Continuous Abstinence

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Variable</th>
<th>B</th>
<th>S.E.</th>
<th>p</th>
<th>OR</th>
</tr>
</thead>
<tbody>
<tr>
<td># of Clean Weeks</td>
<td>CM</td>
<td>0.068</td>
<td>0.174</td>
<td>0.696</td>
<td></td>
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<tr>
<td>Any clean vs. No Clean</td>
<td>CM</td>
<td>-0.740</td>
<td>0.370</td>
<td>0.045</td>
<td>-0.40</td>
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</table>

CM has <\(\frac{1}{2}\) the odds of having no clean samples compared to the No CM group; CM was not significantly related to the # of clean weeks among those with \(\geq 1\) clean weeks.
During and End of Treatment Marijuana Abstinence

* Chi Square Analyses: Both CM groups > MET/CBT (p<.05)
Post Treatment Abstinence (Missing UA counts as use)

GEE analysis with paired contrasts
Significant relapse in MET/CBT (p<.05): no differences between conditions
Replicated positive CM effects on abstinence during treatment in a more diverse, lower SES, sample.

Parent training did not enhance effects on abstinence during or post treatment.

Maintenance was poor across all treatments.
• Timing of Abstinence

• Delay Discounting

• Disruptive Behavior Disorders

• Parenting Behavior
Timing of Abstinence: Early or Not at All?

Hazard function: Onset of first week of abstinence
Abstinence in Week 6 as Predictor of Outcome
Abstinence in Week 6 Predicts Post Treatment Outcome

Chi Square at each time point: If Week 6 UA is negative for THC, each follow up UA is significantly more likely to be negative for THC
- 51% of CM and 35% of non CM youth were abstinent in Week 6
  - Across conditions if abstinence does not occur by week 6, it is unlikely to occur
- Week 6 abstinence is a strong predictor of during and post treatment abstinence
  - We are beginning a trial that will re-randomize teens who are not abstinent in week 6 to a higher level of care (higher magnitude CM for teens)
Delay Discounting - A measure of decision making characterized as a relative preference for smaller, immediate rewards over larger, delayed rewards

- Large literature demonstrating that substance users discount the future (prefer immediate rewards) more than non substance users
- We find that greater delay discounting predicts during treatment abstinence over and above the effect of treatment (Stanger et al., 2012)
Discounting and CM Predict Weeks of Abstinence

Low DD youth have longer abstinence, r=-.19, p<.05 (does not interact with CM)
<table>
<thead>
<tr>
<th>Outcome</th>
<th>Variable</th>
<th>B</th>
<th>S.E.</th>
<th>p</th>
<th>OR/Beta</th>
</tr>
</thead>
<tbody>
<tr>
<td># of Clean Weeks</td>
<td>CM</td>
<td>0.351</td>
<td>0.411</td>
<td>0.393</td>
<td></td>
</tr>
<tr>
<td></td>
<td>DD</td>
<td>-0.09</td>
<td>0.106</td>
<td>&lt;.001</td>
<td>-0.43</td>
</tr>
<tr>
<td>Any clean vs. No Clean</td>
<td>CM</td>
<td>-0.207</td>
<td>0.092</td>
<td>0.024</td>
<td>-0.44</td>
</tr>
<tr>
<td></td>
<td>DD</td>
<td>0.106</td>
<td>0.109</td>
<td>0.331</td>
<td></td>
</tr>
</tbody>
</table>

CM has \( <\frac{1}{2} \) the odds of having no clean samples as the No CM group; Intake DD was significantly related to the # of clean weeks among those with \( \geq 1 \) clean weeks.
Greater DD (preference for immediate rewards) related to poorer abstinence outcomes
  – Whether or not the teen receives CM

However, DD does not predict outcome after controlling for SES and Race.
  – Suggests impulsive decision-making shares variance with these variables

Notably, only DD is potentially modifiable
Delay Discounting: Treatment Relevance

• Teens who show higher levels of DD may be an important subgroup to identify at treatment onset
• Or, all teens may benefit from an intervention targeting DD or impulsive decision making
• Intervention strategies that address DD (testing in new trial)
  • Strategies to target executive function or inhibitory control (e.g., working memory training)
ODD/CD Moderates Treatment Response

Significant DBD x CM interaction; independent replication of VT finding (Ryan et al., 2012) (similar results for both CM conditions)
• Teens without ODD +/or CD showed similar response across interventions
  – Suggesting individual MET/CBT + Urine drug testing and participation incentives might be the appropriate first line treatment for this group.

• Teens with ODD +/or CD had outcomes similar to youth without ODD/CD if they received CM
  – These youth seem to benefit greatly from CM and parent contracting
Parental Monitoring and Post-Treatment MJ use (n = 153)

Intake Poor Monitoring → End of Tx Poor Monitoring → Post Tx MJ Use

CBT+CM

Intake Poor Monitoring: .66
End of Tx Poor Monitoring: .43
Post Tx MJ Use: .36
CBT+CM: -.26

X²(22) = 33.9, p = .05, TLI = .95, RMSEA = .059; Replication of Stanger et al., 2009
Improvements in parental monitoring are a consistent predictor of treatment outcome
– Over and above assigned treatment condition
Because CM does not predict monitoring improvements, it is important to continue to develop new interventions that target this important parenting behavior
– Our new trial targets time outside adult supervision among those not abstinent in Week 6
CM consistently resulted in more during treatment abstinence, but we need to explore why maintenance of abstinence was so poor in this study/sample (family structure, environment, SES, impulsivity)

Guided by these findings on moderators of response, we are attempting to boost outcomes in our current trial by
  – targeting executive function (working memory) at treatment onset in attempt to impact delay discounting
  – targeting youth who have not responded by week 6 with higher magnitude CM and more parental monitoring

Future trials will explore 2nd generation tailored treatment approaches to target potential subgroups with differential outcomes
  – Teens with vs. without conduct problems
Contingency Management Approaches to Adolescent Substance Abuse

• CM can improve during treatment abstinence
• Teen preferences for immediate rewards predicts poor outcomes
• CM may be especially helpful for teens with comorbid ODD +/or CD
• Parental monitoring improvements during treatment predict long term outcomes
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