Process Matching: The Application Of Precision Medicine in Behavioral Treatment for Alcoholism

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Acknowledgements

MOBC Program Committee
NIAAA

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Richard Longabaugh, Distinguished Research Awardee, 2016
Rationale for 2016 MOBC Workshop
Weaves Together Several Narratives
Chapter 1

The Past is Not Far Behind
Building on President Obama’s announcement in his State of the Union Address, today the Administration is unveiling details about the Precision Medicine Initiative, a bold new research effort to revolutionize how we improve health and treat disease. Launched with a $215 million investment in the President’s 2016 Budget, the Precision Medicine Initiative will pioneer a new model of patient-powered research that promises to accelerate biomedical discoveries and provide clinicians with new tools, knowledge, and therapies to select which treatments will work best for which patients. 

The White House
Office of the Press Secretary
For Immediate Release
January 30, 2015
$70 Million Allocated to NIH

Precision Medicine Initiative Working Group Report
September 17, 2015

• Recruit, consent, and follow 1,000,000 cohort sample of Americans.

• Encourage the application of mobile technologies/devices for real-time, low cost data collection in studies.

• Specifically targeted individual and public health consequences of alcohol and illicit drug use.
June 9th: Dr. Koob presents strategic plan, 2016-2020, to NIAAA Council.

Address alcohol misuse across lifespan
Address co-occurring conditions
Reduce health disparities
Advance precision medicine
Strengthen research and clinical training
Project MATCH

“The Big Book”
# Client-Treatment Matching Attributes (N = 21)

<table>
<thead>
<tr>
<th>Attributes</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alcohol Dependence</td>
<td>Problem Recognition</td>
</tr>
<tr>
<td>Alcohol Involvement</td>
<td>Self-Efficacy: Confidence</td>
</tr>
<tr>
<td>Cognitive Impairment</td>
<td>Temptation minus Confidence</td>
</tr>
<tr>
<td>Psychopathology/Severity</td>
<td>Social Network</td>
</tr>
<tr>
<td>Sociopathy/ ASPD</td>
<td>Prior AA</td>
</tr>
<tr>
<td>A versus B Alcohol Typology</td>
<td>Poor social Functioning</td>
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<tr>
<td>Anger</td>
<td></td>
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<tr>
<td>Conceptual Level</td>
<td></td>
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<tr>
<td>Meaning Seeking</td>
<td></td>
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<tr>
<td>Religiosity</td>
<td></td>
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<tr>
<td>Interpersonal Dependence</td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td></td>
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<tr>
<td>Motivational Readiness</td>
<td></td>
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</tbody>
</table>
Project MATCH  Study Design:

Screen    Randomize 3      6     9     12   15       (39)       (120)

Two Arms: Aftercare Sample N = 774,  Outpatient Sample = 952

98%  97%  95%  94% 92%   85%  86%

CBT
MET
TSF
MATCH FINDINGS

1. 400 “a priori” interaction tests were performed: (ignoring time effect)

   2 dependent measures x 40 hypothesized contrasts x 5 occasions (within and posttreatment & 39-month outpatient)

2. Only 12 contrasts met criteria for significance (3%)
Chapter 2
The Era of Statistical Mediation

IV → Mediator → DV

a, b, c'
Areas of Rapid MOBC Behavioral Research

- Motivational Interviewing
- Cognitive Behavioral Therapy
- Alcoholics Anonymous and 12-Step Therapy
- Brief Interventions: Normative Feedback
- Mindfulness Therapy
- Others?
Addiction-related MOBC with Empirical Support

- Abstinence-based Self-Efficacy
- Social Support for Abstinence
- Spirituality
- Change Talk
- Self-Regulation
- Delayed Discounting
- Response Inhibition
- Impulsivity
One Trend in MOBC Research

An important stream of MOBC research is diving deeper to achieve a better understanding of a given MOBC CONSTRUCT.

- Self-report
- Behavioral
- Neural pathways

Neuroimaging mechanisms of change in psychotherapy for addictive behaviors (R13)
An Alternative and Complimentary Path for MOBC Research
Two Exemplar Areas of MOBC

Treatment Research
Meta-analysis has been facilitated in these two areas because:

1. Relative agreement on an “active ingredient” mobilizing change.

2. Strong similarity in the types of MOBC under investigation.

3. Strong similarity in outcome dimension(s).

4. Concordance in designs and methods within each area.

5. Sufficient number of studies to conduct meta-analytic work.
The Q Statistic

The null hypothesis tested by the Q statistic is that studies share a *common* effect size, with differences in observed effect sizes reflecting only sampling error. Rejection of the null hypothesis therefore indicates the presence of multiple "common" effect sizes within a distribution or the action of an unidentified moderator.
Three MOBC in AA Research  
(Tonigan in, Magill et al., 2015)

<table>
<thead>
<tr>
<th>MOBC</th>
<th>#Studies</th>
<th># Subjects</th>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spiritual Gains</td>
<td>9</td>
<td>5,058</td>
<td>.22 *</td>
<td>.13 *</td>
</tr>
<tr>
<td>Social Support</td>
<td>15</td>
<td>15,482</td>
<td>.15 *</td>
<td>.12 *</td>
</tr>
<tr>
<td>Self-Efficacy</td>
<td>11</td>
<td>3,739</td>
<td>.21 *</td>
<td>.33 *</td>
</tr>
</tbody>
</table>
## MI Therapist Consistent and Inconsistent Behaviors: Change and Sustain Talk

