Alternative Approaches to Studying Mechanisms of Behavior Change in Alcohol Use Disorders

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SYMPOSIUM AT RESEARCH SOCIETY ON ALCOHOLISM

PRECONFERENCE SATELLITE SESSION:
The Search for Mechanisms of Change in Evidence-Based Behavioral Treatments
Saturday, June 25, 2005 8:30 a.m.

Reagan Room
Fess Parkers Doubletree Resort
533 E. Cabrillo Boulevard
Santa Barbara, California
Welcoming Remarks:

Dr. Ting-Kai Li (NIAAA)                             9

NIAAA's Perspective:

Robert Huebner, (NIAAA)                         16

Evaluating Mechanism of Change in Treatment:

Matthew Nock (Harvard)                        28

Case Study of Mediators of Treatment Effectiveness:

Mitch Karno (UCLA)                           109

The Search for Mechanisms of Change in Alcohol Behavioral Treatment Research:

Dick Longabaugh (Brown)                     155

Active Ingredients of Motivational Interviewing Using the MISC:

Terri Moyers (UNM)                           183

Statistical Approaches to Identifying Mechanisms of Change:

J. Scott Tonigan (UNM)                      211

Broader Picture of Mechanisms of Action

Mark Willenbring (NIAAA)                    377

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How the science of behaviour change can help with sustainability

Les Robinson shares his tips on how the science of behaviour change can help to make sustainability initiatives more effective

By Les Robinson, TriplePundit, Guardian Sustainable Business Network
theguardian.com, Tuesday 18 January 2011 09.49 EST
Jump to comments (1)

Questions about behaviour change come up often and the answers can help with sustainability initiatives. Photograph: Murdo Macleod for the Guardian
What Do I Know About MOBC in AUD that I Did Not Know in 2005?
What Do I Know About MOBC in AUD that I Did Not Know in 2005?

Content Knowledge

Research Methods
Overview of Presentation

Substantive Understanding of MOBC in AUD in 2005
  • Working Assumptions and Critical Research Questions

Methodological Approaches
  • Treatment Research Science (Nock, 2005)
  • Translational Science (Willenbring, 2005)
Overview of Presentation

Treatment Research Science (Nock, 2005)
• Define approach
• Brief review of studies and findings
• Why approach may be limited

Translational Science (Willenbring, 2005)
• Cognitive Science & Neuroscience Frameworks as a Heuristic to Refine MOBC Theory and Method
• Translation to AUD MOBC & Pilot Study Results
STATE OF KNOWLEDGE ON MOBC FOR AUD IN 2005: I

- A number of modestly effective behavioral treatments
- Despite notable differences, treatments appear to be equally effective
- Limited empirical support for theory-based patient treatment matching (moderators)
- Limited empirical support for theory-based treatment specific effects (mediation)
STATE OF KNOWLEDGE ON MOBC FOR AUD IN 2005: II

Hypothesized Treatment Targets or Mechanisms

• Motivation
• Self-efficacy
• Craving
• Coping
• Social support for abstinence
• Alternative reinforcers
Treatment research should focus on how behavior change occurs not simply whether treatments are effective.

Methods testing whether an intervention is effective are inadequate when attempting to answer questions about how behavior change occurs.
CRITIQUE OF AUD TREATMENT RESEARCH APPROACH: 2005

• Limited number of studies on mediation

• Stronger tests using better methods
  – Kazdin & Nock (2003): 1) strong association, 2) specificity, 3) experiment, 4) temporality
  – Move from association to causal inference
**Test Specific Effects of CBT & MI for AUD Using Stronger Methods**

- Dismantling designs
- Limit prior & background treatments & self-help affiliation as part of treatment
- Limit sample heterogeneity
- Better fidelity to treatment models
- Study initiation of change in moderation goal treatments
- Better measurement of mediators (temporality)
Dismantling Test of MI+CBT for Problem Drinking MSM: Alcohol & HIV

Informed Choices for Men

Time to make some CHOICES

As part of our research study, our staff of professional psychotherapists provide individual therapy at no cost in a gay affirmiative environment. We can help you set and maintain goals that are right for you.

Worried about your drinking or risky sex and want someone to talk to?

