

Amplifying and Extending Substance Use Disorder Treatment Effects

- MGH Psychopharmacology Conference
Boston MA
October, 2026
John F. Kelly, PhD, ABPP

Disclosures

“Neither I nor my spouse/partner has a relevant financial relationship with a commercial interest to disclose.”

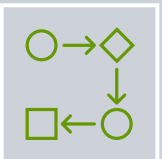
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How did we get here? A rationale for the new public health and scientific focus on addiction treatment to recovery support services linkages



Ingredients of remission/recovery—facilitating access to the scaffolding, building materials, permits, and supportive environments



Recovery Process – Recovery milestones and their utility. Who needs what, when, for how long, at what intensity?



Perspective

FEBRUARY 27, 2025

The Changing Approach to Addiction — From Incarceration to Treatment and Recovery Support

John F. Kelly, Ph.D.,¹ Nora D. Volkow, M.D.,² and Howard K. Koh, M.D., M.P.H.³

It's been more than 50 years since the United States launched a “war on drugs.” History has demonstrated the ineffectiveness of “tough-on-crime” drug-use policies, including laws requiring

mandatory minimum sentencing for possession of illicit drugs. Meanwhile, advances in the recognition of substance use disorder (SUD) as a treatable medical condition have led to the development of lifesaving evidence-based pharmacotherapies and psychosocial interventions.

Further advancement in treating SUD will require both short-term and long-term strategies. Many evidence-based protocols still rely on short-term interventions typically delivered over 12

People remain at risk for SUD recurrence for years after initial remission.¹ After treatment initiation, it takes people an average of about 8 years — and four or five treatment or support-group engagements — to achieve sustained remission and an additional 5 years before their risk of meeting SUD criteria drops to that among members of the general public.^{1,2} Addiction treatment has therefore broadened to encompass a continuity-of-care-based approach that builds on extensive

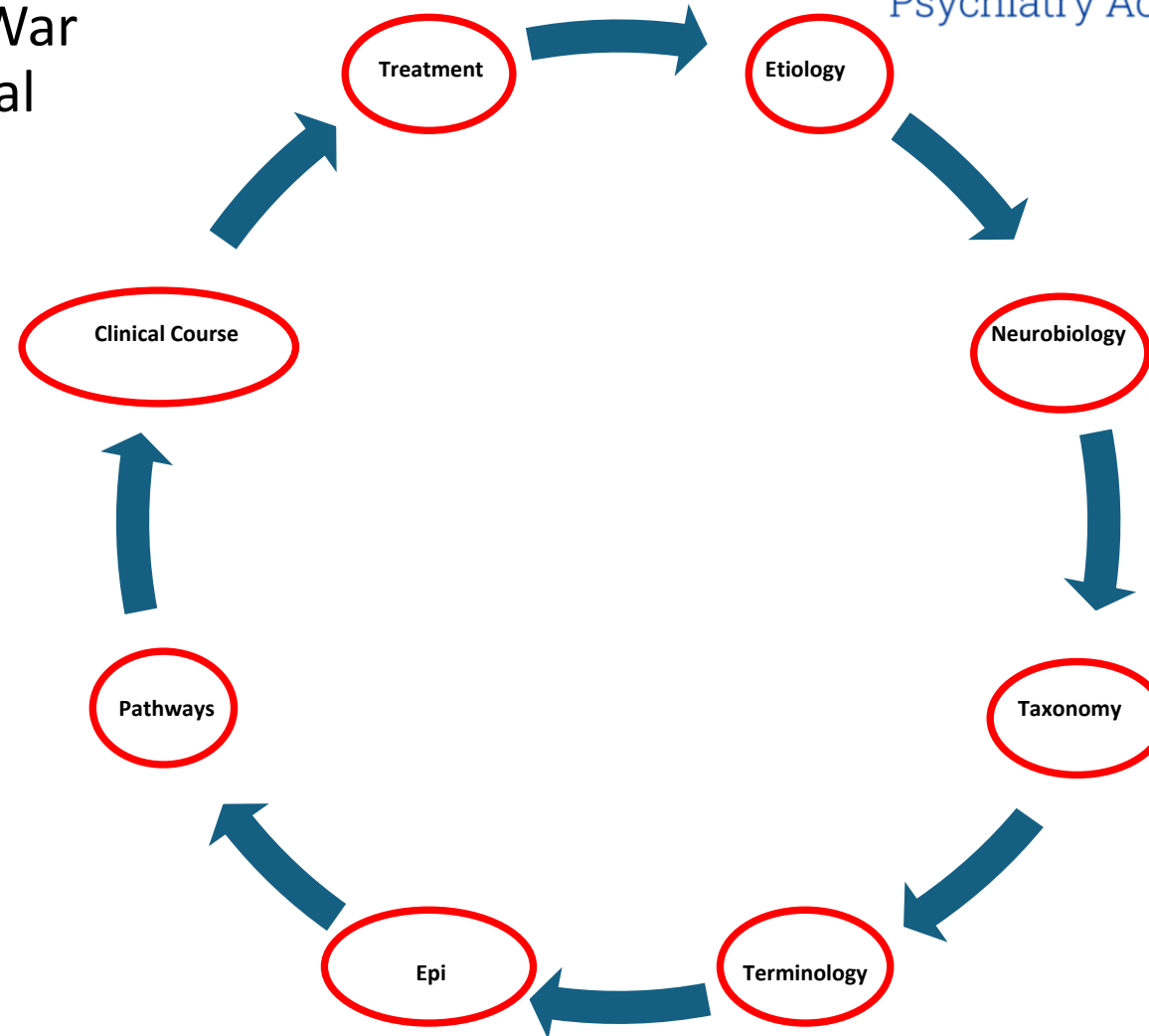
care with community-based services provide a more holistic approach that could reduce the time to stable remission and support recovery.

When a person with SUD enters treatment, the situation may be likened to a building on fire, with clinicians implementing critical short-term interventions to extinguish the flames. After the fire is out, however, attention to scaffolding and building materials is necessary for people with SUD to rebuild their lives in a safer and more secure environment that helps prevent the fire from restarting. Policies focused on criminalization of drug use, such as those leading to arrests for drug possession, can block

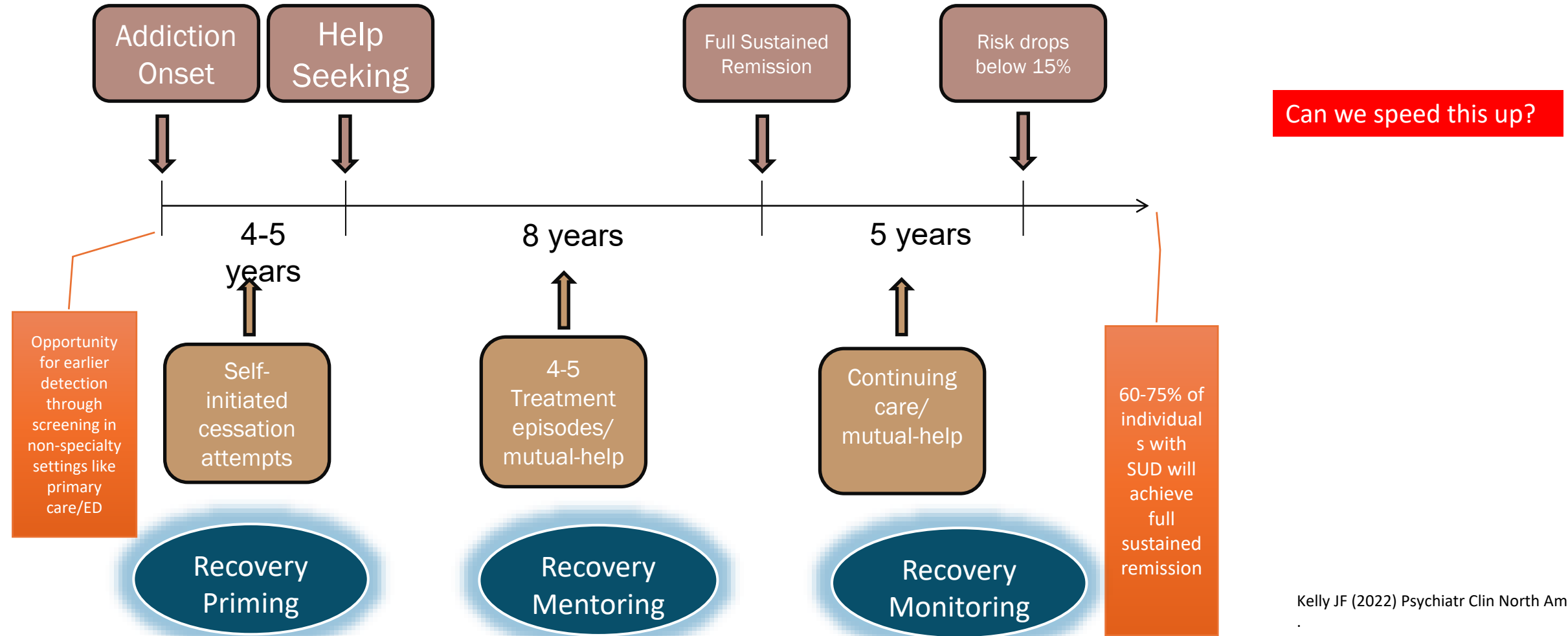
50 years
of criminal justice, treatment,
and public health, approaches



Past 50 yrs since declaration of “War on drugs” led to large-scale federal appropriations and a number of paradigm shifts...



The clinical course of addiction and achievement of stable recovery can take a long time ...



Kelly JF (2022) Psychiatr Clin North Am

50 years of Progress: Burning building analogy...

Putting out the fire –addressing acute
clinical pathology - good job

Preventing it from re-igniting (RP) -
emphasized - pragmatic disconnect;
brief, episodic, disconnected care
episodes

Building materials (recovery capital) –
mostly neglected

**Scaffolding (building skills and support
beyond acute stabilization)**

Granting “rebuilding permits” -
(removing barriers - neglected)

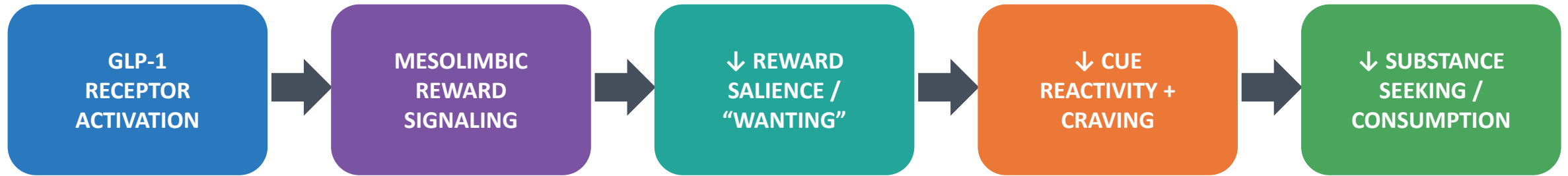


GLP1s for Addiction

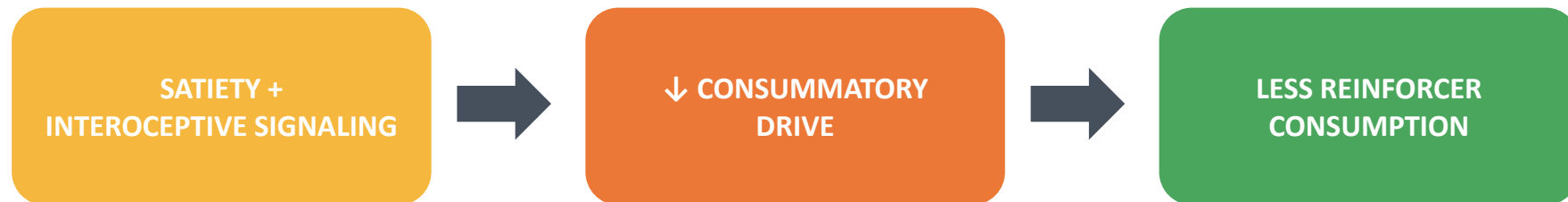
- What does the Science tell us so far...

Mechanisms are Plausible – How Might GLP-1s Affect Addiction?

A broader reward–motivation–consumption mechanism may be involved



POSSIBLE PARALLEL PATHWAY



Mechanistic support includes attenuation of alcohol-cue responses in ventral striatal circuitry in the exenatide AUD trial.

GLP-1s for Addiction: What Does the Human Evidence Show?

Biologically compelling and clinically promising — but not yet established SUD treatment

ALCOHOL	Multiple RCTs	Semaglutide: ↓ heavy drinking / craving Exenatide: primary endpoint negative	PROMISING
NICOTINE	N=255 RCT	Dulaglutide + varenicline: no improvement in abstinence	WEAK / NEGATIVE
COCAINE	N=13 lab study	No effect on self-administration, wanting, or euphoria	VERY LIMITED
OPIOIDS	Ongoing trials	No mature efficacy RCT evidence yet	INSUFFICIENT
METH / CANNABIS	Early / absent	Very limited or no meaningful clinical evidence	INSUFFICIENT

BOTTOM LINE: The enthusiasm currently exceeds the quality and quantity of clinical evidence.

Alcohol Use Disorder: Where the Signal Is Strongest

The pattern is increasingly credible — but endpoints, populations, and trial sizes remain heterogeneous

EXENATIDE • N=127

26-week randomized double-blind trial + CBT
Primary: heavy drinking days — NEGATIVE
↓ alcohol-cue activation in ventral striatum
Exploratory obesity subgroup signal

SEMAGLUTIDE • N=48

9-week randomized phase 2 trial
↓ laboratory alcohol consumption
↓ drinks/drinking day and craving
Small proof-of-concept sample

SEMAGLUTIDE • N=108

AUD + obesity; randomized double-blind
Heavy-drinking days: larger reduction vs placebo
Treatment difference ≈ -13.7 percentage points
Important replication signal

NEGATIVE PRIMARY ENDPOINT → PROOF-OF-CONCEPT SIGNAL → REPLICATING AUD SIGNAL

2026 ORAL SEMAGLUTIDE PHASE 2 • N=50

Primary laboratory craving endpoint and drinks/day: negative • Heavy-drinking days: significantly reduced • Encouraging, but mixed

Interpretation: semaglutide now has a replicating signal for reducing heavy drinking, not definitive phase 3 efficacy.