*(Magill et al., 2014)*

### Change Talk

<table>
<thead>
<tr>
<th>Therapist Behavior</th>
<th># Studies</th>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>MI Consistent Skills</td>
<td>7</td>
<td>.26 *</td>
<td></td>
</tr>
<tr>
<td>MI Inconsistent Skills</td>
<td>6</td>
<td>-.17 *</td>
<td></td>
</tr>
</tbody>
</table>

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### Sustain Talk
Two MOBC Meta-Analytic Summaries Yield Similar Conclusions

Micro level analysis in MI MOBC research
Macro level analysis in AA MOBC research

Heterogeneity in “a” and “b” may be the result of:

1. Variation in study designs
2. Differences in time frames MOBC are investigated
3. Measurement artifacts
4. Sampling different populations of AUD
Chapter 3

Some say po-ta-to, some say po-tah-to, some just say “spud”.

![Mr. Potato Head](image)
“Moderated-Mediation, Conditional Indirect Effects or Process Matching”

Meta-Analytic Message to MOBC Researchers
Responder: The active ingredient mobilized desired change in an underlying mechanism.

Non-Responder: The link between AI and Mediator is not supported.

What can we infer from non-response?

1. Did mediator change in desired direction, but not for the specified reason?
2. Are there “families” of active ingredients (AI) and a “AI family member” mobilized change?
3. Why did the mediator not change?
Implications: “a” Path Process Match

- **Simplest case**: A therapy with one active ingredient and one MOBC.

- **More likely case**: A therapy with multiple active ingredients mobilizing “several” MOBC. Here, there may be value in “matching” active ingredients to individuals.
Responder and Non-Responder: “b” Path Process Match

Responder: Mobilized change mechanism produced desired change in outcome.

Non-Responder: No association between mobilized MOBC and desired change in outcome.

What can we infer from non-response?

1. MOBC was not “mobilized”
2. MOBC was mobilized, but MOBC effect was conditional on third variable.
3. What is the nature of third variable and can it be influenced (altered) within treatment?
Implications: “b” Path Process Match

Implications of non-responding tied to nature of third variable:

- Individual attribute/history
- Social Network
- Cultural values
- Environmental
An Example: Treatment Seeking, AA Lifetime History, and A and B Paths

A majority of treatment seeking adults have prior AA history and 76% of treatment providers include AA referral.

So, we retrospectively investigated:

Does extent of past AA history advance or hinder the influence of AA attendance on later spiritual gains (a path) and, in turn, does AA history advance or hinder the influence of spiritual gains on later increases in abstinence (b path)?
Relapse Replication Extension Project
Lowman, Allen, Stout, 1996

R01 AA022328 Witkiewitz (PI) NIAAA
Integrative Data Analysis to Predict Alcohol Clinical Course and Inform Practice

N = 110
Albuquerque
2 4 6 8 10 12

N = 136
Buffalo

N = 205 of 246
Interviewed at all time points
## Descriptive Statistics on AA Participation by AA Lifetime History Status

**N = 194, Low AA;  N = 52 High AA**

<table>
<thead>
<tr>
<th></th>
<th>Baseline</th>
<th>6</th>
<th>12</th>
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</thead>
<tbody>
<tr>
<td><strong>Percent AA “Members”</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low AA</td>
<td>37.1</td>
<td>49.3</td>
<td>44.3</td>
</tr>
<tr>
<td>High AA</td>
<td>80.8</td>
<td>81.1</td>
<td>66.7</td>
</tr>
<tr>
<td><strong>Days AA Attendance</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low AA</td>
<td>.01 (.04)</td>
<td>.06 (.14)</td>
<td>.06 (.15)</td>
</tr>
<tr>
<td>High AA</td>
<td>.14 (.22)</td>
<td>.29 (.35)</td>
<td>.27 (.34)</td>
</tr>
<tr>
<td><strong>Percent with AA Sponsor</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low AA</td>
<td>10.8</td>
<td>30.3</td>
<td>34.2</td>
</tr>
<tr>
<td>High AA</td>
<td>71.2</td>
<td>61.1</td>
<td>40.0</td>
</tr>
</tbody>
</table>
The indirect effect was significant (95% CI = 1.48-11.85)
Process Matching: A Path

Low AA History (n = 194)

High AA History (n = 52)

\[ t = -1.34, \ p < .18 \]

LL CI = -9.59
ULCI = 1.83
Process Matching: B Path

High AA History (n = 52)

Low AA History (n = 194)

\[ t = -0.944, \ p < 0.35 \]

\[ LLCI = -2.21 \]

\[ ULCI = 0.78 \]
AA attendance mobilized gains in spiritual practices that, in turn, predicted later increases in abstinence, (simple mediation).

Extent of AA lifetime history did not moderate the effect of AA meetings on spiritual gains nor did AA lifetime history alter the influence of spiritual gains on increased abstinence (moderated mediation).
Chapter 4

“A story has no beginning or end, arbitrarily one chooses that moment of experience from which to look back or from which to look ahead.”

— Graham Greene
To Summarize

Precision medicine has been assigned a high priority by NIH and NIAAA.

Strong possibility that MOBC pathways of interest are moderated.

Need additional meta-analytic work on MOBC in evidence-based behavioral treatments.

Process-matching provides a means to respond to ongoing trends in MOBC research as well as to support NIAAA strategic mission.