IC⁴/m
Informed Choices for Men
1.888.256.8718

http://www.mssm.edu/psychiatry/ic4m

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Cognitive Behavioral Risk Reduction Treatment (CBRRT)

- Offer goal choice
- Address motivation for drinking & risky sex
- Identify proximal antecedents for drinking & risky sex
- Identify common distal antecedents (internalized homophobia, negative affects)
- Case formulation: teach to skill’s deficit
- Address therapeutic alliance issues
Dismantling Treatment Design

Cognitive Behavioral Risk Reduction Treatment (CBRRT)
- 12 weekly sessions
- 2 sessions motivational enhancement for drinking & HIV risk
- Behavioral assessment, case formulation, individual skill acquisition plan tailored for drinking & HIV
- 8 sessions cognitive behavioral skills building for drinking & HIV
- 2 sessions for relapse prevention and termination.

Motivational Enhancement Therapy (MET)
- 4 sessions of motivational enhancement at weeks 1, 2, 6 & 12
- MI plus feedback for drinking and HIV
Inclusion / Exclusion Criteria

Inclusion criteria:
1) Male
2) Sexually active & HIV negative (via self-report)
3) Diagnosis of alcohol abuse or dependence/active drinking

Exclusion criteria:
1) Injection drug use or crack cocaine use (past 6 months)
2) Evidence of thought disorder or severe cognitive impairment
3) Drug use disorder more severe than their alcohol use disorder
4) Currently in substance abuse treatment
Readiness, Goals, & Prior Help Seeking

Readiness to Change  \( m = 9.0, \ sd = 1.9 \)
(Match Outpatient Male  \( m = 10.4, \ sd = 1.7 \))

\% abstinence goal  5.7\%.
\% with prior AOD treatment  13.5\%.
\% >1 AA Meeting  19.3\%
Drinks Per Day – During Treatment

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline CBRRT</td>
<td>6.5</td>
<td>6.4</td>
</tr>
<tr>
<td>During Tx CBRRT</td>
<td>3.7</td>
<td>2.2</td>
</tr>
<tr>
<td>Effect Size CBRRT</td>
<td>0.67</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline MET</td>
<td>5.5</td>
<td>5.7</td>
</tr>
<tr>
<td>During Tx MET</td>
<td>2.0</td>
<td>2.2</td>
</tr>
<tr>
<td>Effect Size MET</td>
<td>0.90</td>
<td></td>
</tr>
</tbody>
</table>
Drinks Per Day-12 Month Post-Treatment Outcomes

- MI
- CBT+MI

Month
Drinks Per Day Three Months Pre and After Baseline

Week

Drinks per Day

- CBRRT
- MET
- No Treatment
Some Thoughts

• Study strengths
  • Improved fidelity to behavioral therapy treatment model
  • Limited confounds from prior treatment or AA
  • Dismantling enables stronger causal inference

• Conclusions
  • Study does not support specific effects of CBT
  • Perhaps most people possess skills or can learn them if sufficiently motivated without intensive skills training
  • Novel finding regarding MI efficacy relative to bonafide treatment
  • A great deal of drink reduction occurred rapidly & before treatment
Dismantling MI for Problem Drinkers: Specific Effects, Common Factors, & Self-Change

Background: Dismantling MI Components Related to Drink Reduction

• **Self-Change**
  - Decision-making, motivation, actions individuals bring to treatment as part of change episode
  - Impact of study procedures (e.g., assessment reactivity)

• **Spirit-only MI** (SOMI; common therapy factors)
  - Therapist stance (warmth, egalitarianism)
  - Extensive use of reflective listening
  - Avoid MI-inconsistent behaviors

• **MI specific elements** (directive/strategic)
  - Enhance discrepancy (structured feedback, double-sided reflections)
  - Elicit & reinforce positive change talk (change plan)
Approach

• Sample: 90 Problem Drinkers (age 18 – 65, mean weekly consumption of ≥ 24 Men; ≥15 Women standard drinks; goal of moderation; agreed not to seek additional alcohol treatment during the study; minimal other drug use; no co-occurring psychiatric disorder; no risk of withdrawal)
  • Demographics: Age $M = 38.29$ (11.17); 50.6 % Male; 77% White; Employed 85.4%; 71.9% Bachelor’s Degree or higher
  • Drinking Severity: Mean Drinks Per Week: $M = 31.32$ (3.2); DPDD: $M = 5.05$ (2.3); SIP: $M = 14.88$ (7.2); DSM-IV Alcohol Dependence Criteria: $M = 4.0$ (1.6); ADS: $M = 12.49$ (5.1)
  • 86.5% had no prior treatment