GLP-1s and Addiction: Exciting — But Not Ready for Prime Time

WHAT WE KNOW

- ✓ Strong preclinical rationale
- ✓ Growing observational evidence
- ✓ Early human experimental evidence
- ✓ Replicating semaglutide signal in AUD
- ✓ Plausible reward-system mechanism

WHAT WE DON'T KNOW

- ? Generalizability beyond overweight/obesity
- ? Optimal dose and treatment duration
- ? Persistence after discontinuation
- ? Abstinence vs harm-reduction effects
- ? Comparative effectiveness vs established meds
- ? Mediation by weight loss / metabolic change
- ? Generalization across substances

WHAT WOULD CHANGE PRACTICE?

2–3 adequately powered multisite phase 3 RCTs with clinically meaningful, durable effects on prespecified SUD outcomes.

THE 2026 "TAKE-HOME" on GLP1s for Addiction

GLP-1 receptor agonists may represent an important new class of addiction pharmacotherapy, with the strongest emerging evidence for alcohol use disorder; however, definitive evidence of efficacy remains lacking.

33 registered SUD trials: 15 AUD • 9 nicotine • 4 cocaine • 4 opioid • 1 methamphetamine

State of the science • August 2026

Recovery Capital

Individual

(coping, motivation, self-efficacy)

Social

(recovery-specific/family, friends)

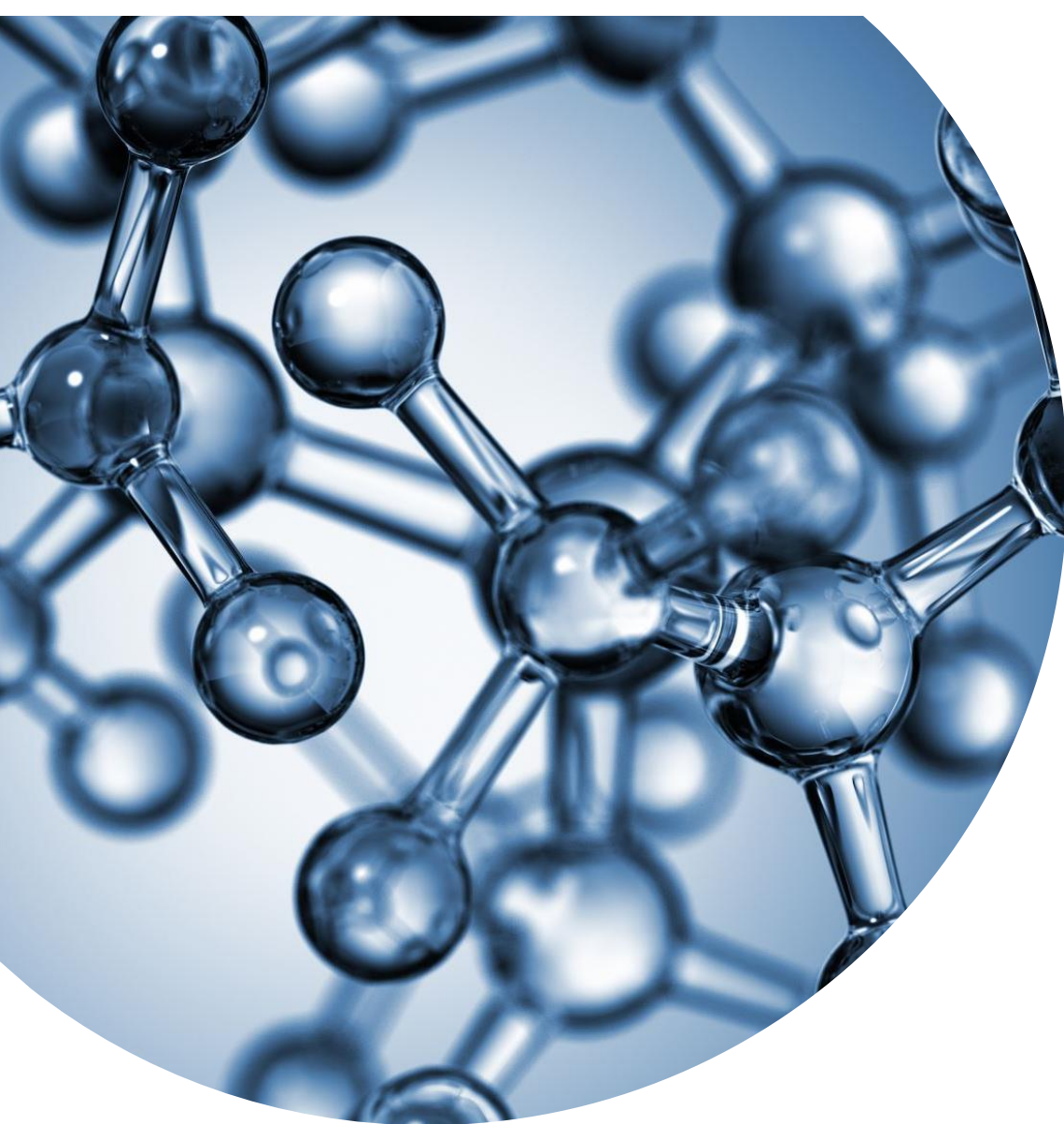
Financial

(income, resources)

Cultural

(identity, values)





Challenges undermining change attempts



Increased
sensitivity to
stress



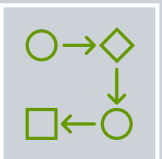
Decreased capacity
to experience
normal levels of
reward



How did we get here? A rationale for the new public health and scientific focus on addiction recovery and support services



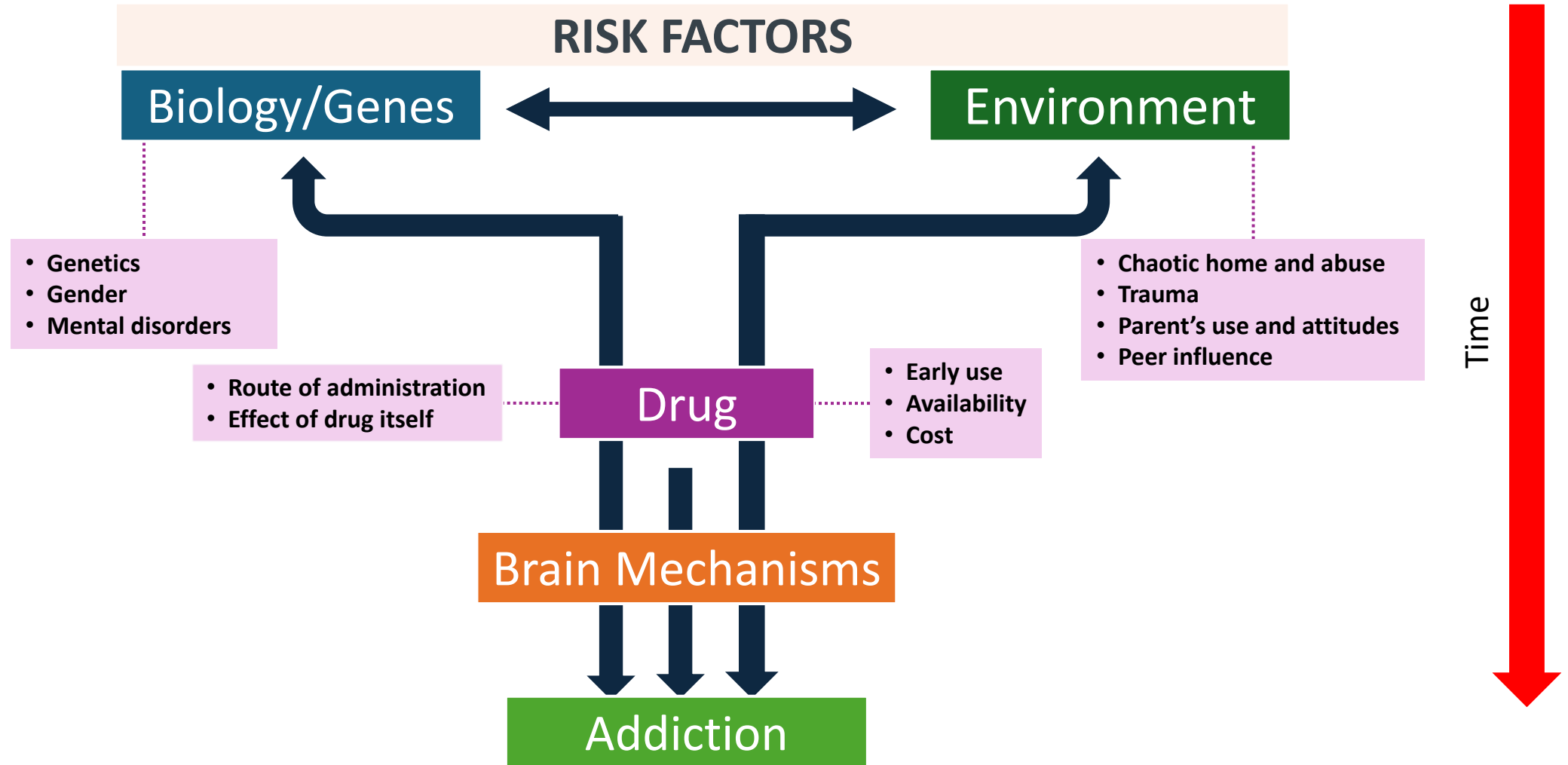
Ingredients of recovery— facilitating access to the scaffolding, building materials, permits, and supportive environments



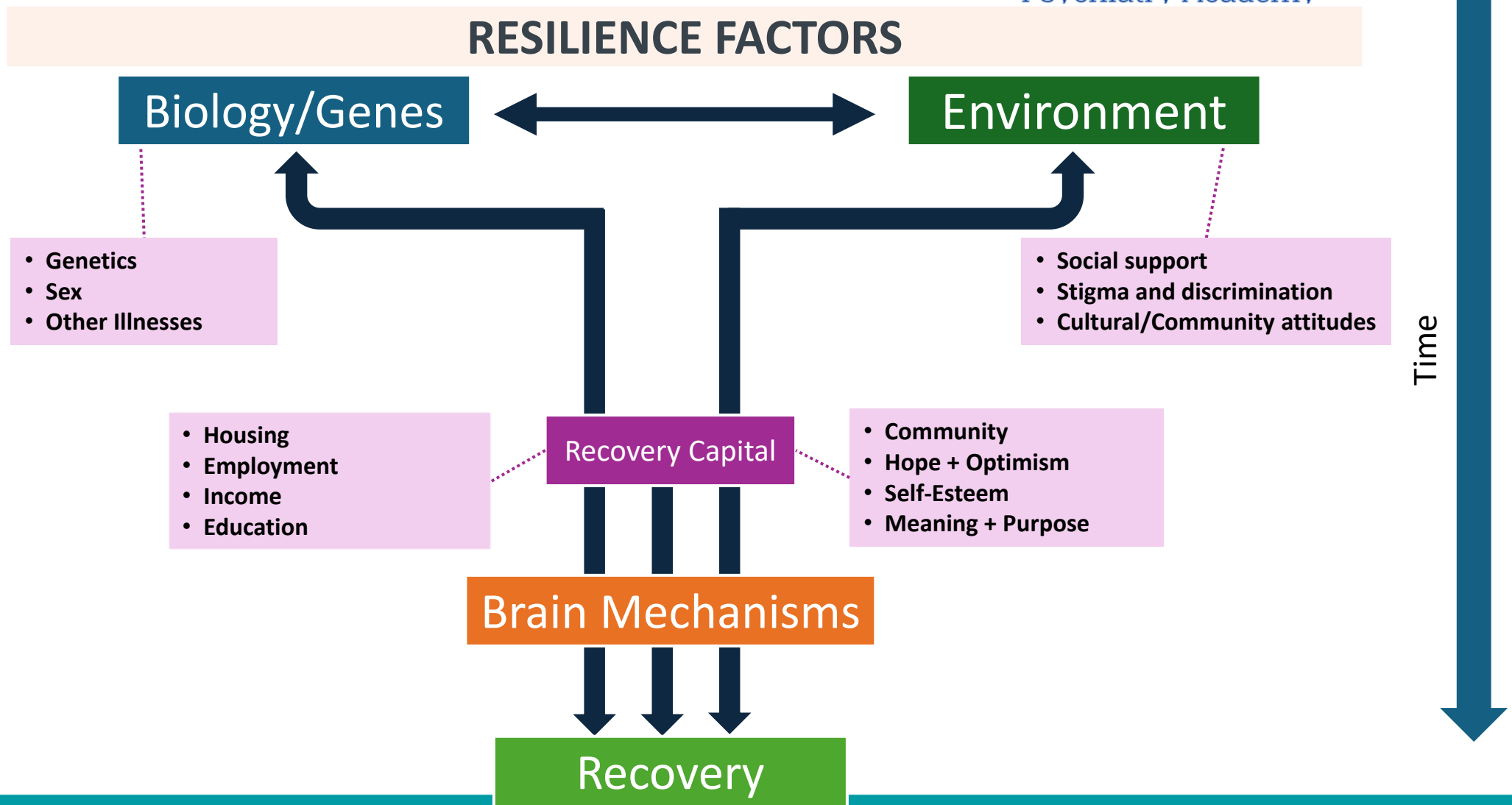
Recovery Process – Recovery milestones and their utility. Who needs what, when, for how long, at what intensity?



