Mindfulness-Based Relapse Prevention: A Dialogue Between Clinical Science and Neuroscience in the Treatment of Addictive Behavior.

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Why Falling Off the Wagon Isn't Fatal

By MAIA SZALAVITZ. Tuesday, Dec. 30, 2008
Brickman’s Model of Helping & Coping Applied to Addictive Behaviors

Is the person responsible for the development of the addictive behavior?

<table>
<thead>
<tr>
<th>Is the person responsible for changing the addictive behavior?</th>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>YES</td>
<td>MORAL MODEL (War on Drugs)</td>
<td>Relapse = Crime or Lack of Willpower</td>
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<tr>
<td></td>
<td>SPIRITUAL MODEL (AA &amp; 12-Steps)</td>
<td>Relapse = Sin or Loss of Contact with Higher Power</td>
</tr>
<tr>
<td>NO</td>
<td>COMPENSATORY MODEL (Cognitive-Behavioral)</td>
<td>Relapse = Mistake, Error, or Temporary Setback</td>
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<tr>
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<td>DISEASE MODEL (Heredity &amp; Physiology)</td>
<td>Relapse = Reactivation of the Progressive Disease</td>
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</table>
Neural Mechanisms in addiction

+ Reinforcement

ventral striatum – nucleus accumbens

Pleasure

ventral tegmental area

Neural Mechanisms in addiction

Habit

dorsal striatum - caudate & putamen

ventral tegmental area
Rajita Sinha et al. at Yale showed stress increases activity in the dorsal striatum of cocaine addicts.

Positive Correlation,

\[ p < .005 \]

inverse correlations with subjective distress - the higher the distress ratings, the lower the activation in the anterior cingulate (ACC).

Source: Rajita Sinha, et al. 2004

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Neural Mechanisms in addiction

hypofrontality

dorsal striatum - caudate & putamen

ventral tegmental area


Volume of prefrontal gray matter in the prefrontal cortex of healthy controls, alcoholic patients, schizophrenic patients, and patients co-morbid for both disorders. From Mathalon et al., Archives of General Psychiatry, 2003, 60, 245-252.
A Cognitive Behavioral Model of the Relapse Process

High-Risk Situation

Effective coping response -> Increased self-efficacy -> Decreased probability of relapse

Ineffective coping response

Decreased self-efficacy
- Positive outcome Expectancies (for initial effects of the substance)

Lapse (initial use of the substance)

Increased probability of relapse

Abstinence Violation Effect
- Perceived effects of the substance

Neural Mechanisms in addiction

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So what would be helpful?

Something to reduce stress

Something to increase PFC inhibition over habit behaviors

Something to temper negative emotion – perhaps by toning down activity in the amygdala

Mindfulness Meditation

Mindfulness is a way of paying attention: on purpose, in the present moment, & non-judgmentally

(Adapted from Kabat-Zinn, 2005)
Results: Vipassana vs. TAU
3-Months Post-Release

- N = 173
- Significant reductions in substance use
  - Marijuana
  - Crack cocaine
  - Alcohol
  - Alcohol-related negative consequences

- Significant changes in psychosocial outcomes
  - Decreased psychiatric symptoms
  - Increased internal drinking-related locus of control
  - Increased optimism

(By Bowen et al, 2006)

Mindfulness-Based Relapse Prevention (MBRP)

(Witkewitz, Marlatt & Walker, 2005; Bowen, Chawla & Marlatt, 2008)

NIDA Grant # R21 DA010562; PI Marlatt
**MBRP Structure**

- Integrates mindfulness practices with Relapse Prevention
- Patterned after:
  - MBSR (Kabat-Zinn)
  - MBCT (Segal et al.)

8 weekly 2 hour sessions; daily home practice

**“Formal” Practices**

- Body Scan
- Mindful Movement/Walking Meditation
- “Lovingkindness” or “metta”
- Sitting Meditation
- Mountain Meditation

**“Informal” Practices**

- Mindfulness of daily activities
- “SOBER” breathing space
Results: Substance Use

Time x group interaction: \( p = .02 \)
Time\(^2\) x group interaction: \( p = .01 \)

![Graph showing percentage of AOD use over time for MBRP and TAU groups.]

**Mindfulness Meditation and the Brain**

*Focus on the PFC*

**Executive Functions**
Sara Lazar et al. at Harvard studied brain activity during meditation.

Tasks in Scanner

cow, duck, lion, zebra...

Effects?

Meditators showed increased activity in the PFC, responsible for executive functions


Britta Hölzel et al. at the U of Giessen Germany studied brain activity during meditation.

Groups

Tasks in Scanner

Meditators showed stronger activity in the PFC, particularly in the ACC (attention) & dmPFC (impulse control) with breath awareness than controls

David Creswell et al. at UCLA studied brain activity during an affect labeling task and correlated those changes with dispositional mindfulness.

Mindful Attention Awareness Scale (MAAS) + correlation & - Correlation with amygdala activity


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**MBRP Results: Craving**

![Graph showing MBRP results for craving over time](image)

Time x treatment: $p = .02$
Time$^2$ x treatment: $p = .02$

PACS, Flannery et al., 1999
MBRP Results: Mediating Effect of Craving

\[ z = -2.00, \quad p < .05 \]

Coefficients are IRR's; **\( p < .01 \), ***\( p < .001 \); Baron & Kenney, 1986; Sobel, 1982

Craving

Treatment (MBRP vs. TAU)

Substance Use (2 month)

\[ .48** \]

\[ 2.27*** \]

\[ .11*** \]

MBRP Results: Depression and Substance Use

Substance Use

BDI postcourse

R-Square = .63

R-Square = .81
Mindfulness Training (MT) and ANS Tone in Addicts

Judson Brewer et al. at Yale studied mindfulness training (MT) effects on reactivity in substance abusers.

\[ F = 7.97, \ p = .02, \ es = .42 \]

Stress imagery script


Antoine Lutz et al., at U of Wisc. Madison studied fMRI responses during compassion meditation.

2 groups

Greater increases in Insula (emotional arousal & empathy) activity to negative sounds for experts.

Activity in the mPFC (attending) & temporal-parietal junction (TPJ; attuning) increased to both sounds in experts.


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Norman Farb, et al. used fMRI to study two aspects of self-awareness: the narrative “me” and the experiential “I”.


Narrative Focus: “me” & my story
or
Experiential Focus: current moment “I” (mindful practice)

2. Activity pattern associated with detached or objective modes of self-focus.

State (fMRI) vs. Trait (MRI)

2 studies that assess structural changes in the brain in response to MM are:

Where do we go from here?

Psychophysiological effects of MBRP

NIH-ITHS Grant # UL1RR025014; PI Lustyk

All with a focus on gender differences

www.spu.edu/LustykLab