• Method: Randomized controlled trial; 3 conditions (MI, SOMI, and SC)
  • Screened for eligibility at week 0; Began daily Interactive Voice Recording
  • Randomized at Week 1; Assessments occurred at weeks 1, 4, and 8.
  • Treatment conditions: 4 sessions over 8 weeks.
  • Treatment fidelity and discriminability: MITI coding; behavior count of directive strategies;
  • Primary Measures: Commitment Language (Amrhein); TLFB for drinking outcomes
Effect Size Reductions Pre to End Treatment
MI, Spirit-only MI, & Self-change

<table>
<thead>
<tr>
<th>Condition</th>
<th>Effect Size</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>MI</td>
<td>.91</td>
<td></td>
</tr>
<tr>
<td>Spirit-only MI</td>
<td>.93</td>
<td>NS</td>
</tr>
<tr>
<td>Self-change</td>
<td>1.05</td>
<td></td>
</tr>
</tbody>
</table>
Commitment Language Strength by Session Decile: MI versus SOMI

Mean Commitment Strength

Session 1 Decile

Session 2 Decile

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Some Thoughts

• Study strengths
  • Problem drinker sample: minimal drug use, co-occurring disorders
  • Good fidelity to model: change talk greater in MI vs. SOMI
  • Dismantling enables stronger causal inference

• Study Weaknesses
  • Smallish sample & short follow-up

• Conclusions
  • No evidence for MI specific effects relative to SOMI
  • Surprising outcomes for SC condition
  • Rapid change in drink reduction contrary to treatment theories
Challenges Not Addressed by Treatment Science Approach

- Conceptual frameworks that undergird treatment
  - No longer grounded in the best science
  - Often not specific to addiction

- Heterogeneity
  - Descriptive subtyping schemes are weak predictors of differential response
  - Substantial heterogeneity in pre- and within treatment trajectories

- Treatment is highly dynamic process & not well captured by current linear methods
**Framework that Undergirds Behavioral Treatment Research**

<table>
<thead>
<tr>
<th>Conceptual Framework</th>
<th>Application to CBT</th>
</tr>
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<tbody>
<tr>
<td><strong>Broad Theory of the Disorder</strong></td>
<td>Social Learning Theory of Addiction</td>
</tr>
<tr>
<td><strong>Factors that Maintain Disorder</strong></td>
<td>Coping Skills Deficits</td>
</tr>
<tr>
<td><strong>How Intervention Remediates Factors that Maintain Disorder</strong></td>
<td>Teaching Leads to Skills Acquisition</td>
</tr>
</tbody>
</table>

**Patient Features that Moderate Intervention Effects**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>I)</strong> Disease subtype theory</td>
<td>Skill deficit is a maintenance factor in only a subgroup</td>
</tr>
<tr>
<td><strong>II)</strong> Limitation in capacity to process intervention</td>
<td>Cognitive impairment limits ability to learn coping skills</td>
</tr>
</tbody>
</table>

Cognitive Architecture of Self-Control Processes (RIM: Strack & Deutsch)

- **SLOW-ACTING**
- **EXECUTIVE CONTROL FUNCTIONS**
- **LONG-TERM GOALS**
- **EFFORTFUL**
- **PERSONAL STANDARDS**
- **LOW CAPACITY**
- **PERSERVES GOAL-DIRECTED ACTIONS**
- **VERBALLY MEDIATED**
- **REFLECTIVE SYSTEM**
- **CONTROLLED EXPLICIT**
- **APPRaisal OF**
- **AUTOMATIC**
- **AFFECTIVE & MOTIVATIONAL SIGNIFICANCE OF PRESENT STIMULUS**
- **FAST ACTING**
- **IMPULSIVE SYSTEM**
- **HIGH CAPACITY**
- **ASSOCIATIVE LEARNING**
- **IMMEDIATE GOALS**
- **STIMULUS-RESPONSE FUNCTIONS**
Self Control Involves a Switch in Modes of Information Processing between Systems

- short-term to long-term perspective
- hot to cool
- low-level to high-level construal
- habitual, bottom up action control by present stimuli to top-down control desired end states specified in respective goals
Interaction of Reflective (Blue) and Impulsive (Red) Stimuli in response to Affective Stimuli
Cognitive/Affective Processes

Neural Systems

Neurotransmitters
Neurocognitive Theories of Addiction: Impairment in Normal Self-Control Processes