ADDICTION IS A DYNAMIC COMPLEX DISORDER

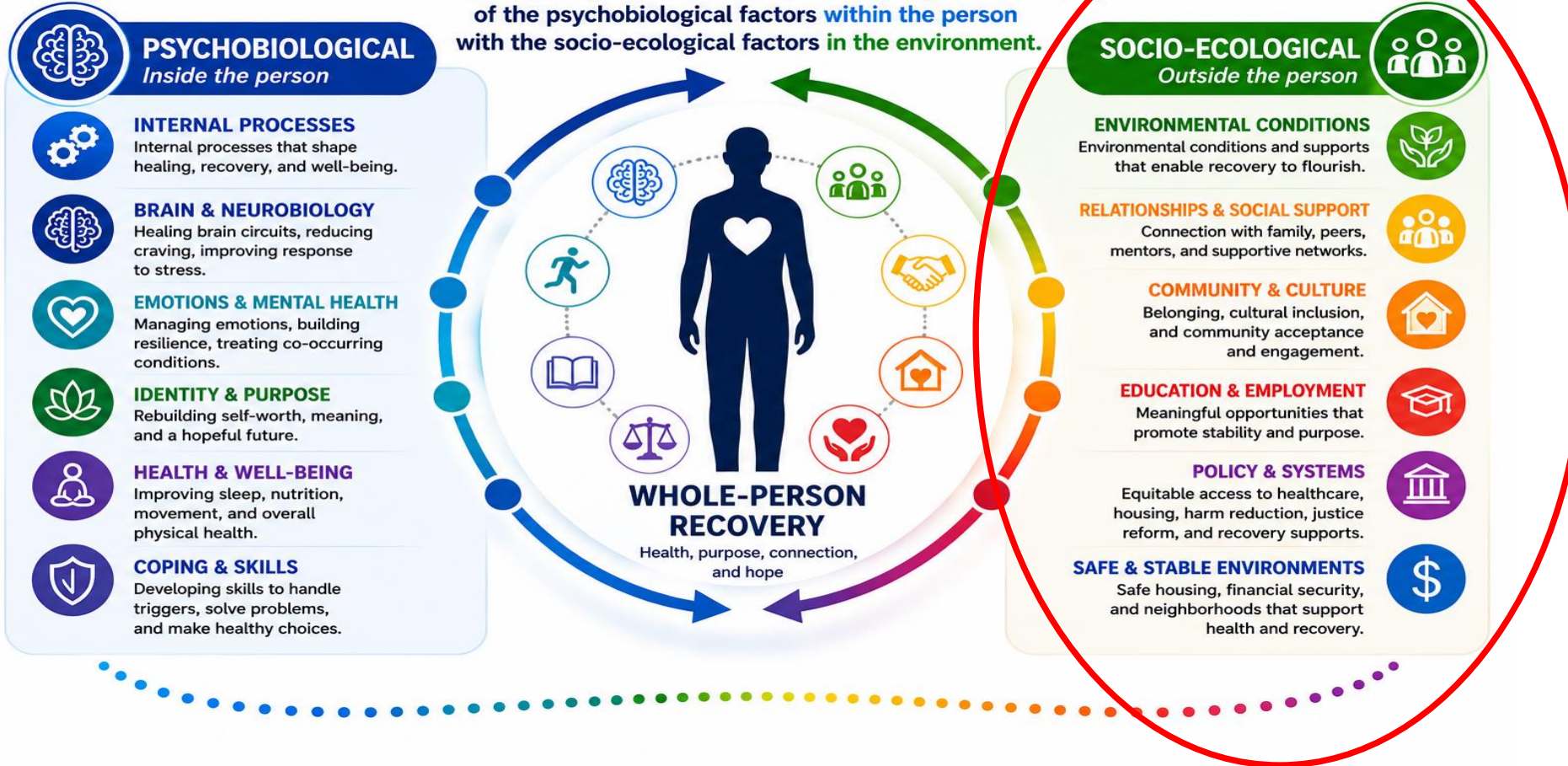


RECOVERY IS A DYNAMIC COMPLEX PROCESS



RECOVERY

Successful healing from addiction involves the dynamic interplay of the psychobiological factors **within the person** with the socio-ecological factors **in the environment**.



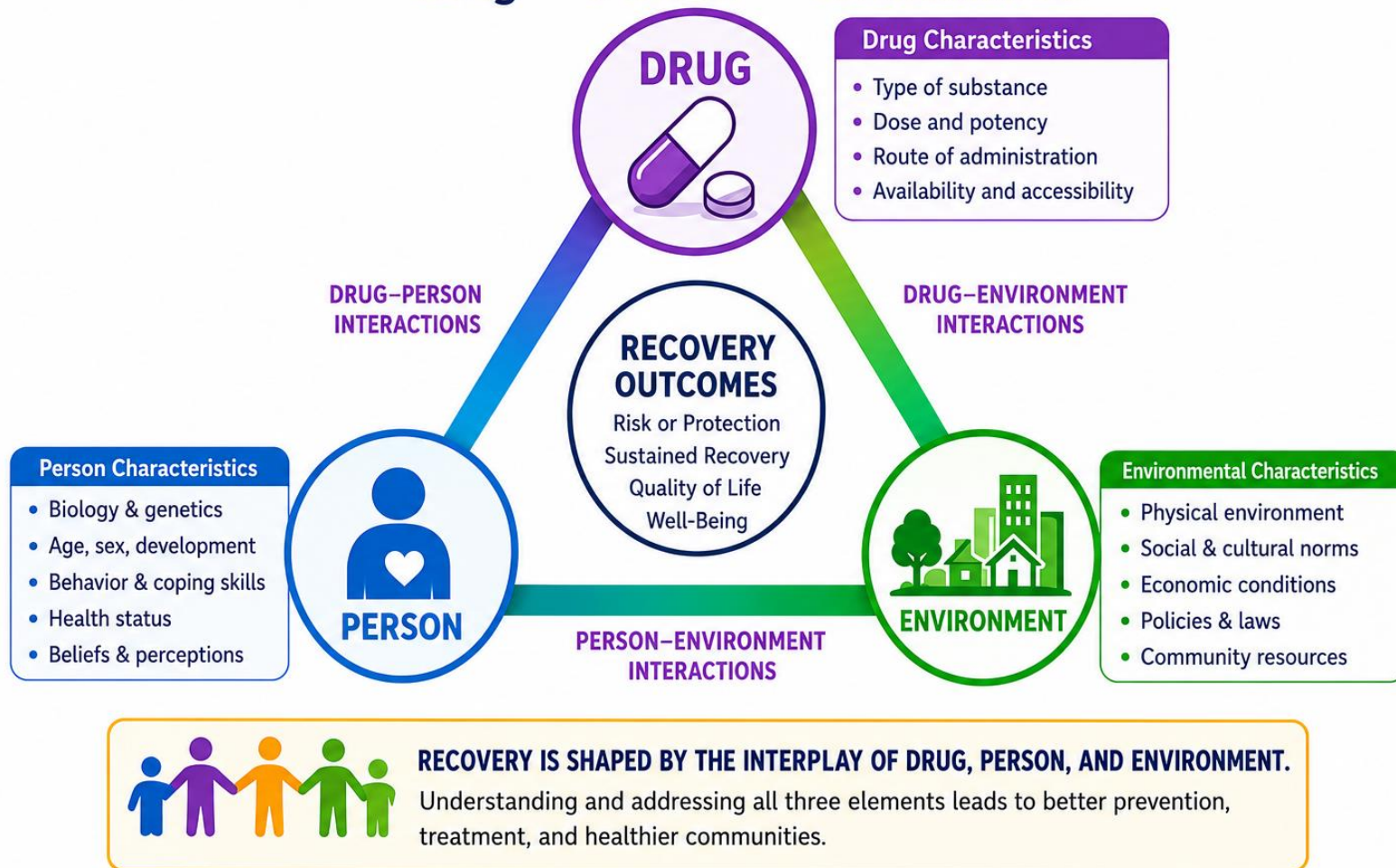
The Paradox of Addiction:

The same four Reasons are responsible for getting in to and out of addiction



RECOVERY PUBLIC HEALTH PARADIGM

Drug • Person • Environment



Kelly, 2026

How Organisms Recover



Photosynthesis

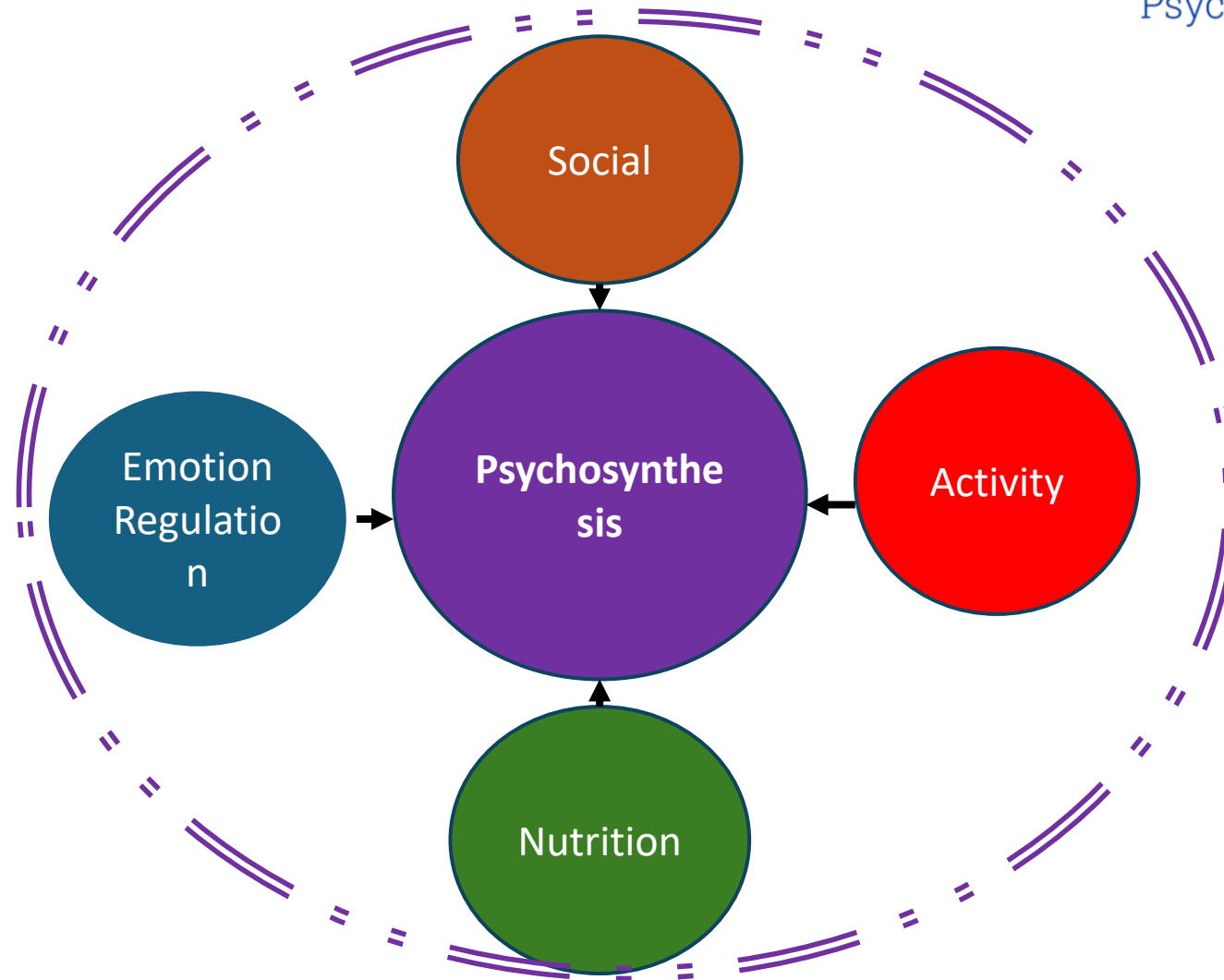


Psychosynthesis



A Social Activity Nutrition Emotion Regulation (SANER) Approach to Recovery

 **Massachusetts General Hospital**
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Social

Activity

Nutrition

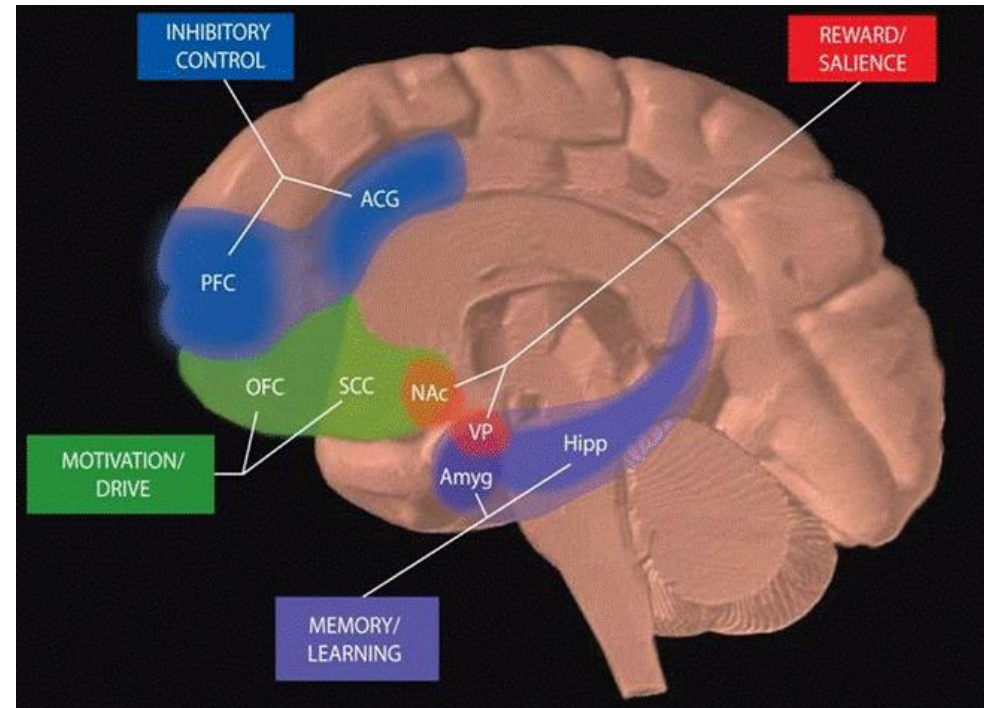
Emotion

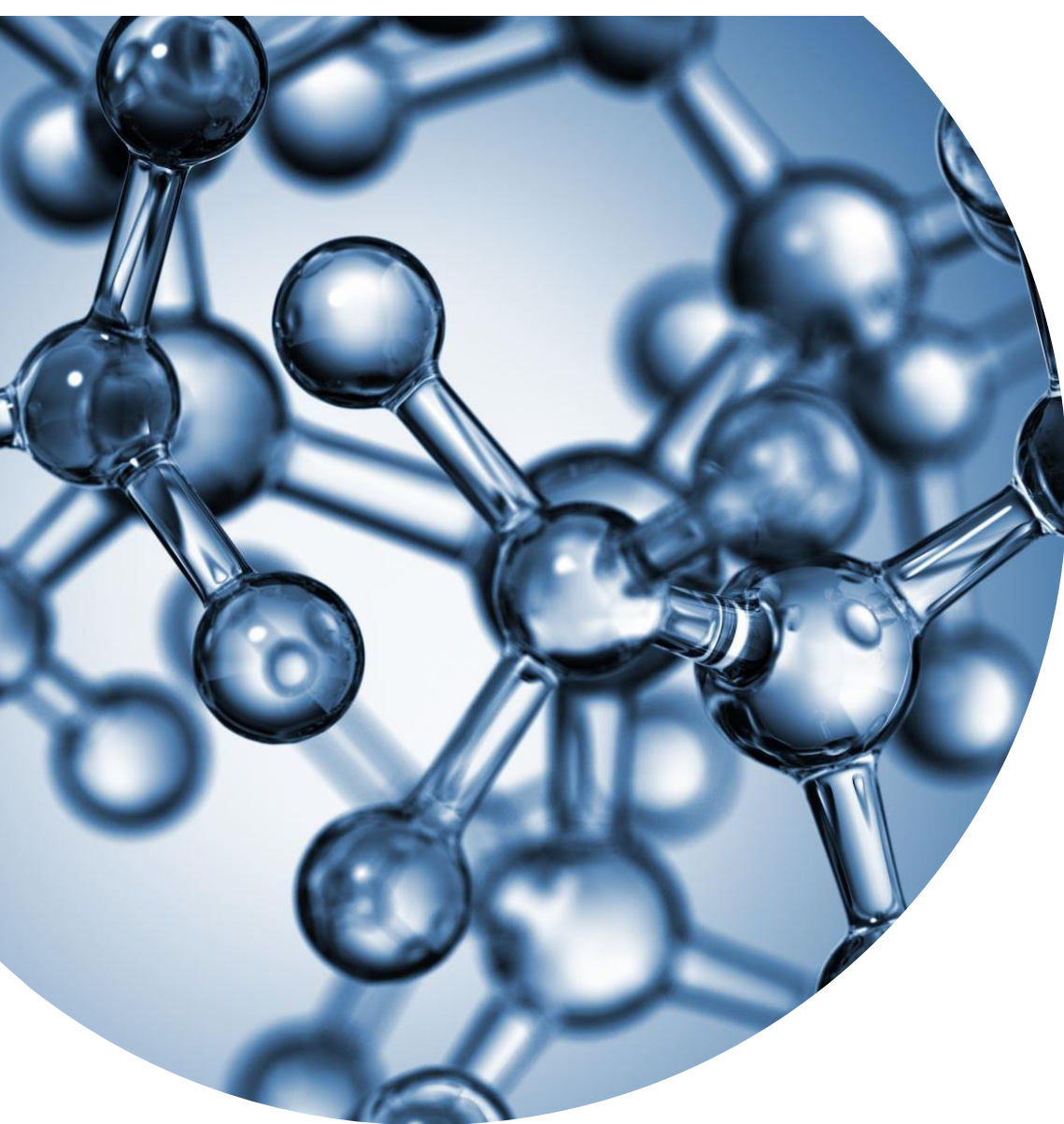
Regulation

(**SANER**)

Neuroscience of Recovery Capital

Can social factors, recovery housing, and employment, change the brain, mitigate stress, upregulate down-regulated receptor systems, and increase the chances of long-term remission?





Challenges undermining change attempts



Increased
sensitivity to
stress



Decreased capacity
to experience
normal levels of
reward

RESPONDING TO STRESS: SOCIAL BUFFERING

...and researchers have started to examine possible neurobiological connections between social support and individual stress responses

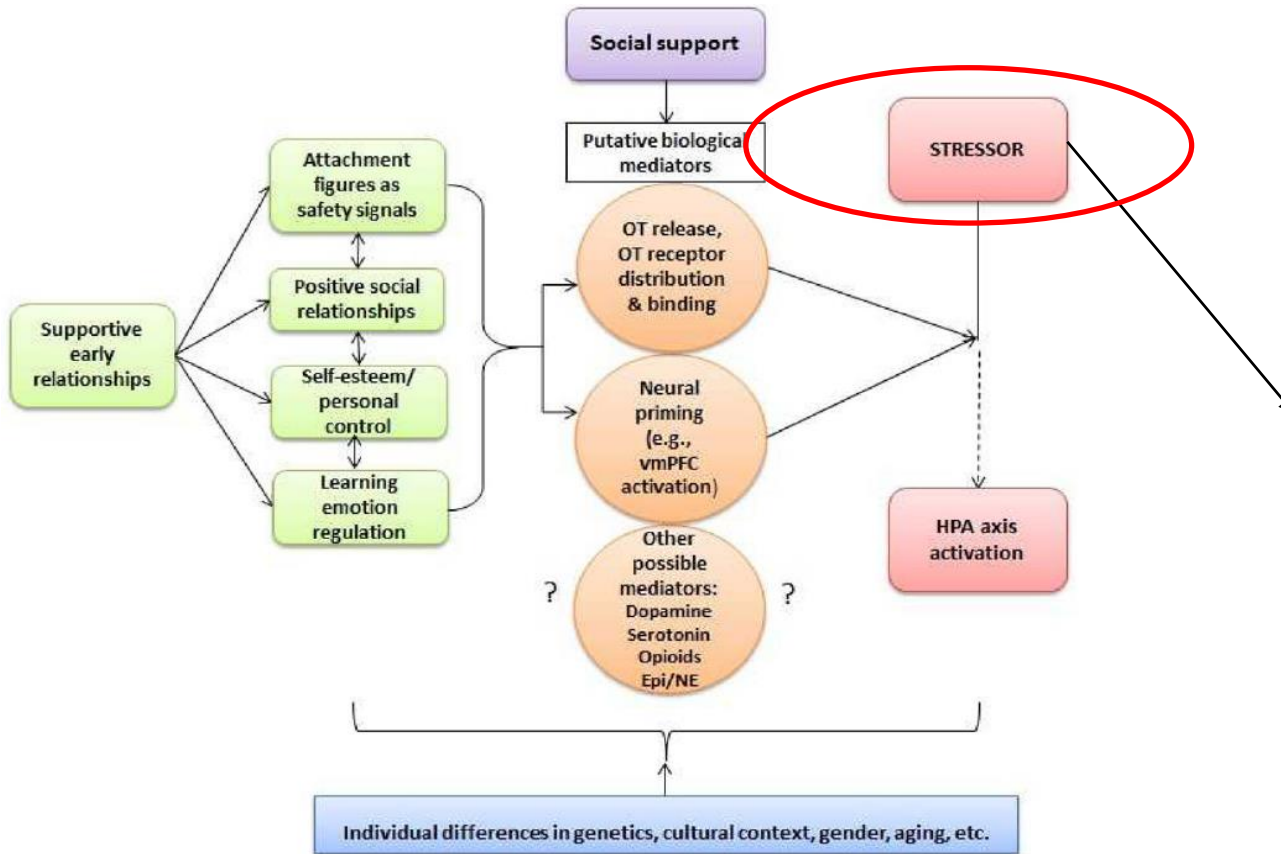


Figure 1. A Developmental Working Model of Social Buffering of the HPA Axis in Humans

OT = oxytocin, vmPFC = ventro-medial prefrontal cortex, Epi = epinephrine, NE = norepinephrine

Hostinar, C. E., Sullivan, R. M., & Gunnar, M. R. (2014). Psychobiological Mechanisms Underlying the Social Buffering of the HPA Axis: A Review of Animal Models and Human Studies across Development. *Psychological Bulletin*, 140(1).

D2/D3 RECEPTOR BINDING & SOCIAL STATUS AND SUPPORT

AIM

Assess whether D_{2/3} receptor levels correlate with social status and social support (particularly, to determine if low social status and low social support correlate with low D_{2/3} receptor binding)

SAMPLE

N = 14 healthy participants (i.e., non-smoking with no Axis I disorders, significant medical conditions, or use of medications before the scan) who were scanned using positron emission tomography (PET) imaging to measure D_{2/3} receptor binding potential (BP)

MEASURES

- Barratt Simplified Measure of Social Status (BMSSS) to measure social status
- Scale of Perceived Social Support (MSPSS) to measure social support
- [¹¹C]raclopride to measure D_{2/3} receptor binding in the striatum

OUTCOMES

- Positive correlation between **D_{2/3} receptor** binding potential and **social status**
- Positive correlation between **D_{2/3} receptor** binding potential and **perceived social support**
- Results similar to prior studies of nonhuman primates, which show higher D_{2/3} receptor levels in monkeys who are dominant in their social hierarchy, compared to those who are subordinate

BRIEF REPORTS

Dopamine Type 2/3 Receptor Availability in the Striatum and Social Status in Human Volunteers

Diana Martinez, Daria Orlowska, Rajesh Narendran, Mark Slifstein, Fei Liu, Dileep Kumar, Allegra Broft, Ronald Van Heertum, and Herbert D. Kleber

Background: Previous positron emission tomography (PET) imaging studies in nonhuman primates have shown that striatal dopamine type 2/3 (D_{2/3}) receptors correlate with social hierarchy in monkeys and that dominant animals exhibit higher levels of D_{2/3} receptor binding. The goal of the present study was to examine this phenomena in human subjects using PET and the radiotracer [¹¹C]raclopride.

Methods: Fourteen healthy volunteers were scanned with [¹¹C]raclopride to measure D_{2/3} receptor binding potential (BP). Social status was assessed using the Barratt Simplified Measure of Social Status. In addition, participants were asked to assess their level of social support using the Multidimensional Scale of Perceived Social Support (MSPSS).

Results: A correlation was seen between social status and dopamine D_{2/3} receptors, where volunteers with the higher status had higher values for [¹¹C]raclopride BP. A similar correlation was seen with the perceived social support, where higher [¹¹C]raclopride BP correlated with higher scores on the MSPSS.

Conclusions: The results of this study support the hypothesis that social status and social support is correlated with D_{2/3} receptor binding.

Key Words: [¹¹C]raclopride, dopamine 2/3 receptor, PET imaging, social status

Methods and Materials

The study was approved by the Institutional Review Board of the New York State Psychiatric Institute and all subjects provided written informed consent. Study participants were nonsmoking healthy control subjects and were required to have no DSM-IV Axis I disorder (including substance abuse or dependence), no significant medical conditions, and no use of medications before the scan (6 months for medications that could affect dopamine, 2 weeks for all others). Subjects (nine men and five women) were recruited from the New York City metropolitan area. Participant screening included a psychiatric assessment with the *Structured Clinical Interview for DSM-IV Axis I Disorders* (10), physical examination, electrocardiogram, and laboratory tests. All subjects were asked for data to complete the Barratt Simplified Measure of Social Status and to complete the Multidimensional Scale of Perceived Social Support. The scans performed on female subjects were not controlled for menstrual cycle phase.

[¹¹C]raclopride was prepared as previously described (11), and PET studies were acquired using a bolus injection of the radiotracer. The PET scans were obtained on the ECAT EXACT HR+ (Siemens/CTI, Knoxville, Tennessee) in three-dimensional (3-D) mode. Emission data were obtained as 15 frames of increasing duration up to 60 minutes. The PET images were reconstructed by filtered backprojection (Shepp .5 filter) with attenuation correction using the data from a 10-minute transmission scan.

All image analysis was performed in MEDx (Sensor Systems, Inc., Sterling, Virginia). Each subject underwent a transaxial T1 magnetic resonance imaging (MRI) scan, acquired on the GE Signa EXCITE 3 T/94 cm scanner (GE Medical Systems, Milwaukee, Wisconsin), for delineation of the regions of interest (ROIs). The regions of interest outlined on the MRI included the subdivisions of the striatum, which have been previously described (12). Briefly, these included the ventral striatum (VST), the dorsal caudate rostral to the anterior commissure (AC) (precommissural dorsal caudate [preDCAD]), the dorsal putamen rostral to the AC (precommissural dorsal putamen [preDPUT]), the caudate caudal to the AC (postcommissural caudate [postCAUD]), and the putamen caudal to the AC (postcommissural putamen [postPUT]).

From the Departments of Psychiatry (DM, DO, MS, FL, DK, AB, HDK) and Radiology (RVH), Columbia University, College of Physicians and Surgeons, New York, New York; and Department of Radiology (RN), University of Pittsburgh, Pittsburgh, Pennsylvania.

Address correspondence to Diana Martinez, M.D., New York State Psychiatric Institute, 1051 Riverside Drive, Box #31, New York, NY 10032; E-mail: dm437@columbia.edu.

Received Dec 18, 2008; revised Jul 23, 2009; accepted Jul 28, 2009.

Martinez, D., Orlowska, D., Narendran, R., Slifstein, M., Liu, F., Kumar, D., . . . Kleber, H. D. (2010). Dopamine type 2/3 receptor availability in the striatum and social status in human volunteers. *Biological Psychiatry*, 67(3), 275-278. doi:10.1016/j.biopsych.2009.07.037

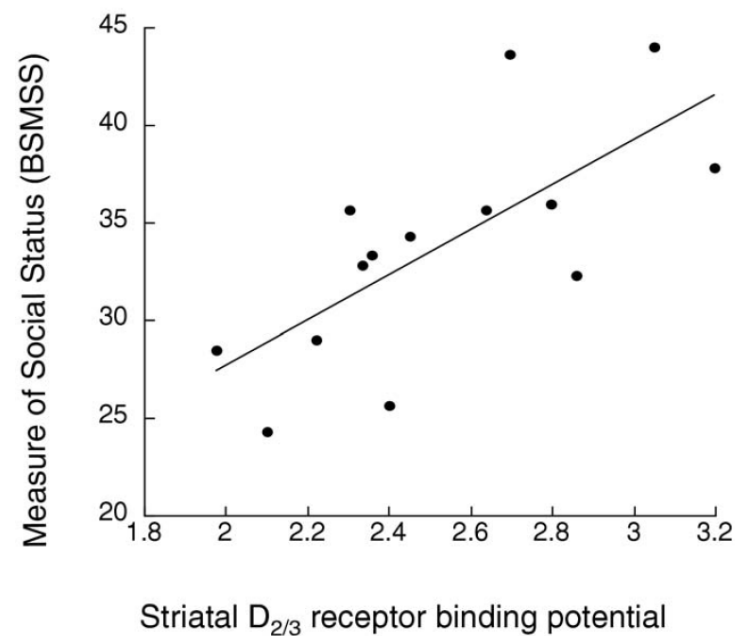


Figure 1. Correlation between [¹¹C]raclopride BP (x axis) and social status, measured with the Barratt Simplified Measure of Social Status (BSMSS). A positive correlation was seen, where higher BP correlated with higher BSMSS ($r = .71, p = .004$, age-corrected $p = .007$). BP, binding potential.

D_{2/3} receptor binding increases as social status increases.