**REFLECTIVE SYSTEM**

Executive Cognitive Functions are Weakened

---

Additive Cues Overvalued Relative to Natural Reinforcers

**IMPULSIVE SYSTEM**
Neurocognitive Theory of Addiction

REFLECTIVE SYSTEM

Executive Cognitive Functions are Weakened

Additive Cues Overvalued Relative to Natural Reinforcers

IMPULSIVE SYSTEM

Cognitive Control
Attentional Control
Inhibitory Control
Behavioral Monitoring

Reward Systems
Stress/Allostasis Systems
Incentive Habit Systems
Neurocognitive Theory of Addiction: Core Elements

• Dyscontrol is product of interactions across systems

• Multiple neural mechanisms likely involved (e.g., Bechara, 2005)

• Processes occur across multiple levels: cognitive, neural, neurotransmitter

• Clarification of system components hold promise to improve classification & treatment

• Alcohol dependence associated with abnormalities in PFC & limbic systems (e.g., Ware et al., 2008)
Cognitive neuroscience approach

Ochsner & Lieberman, 2001; Ochsner & Feldman Barrett, 2001; Ochsner, 2008; Martin Braunstein et al., in prep

Social/Cognitive/Affective Performance

Information Processing

Neural Systems

behavioral measures of emotion & regulation

affective & cognitive processes

fMRI measures of cortical & subcortical systems
Cognitive neuroscience approach

Ochsner & Lieberman, 2001; Ochsner & Feldman Barrett, 2001; Ochsner, 2008; Martin Braunstein et al., in prep

1: Apply the model of basic mechanisms

2: Translate the model

For a given population, use behavioral and neural measures to draw inferences about (dys)function of specific processes
<table>
<thead>
<tr>
<th>Cognitive/Affective Processes</th>
<th>Laboratory Tasks</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Alcohol Attentional Bias</td>
<td>• Alcohol Stroop</td>
</tr>
<tr>
<td>• Cue Reactivity &amp; Regulation of Cravings</td>
<td>• Regulation of Craving Task</td>
</tr>
<tr>
<td>• Alcohol Approach Avoidance Processes</td>
<td>• Stimulus Compatibility Response Task</td>
</tr>
</tbody>
</table>
Alcohol Approach Avoidance

Appetitive & aversive responses to alcohol cues results from activation of approach/avoidance domains

- Approach inclination are defined as the desire to consume the alcohol
- Avoidance inclination are defined as the desire to withdraw/refrain from consumption
- Some evidence for a casual link between approach tendencies & drinking (Weirs)
- Evidence that approach processes are elicited more rapidly than avoidance processes
Do basic alcohol Approach & Avoidance motivations relate to drinking?

- **Measure** reaction times to Approach & Avoid alcohol
- **Stimulus Response Compatibility (SRC) computer task:**
  - Subjects **view pictures** of alcohol and office supplies
  - Categorize pictures by making **joystick** responses
  - **Instruction:** “Pull joystick towards you for pictures that contain alcohol. Move joystick to the left for pictures without alcohol.”
- **Problem drinkers** (n=60) seeking treatment to reduce drinking
- Completed at **Baseline & Post** 8 weeks of treatment
Approach & Avoid responses

Approach = Pull

Avoid = Push

Picture gets larger when pulling

Picture shrinks when pushing
### Approach & Avoidance explain unique variance in Drinking Outcome

**Outcome: Week 12 Sum of Standard Drinks**

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>R Square Change</th>
<th>Sig. F Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wk 1 drinking</td>
<td>.422</td>
<td>.178</td>
<td>.164</td>
<td>.178</td>
<td>.001</td>
</tr>
<tr>
<td>Wk 1 drinking SRC Approach SRC Avoidance</td>
<td>.526</td>
<td>.276</td>
<td>.238</td>
<td>.098</td>
<td>.029</td>
</tr>
</tbody>
</table>

SRC explains additional 10% of variance

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Standardized Coeff.</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wk 1 drinking</td>
<td>.423</td>
<td>.001</td>
</tr>
<tr>
<td>SRC Approach</td>
<td>.231</td>
<td>.048</td>
</tr>
<tr>
<td>SRC Avoidance</td>
<td>-.193</td>
<td>.098</td>
</tr>
</tbody>
</table>

SRC betas ½ size of Wk 1 drinking
Do Approach and Avoid RTs change over time?

Yes, but only for High ADS group
SRC Avoidance is related to Cognitive Coping

The faster you avoid alcohol, the higher your cognitive coping score.

R = .245, p = 0.06
Summary

• Identifying novel methods to understand *how* behavior change occurs represents a critical area for MOBC research

• While treatment science approaches are necessary, they are likely not sufficient

• Translational science approaches can help refine conceptual frameworks, address AUD heterogeneity, and better represent the dynamic nature of the treatment process
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