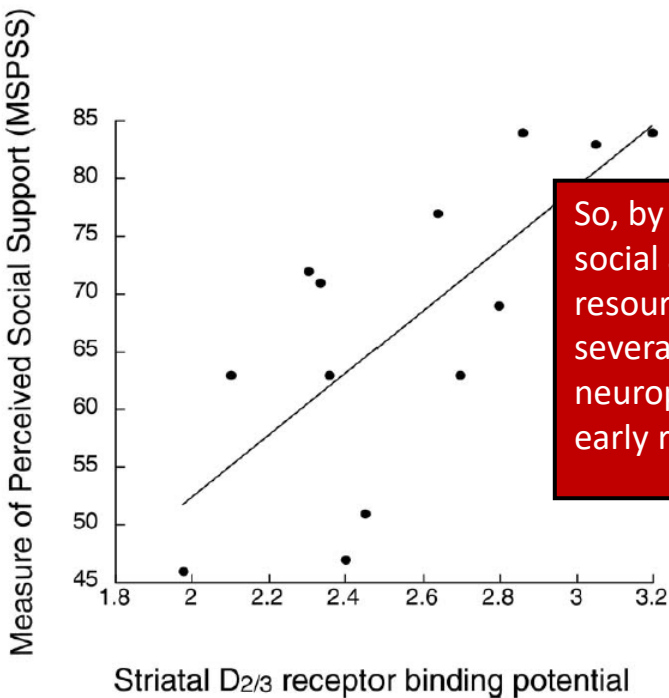


Figure 2. Correlation between [¹¹C]raclopride BP (x axis) and score on the Multidimensional Scale of Perceived Social Support (MSPSS). A positive correlation was seen, where higher BP correlated with higher score on the MSPSS ($r = .73, p = .005$, age-corrected $p = .02$). BP, binding potential.

D_{2/3} receptor binding increases as social support increases.

So, by providing greater access to social and other recovery specific resources, we may be able to mitigate several of the neuroendocrine/ neurophysiological deficits present in early remission...

Martinez, D., Orlowska, D., Narendran, R., Slifstein, M., Liu, F., Kumar, D., . . . Kleber, H. D. (2010). Dopamine type 2/3 receptor availability in the striatum and social status in human volunteers. *Biological Psychiatry*, 67(3), 275-278. doi:10.1016/j.biopsych.2009.07.037

Recovery support services have grown intended to facilitate access to conducive and supportive environments and recovery capital ...



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NARR
National Alliance for
Recovery Residences
Community • Standards • Ethics • Education

**ALCOHOLICS
ANONYMOUS**

Anchor
Recovery Community Center
Peer-to-peer support services

LifeRing

HOPE
for NEW HAMPSHIRE
RECOVERY

ASSOCIATION OF
**RECOVERY
COMMUNITY
ORGANIZATIONS**
FACES & VOICES OF RECOVERY

ARHE
ASSOCIATION OF RECOVERY
IN HIGHER EDUCATION

WOMEN FOR SOBRIETY

CONNECTICUT COMMUNITY
CCAR
FOR ADDICTION RECOVERY

**SMART
Recovery®**

Advantages of recovery support services in disease/recovery management....

Available

Accessible

Flexible

Enduring

Low/no cost

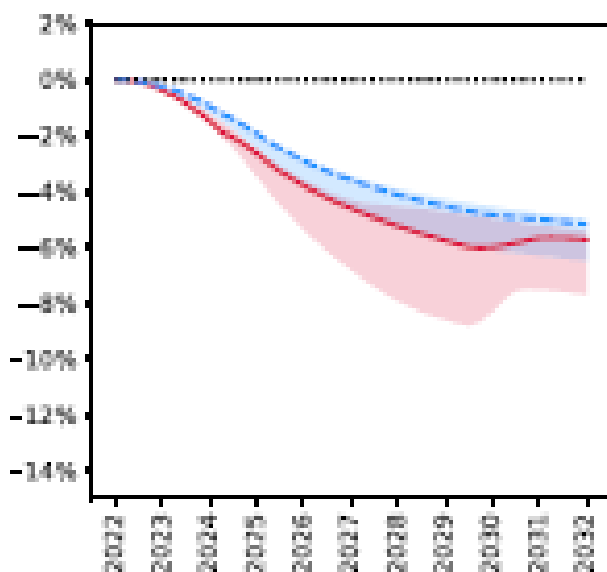
Recovery Support Services “Big 5” Public Health and Public Safety Benefits ...

- Sustained and stable remission rates
- Overdose and infectious disease transmission
- Expensive emergency medical usage (ED, overnight hosp. stays)
- Arrests and legal costs
- Employment rates

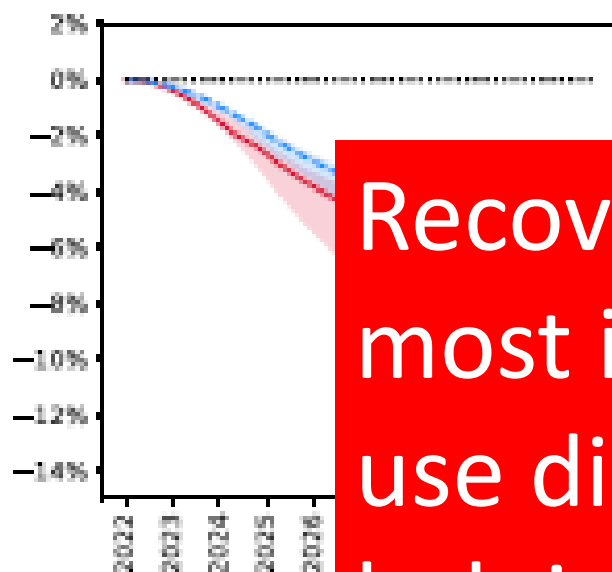


C Recovery support

(8) ↓ Return to OUD



(9) ↑ Peer Recovery



SCIENCE ADVANCES | RESEARCH ARTICLE

HEALTH AND MEDICINE

Reducing opioid use disorder and overdose deaths in the United States: A dynamic modeling analysis

Erin J. Stringfellow¹, Tse Yang Lim², Keith Humphreys³, Catherine DiGennaro¹, Celia Stafford⁴

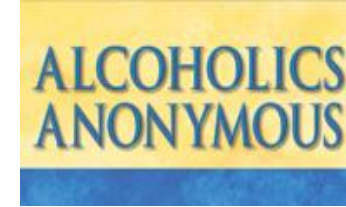
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American Association
for the Advancement
of Science. No claim to
original U.S. Government
works.

Recovery support services found most impactful in reducing opioid use disorder prevalence through helping to sustain and stabilize remission and prevent relapse

Recovery support services have grown intended to facilitate access to conducive and supportive environments and recovery capital ...



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ASSOCIATION OF
**RECOVERY
COMMUNITY
ORGANIZATIONS**
FACES & VOICES OF RECOVERY



Anchor

Recovery Community Center
Peer-to-peer support services



Alcoholics Anonymous and other 12-step programs for alcohol use disorder (Review)

Kelly JF, Humphreys K, Ferri M

Kelly JF, Humphreys K, Ferri M.
Alcoholics Anonymous and other 12-step programs for alcohol use disorder.
Cochrane Database of Systematic Reviews 2020, Issue 3, Art. No.: CD012880.
DOI: [10.1002/14651858.CD012880.pub2](https://doi.org/10.1002/14651858.CD012880.pub2).

www.cochranelibrary.com

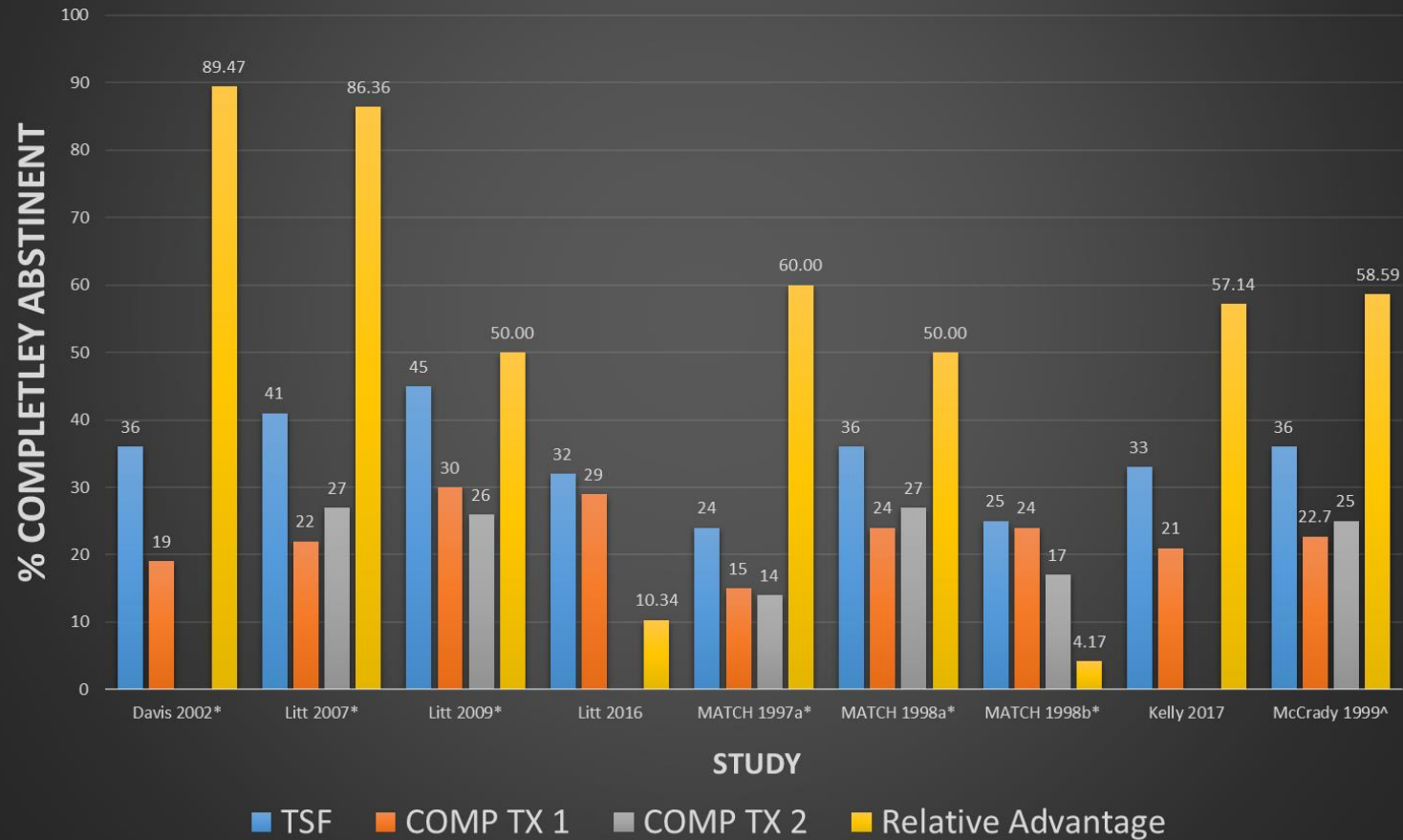
Alcoholics Anonymous and other 12-step programs for alcohol use disorder (Review)
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WILEY

Cochrane Systematic Review on AA/TSF (2020)

- Kelly, JF
- Humphreys, K
- Ferri, M

TSF Compared to Different Theoretical Orientation Treatments (RCTs all Manualized)



Economic Studies

Healthcare Cost Savings

- 3/4 included studies in this category (n reports = 4/5; found sig. health care cost saving in favor of the AA/TSF condition).
- Economic analyses found benefits in favor of AA/TSF relative to outpatient treatment, and CBT interventions.
- Magnitude - large. In addition to sig. increased abstinence/remission, compared to CBT interventions delivered in residential VA, AA/TSF reduces mental health and substance use related healthcare costs over next 2 years by over \$10,000 per patient (converted to 2018 U.S.



**\$10-15 Billion/yr savings
in health care alone**

Empirically-supported MOBCs through which AA confers benefit: AA mobilizes social and personal recovery capital...

- AA is the closest thing public health to a free lunch, but...
- While AA is proven to help, not everyone wants to use AA
- Increasing the menu of recovery mutual-help support options is likely to engage more individuals in the recovery process

Kelly, 2022 (adapted from Kelly, 2017;
Kelly, Magill, Stout, 2009)

Do Fitness Centers Keep people fit?



- Of course!
- If you go and if you work out regularly
- Ongoing challenge is engaging and retaining people in some kind of ongoing exercise regimen...
- Fitness Centers therefore provide not just one, but an array, of different classes, spaces, equipment, pools, and courts, so that people can find something appealing...
- ...and move toward increasing physical fitness

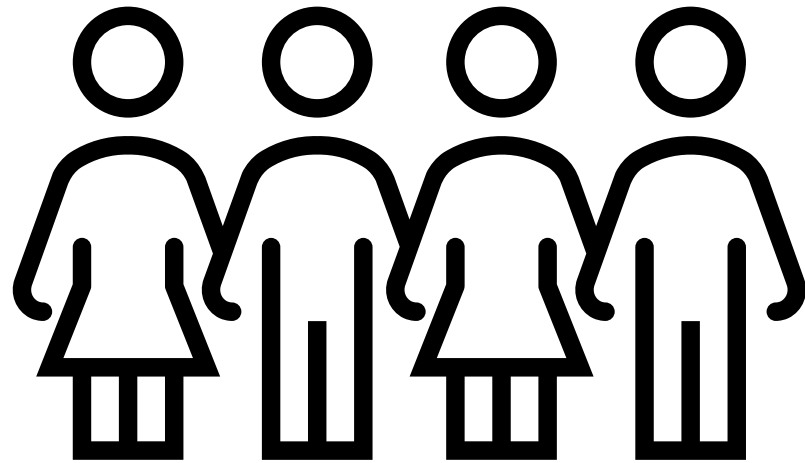
Do Mutual-Help Organizations Keep people fit for recovery?



- Of course!
- If you go regularly and if you work the recovery program and build it in to your lifestyle (like exercise)
- Perennial challenge is engaging and retaining people in some kind of ongoing recovery support service ...
- Recovery mutual-help organizations, however, have been largely limited to one variety (12-step) therefore severely limiting options to engage and retain people in an ongoing recovery support service that can help mitigate relapse risk and sustain remission and recovery.
- This is tantamount to a fitness center having ONLY a weight room, or ONLY a pool etc...

Emerging Evidence for Additional Mutual-Help Organizations....

J Subst Abuse Treat. 2017 February ; 73: 16–26. doi:10.1016/j.jsat.2016.10.004.



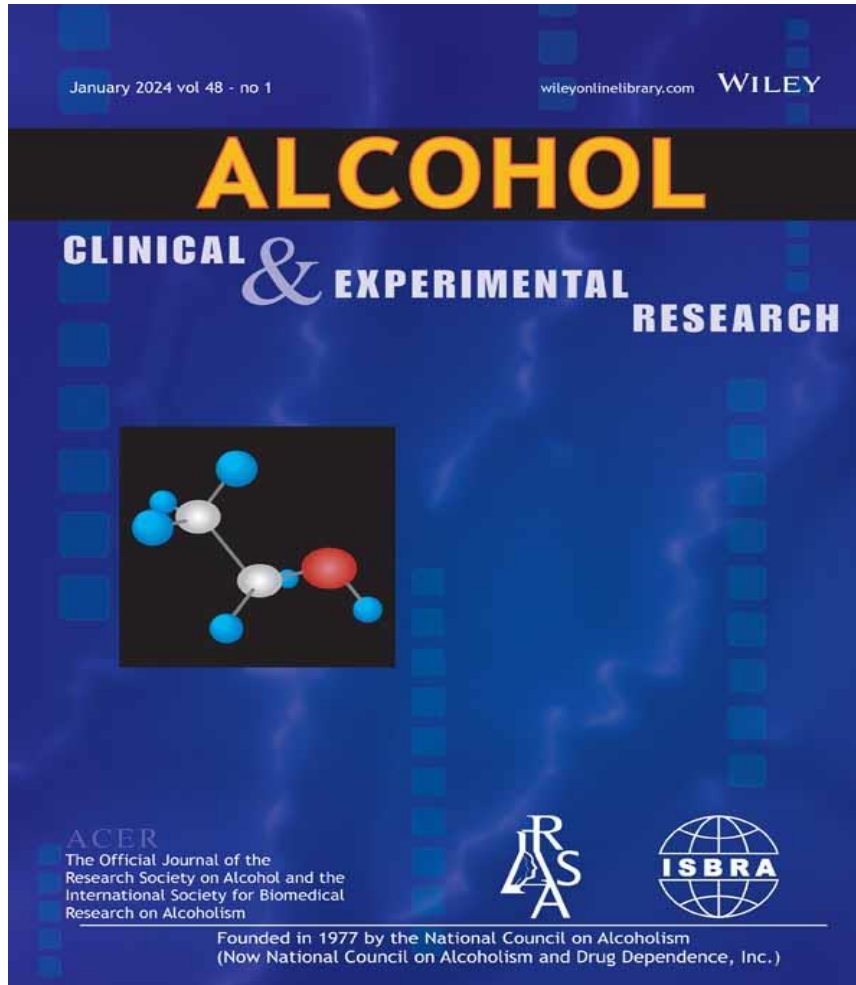
Comparison of 12-step Groups to Mutual Help Alternatives for AUD in a Large, National Study: Differences in Membership Characteristics and Group Participation, Cohesion, and Satisfaction

Sarah E. Zemore, Ph.D., Lee Ann Kaskutas, Dr.P.H., Amy Mericle, Ph.D., and Jordana Hemberg, MPH

Alcohol Research Group, Emeryville, CA

Abstract

Background—Many studies suggest that participation in 12-step groups contributes to better recovery outcomes, but people often object to such groups and most do not sustain regular involvement. Yet, research on alternatives to 12-step groups is very sparse. The present study aimed to extend the knowledge base on mutual help group alternatives for those with an alcohol use disorder (AUD), sampling from large, active, abstinence-focused groups including Women for Sobriety (WFS), LifeRing, and SMART Recovery (SMART). This paper presents a cross-sectional



Who affiliates with SMART recovery? A comparison of individuals attending SMART recovery, alcoholics anonymous, both, or neither

John F. Kelly^{1,2} | Samuel Levy¹ | Maya Matlack¹ | Bettina B. Hoepfner^{1,2}

¹Psychiatry Department, Massachusetts General Hospital, Boston, Massachusetts, USA

²Department of Psychiatry, Harvard Medical School, Boston, Massachusetts, USA

Correspondence
John F. Kelly, MGH Recovery Research Institute, 151 Merrimac St, 4th Floor, Boston, MA 02114, USA.
Email: jkelly11@mgh.harvard.edu

Funding information
National Institute on Alcohol Abuse and Alcoholism, Grant/Award Number: K24AA022136 and R01AA026288; Massachusetts General Hospital Recovery Research Institute

Abstract

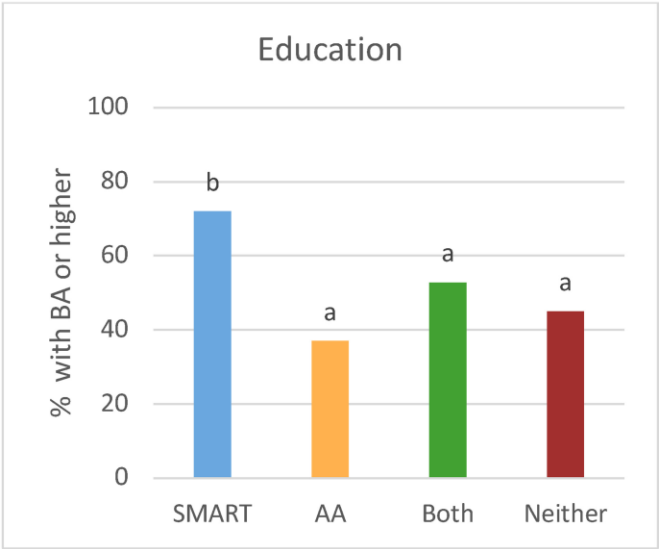
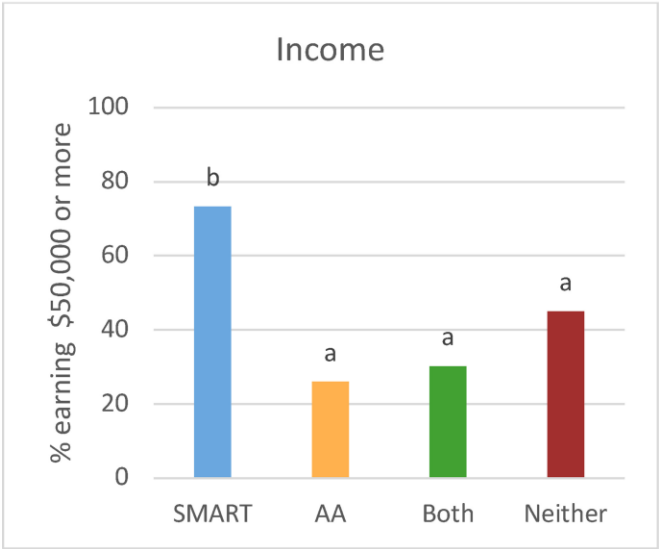
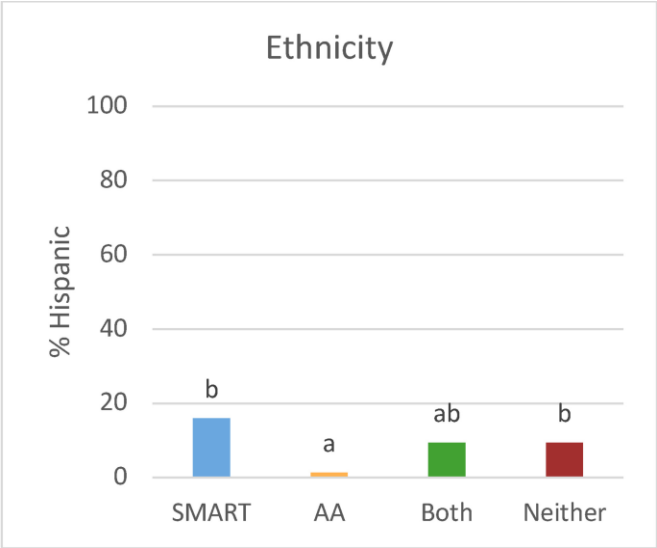
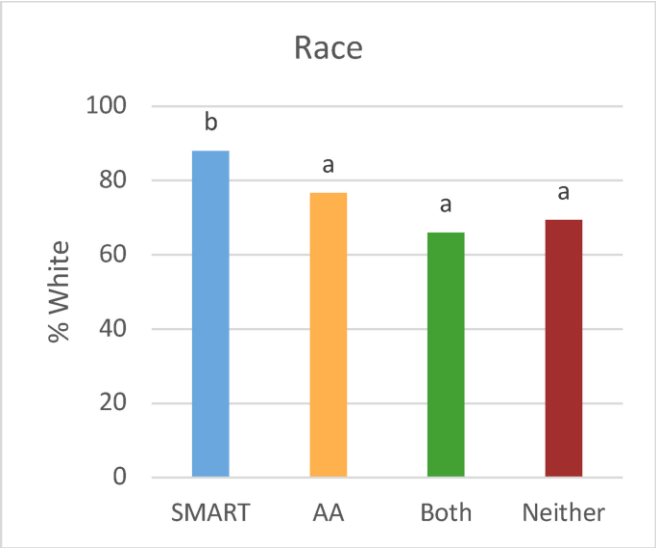
Background: Mutual-help organizations (MHOs) play a crucial role for many individuals with alcohol use disorder (AUD) or other substance use disorders in achieving stable remission. While there is now substantial research characterizing who uses 12-step MHOs, very little is known about who becomes affiliated with newer and rapidly growing MHOs, such as Self-Management and Recovery Training ("SMART" Recovery). More research could inform knowledge regarding who may be best engaged by these differing pathways.

Methods: We conducted a cross-sectional analysis of participants ($N = 361$) with AUD recruited mostly from the community who were starting a new recovery attempt and self-selected into one of four different recovery paths: (1) SMART Recovery ("SMART-only"; $n = 75$); (2) Alcoholics Anonymous ("AA-only"; $n = 73$); (3) Both SMART and AA ("Both"; $n = 53$); and (4) Neither SMART nor AA ("Neither"; $n = 160$). We compared the groups on demographics, clinical history, treatment and recovery support service use, and indices of functioning and well-being. We computed descriptives and conducted inferential analyses according to the data structure.

Results: Compared to study participants choosing AA-only or Both, SMART-only participants were more likely to be White, married, have higher income and more education, be full-time employed, and evince a pattern of lower clinical severity characterized by less lifetime and recent treatment and recovery support services usage, lower alcohol use intensity and fewer consequences, and less legal involvement. AUD symptom levels, lifetime psychiatric diagnoses, psychiatric distress, and functioning were similar across MHO-engaged groups.

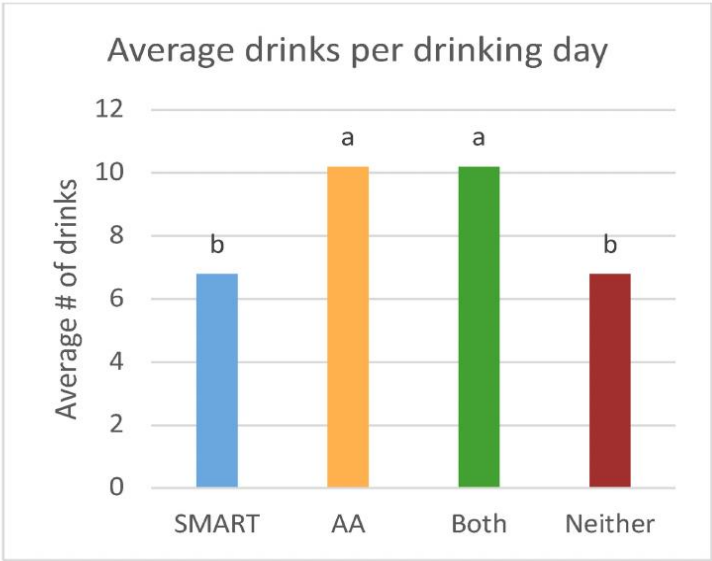
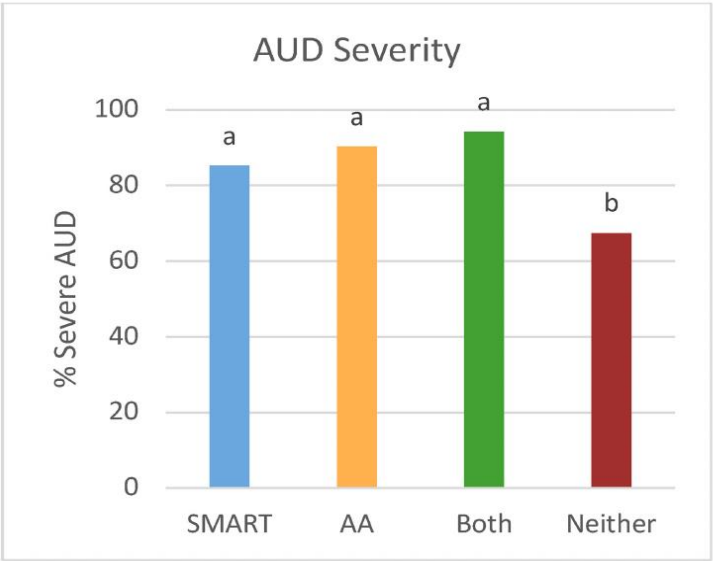
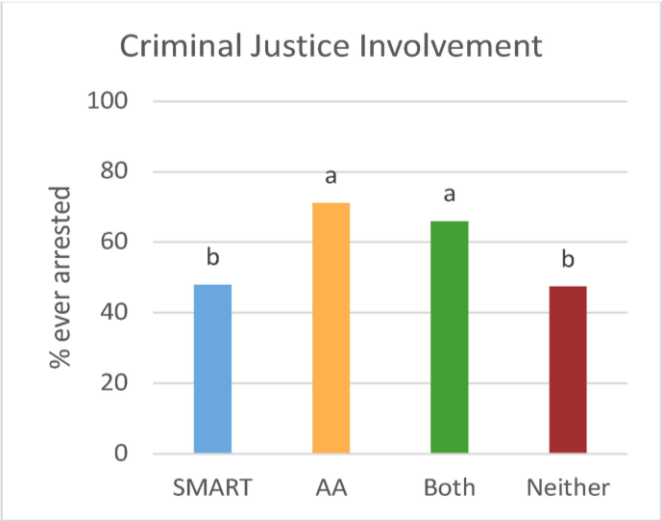
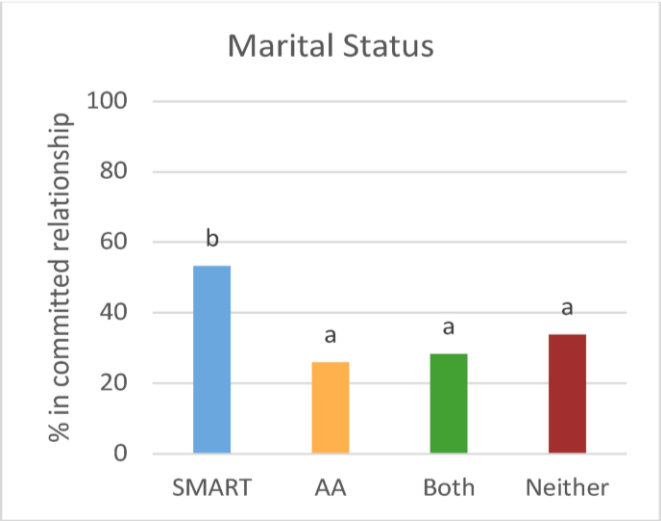
Conclusion: SMART Recovery appears to attract individuals with greater psychosocial stability and economic advantage and less severe histories of alcohol-related impairment and legal involvement. Findings suggest that certain aspects specific to the SMART Recovery group approach, format, and/or contents may appeal to individuals exhibiting this type of profile. As such, SMART appears to provide an additional

Results



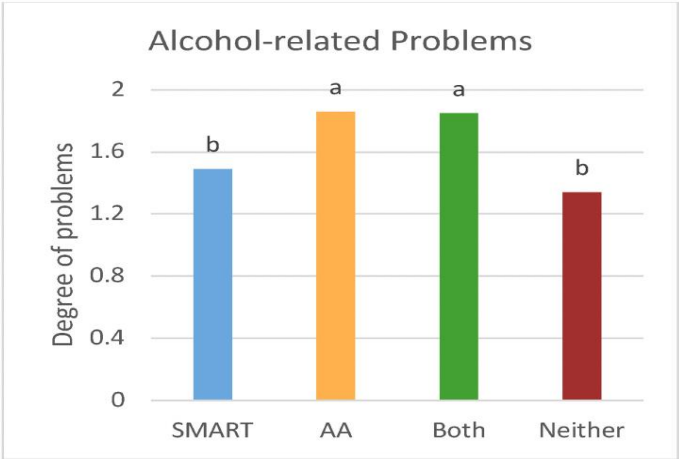
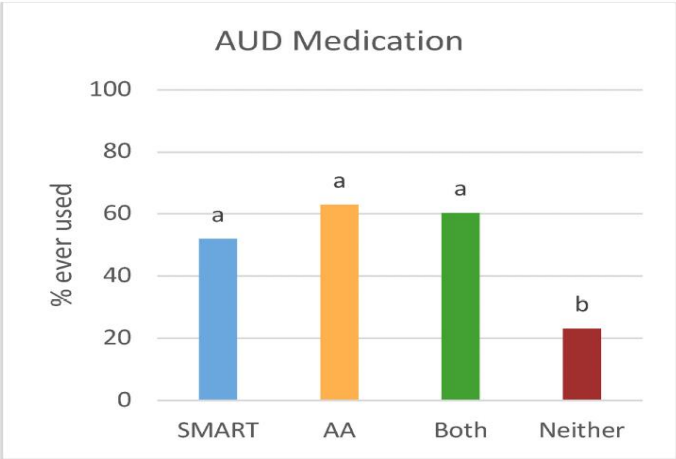
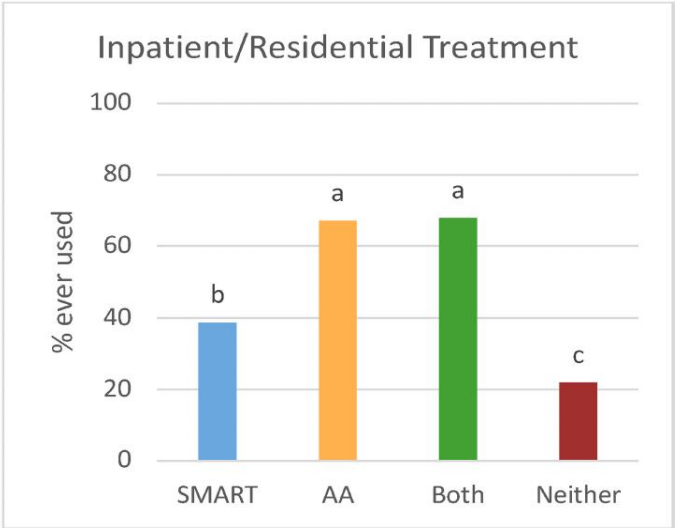
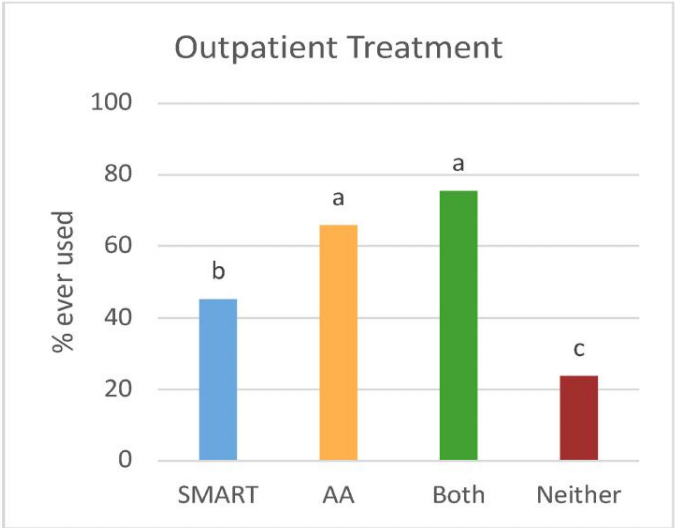
Kelly et al. (2023)

Results



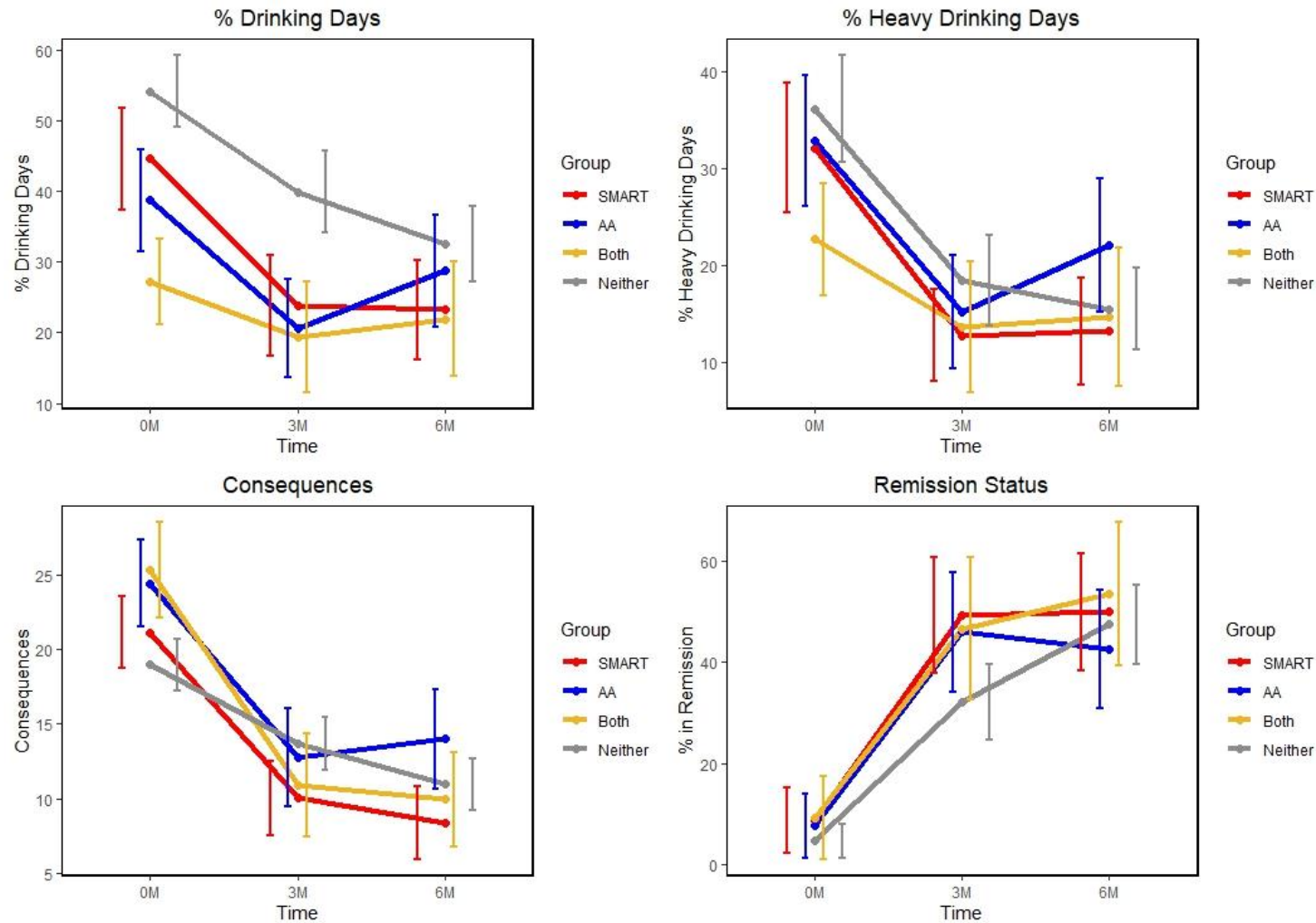
Kelly et al. (2023)

Results



Kelly et al. (2023)

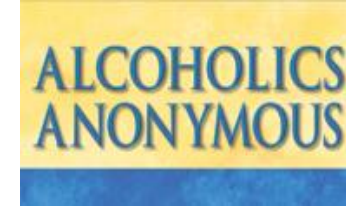
SMART vs AA vs Both vs Neither: Group Effects over Time on four outcomes across 6 months



Recovery support services have grown intended to facilitate access to conducive and supportive environments and recovery capital ...



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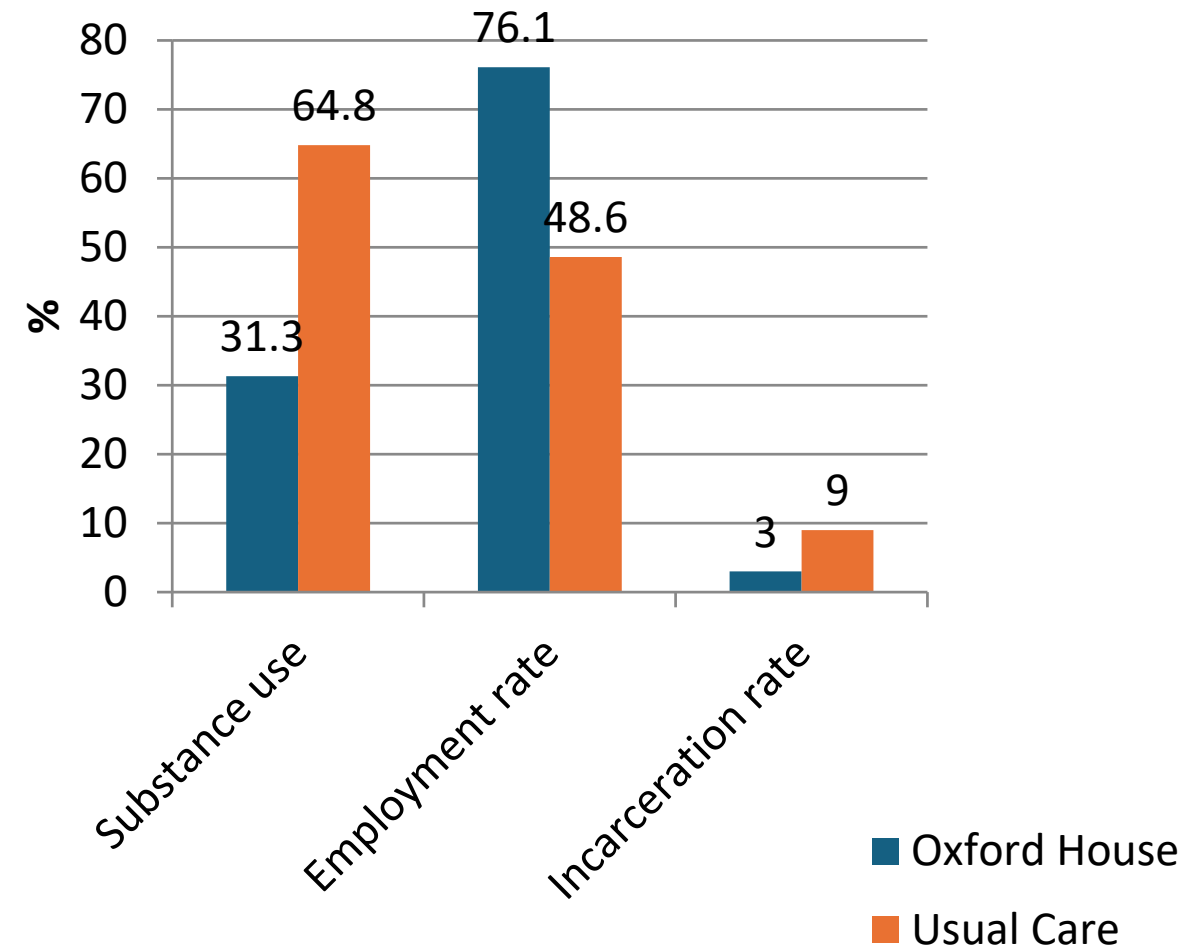
Recovery Community Center
Peer-to-peer support services



Oxford House vs. Usual Care

Recovery Residences had –

- half as many using substances across 2 yrs
- 50% more employed
- 1/3 re-incarceration



Cost-benefit analysis of the Oxford House Model

Evaluation and Program Planning 35 (2012) 47–53



Contents lists available at ScienceDirect

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Benefits and costs associated with mutual-help community-based recovery homes: The Oxford House model

Anthony T. Lo Sasso ^{a,*}, Erik Byro ^b, Leonard A. Jason ^c, Joseph R. Ferrari ^d, Bradley Olson ^e

^a Health Policy and Administration, School of Public Health, University of Illinois at Chicago, 1603 W Taylor, Chicago, IL 60660, United States

^b Economics Department, University of Illinois at Chicago, 601 South Morgan UH725, Chicago, IL 60607, United States

^c DePaul University, Center for Community Research, 990 W. Fullerton Ave., Suite 3100, Chicago, IL 60614, United States

^d DePaul University, Department of Psychology, 2219 North Kenmore Avenue, Chicago, IL 60614, United States

^e National-Louis University, Psychology Department, 122 S. Michigan Ave., Suite 300, Chicago, IL 60603, United States

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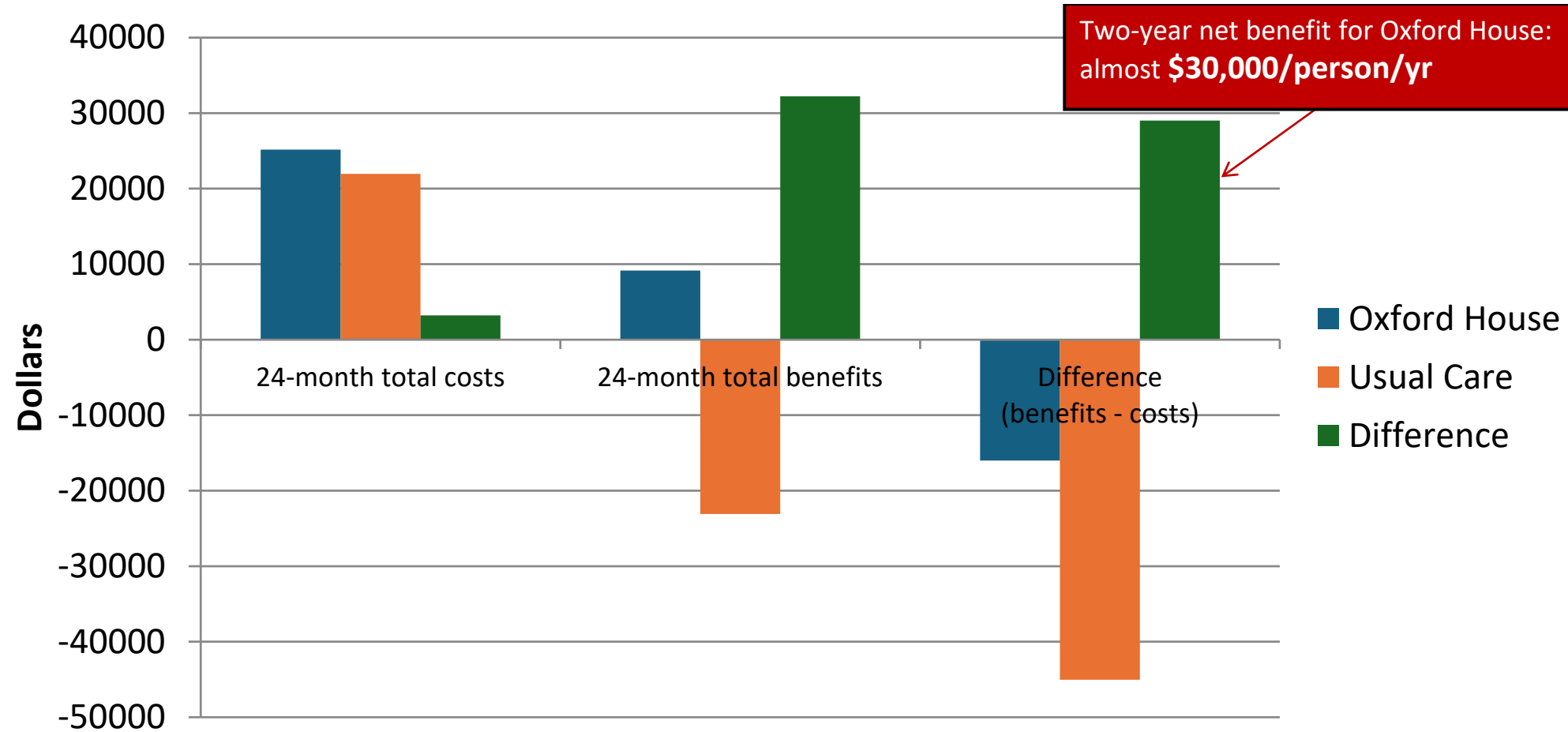
ABSTRACT

We used data from a randomized controlled study of *Oxford House* (OH), a self-run, self-supporting recovery home, to conduct a cost-benefit analysis of the program. Following substance abuse treatment, individuals that were assigned to an OH condition ($n = 68$) were compared to individuals assigned to a usual care condition ($n = 61$). Economic cost measures were derived from length of stay at an Oxford House residence, and derived from self-reported measures of inpatient and outpatient treatment utilization. Economic benefit measures were derived from self-reported information on monthly income, days participating in illegal activities, binary responses of alcohol and drug use, and incarceration. Results suggest that OH compared quite favorably to usual care: the net benefit of an OH stay was estimated to be roughly \$29,000 per person on average. Bootstrapped standard errors suggested that the net benefit was statistically significant. Costs were incrementally higher under OH, but the benefits in terms of reduced illegal activity, incarceration and substance use substantially outweighed the costs. The positive net benefit for Oxford House is primarily driven by a large difference in illegal activity between OH and usual care participants. Using sensitivity analyses, under more conservative assumptions we still arrived at a net benefit favorable to OH of \$17,830 per person.

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- **Sample:** 129 adults leaving substance use treatment between 2002 and 2005
- **Design:** Cost-benefit analysis using RCT data
- **Intervention:** Oxford House vs. usual continuing care
- **Follow-up:** 2 years
- **Outcome:** Substance use, monthly income, incarceration rates

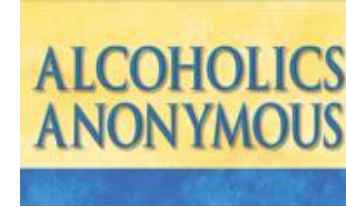
Mean per-person societal benefits and costs



Recovery support services have grown intended to facilitate access to conducive and supportive environments and recovery capital ...



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Peer-to-peer support services



One-Stop Shopping for Recovery: An Investigation of Participant Characteristics and Benefits Derived From U.S. Recovery Community Centers

John F. Kelly , Robert L. Stout, Leonard A. Jason, Nilofar Fallah-Sohy, Lauren A. Hoffman, and Bettina B. Hoepfner

Background: Recovery community centers (RCCs) are the “new kid on the block” in providing addition recovery services, adding a third tier to the 2 existing tiers of formal treatment and mutual-help organizations (MHOs). RCCs are intended to be recovery hubs facilitating “one-stop shopping” in the accrual of recovery capital (e.g., recovery coaching, employment/educational linkages). Despite their growth, little is known about who uses RCCs, what they use, and how use relates to improvements in functioning and quality of life. Greater knowledge would inform the field about RCC’s potential clinical and public health utility.

Methods: Online survey conducted with participants ($N = 336$) attending RCCs ($k = 31$) in the northeastern United States. Substance use history, services used, and derived benefits (e.g., quality of life) were assessed. Systematic regression modeling tested a priori theorized relationships among variables.

Results: RCC members ($n = 336$) were on average 41.1 ± 12.4 years of age, 50% female, predominantly White (78.6%), with high school or lower education (48.8%), and limited income (45.2% < \$10,000 past-year household income). Most had either a primary opioid (32.7%) or alcohol (26.8%) problem. Just under half (48.5%) reported a lifetime psychiatric diagnosis. Participants had been attending RCCs for 2.6 ± 3.4 years, with many attending <1 year (35.4%). Most commonly used aspects were the socially oriented mutual-help/peer groups and volunteering, but technological assistance and employment assistance were also common. Conceptual model testing found RCCs associated with increased recovery capital, but not social support; both of these theorized proximal outcomes, however, were related to improvements in psychological distress, self-esteem, and quality of life.

Conclusions: RCCs are utilized by an array of individuals with few resources and primary opioid or alcohol histories. Whereas strong social supportive elements were common and highly rated, RCCs appear to play a more unique role not provided either by formal treatment or by MHOs in facilitating the acquisition of recovery capital and thereby enhancing functioning and quality of life.

Key Words: Recovery Community Centers, Recovery, Addiction, Support Services, Recovery Coaching, Addiction, Substance Use Disorder.

PROFESSIONAL TREATMENT SERVICES often play a vital role in addressing substance use disorders in the United States and around the world. Such clinical services can provide life-saving medically managed detoxification and stabilization as well as deliver medications and psychosocial interventions that can alleviate cravings and help prevent relapse. Extending the framework and benefits of these professional treatment efforts, peer-led mutual-help

organizations (MHOs), such as Alcoholics Anonymous (AA), Narcotics Anonymous (NA), SMART Recovery, and many others are commonly used to provide additional long-term free recovery support over time in the communities in which people live (Bog et al., 2017; Kelly, 2017; Kelly et al., 2017a). Adding to these resources in recent years has been a new dimension of recovery support services that are neither professional treatment nor MHOs. These new services (e.g., recovery community centers [RCCs], recovery residences, recovery coaching, recovery high schools, and collegiate recovery programs; Kelly et al., in press; White et al., 2012, 2012) combine voluntary, peer-led initiatives, with professional activities, and are intended to provide flexible community-based options to address the psychosocial barriers to sustained remission (White et al., 2012, 2012).

RCCs are one of the most common of these new additions to recovery support infrastructure and are growing rapidly (Cousins et al., 2012; Kelly et al., in press; Kelly et al., 2017b). RCCs are literally and metaphorically, “new kids on the block,” as these novel entities are most often located on

From the Recovery Research Institute (JFK, NF-S, LAH, BBH), Massachusetts General Hospital and Harvard Medical School, Boston, Massachusetts; DePaul University (RLS), Chicago, Illinois; and Decision Sciences Institute (LAJ), Providence, Rhode Island.
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Reprint requests: John F. Kelly, PhD, Recovery Research Institute, Massachusetts General Hospital and Harvard Medical School, 151 Merrimac Street, 6th Floor, Boston, MA 02114; Tel.: 617-643-1980; Fax: 617-643-7667; E-mail: jfkelly11@mgh.harvard.edu
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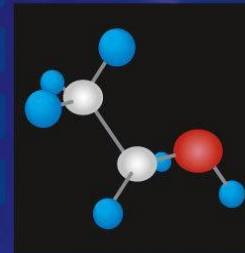
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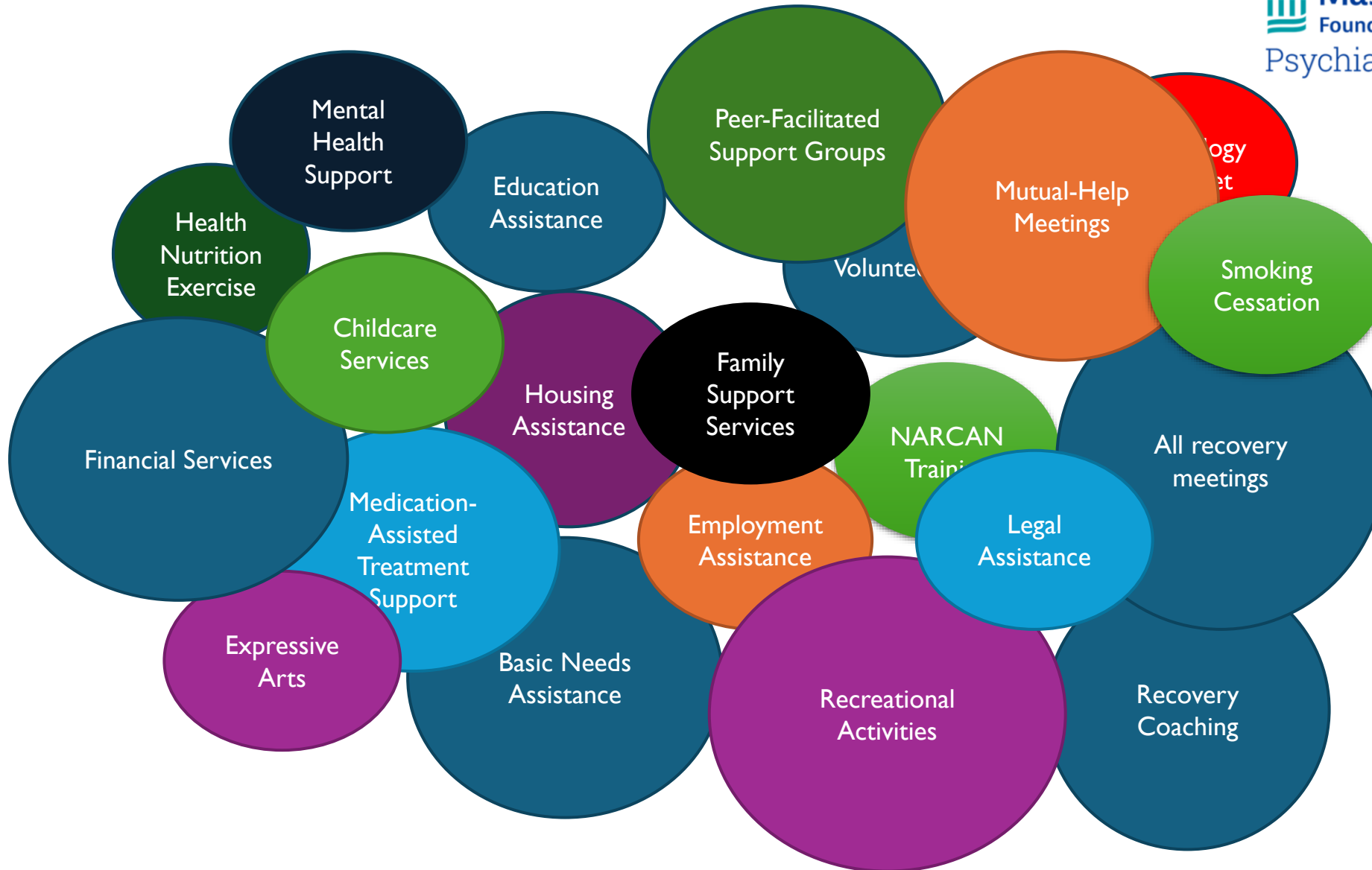
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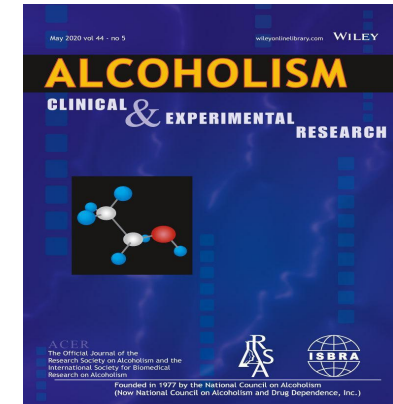
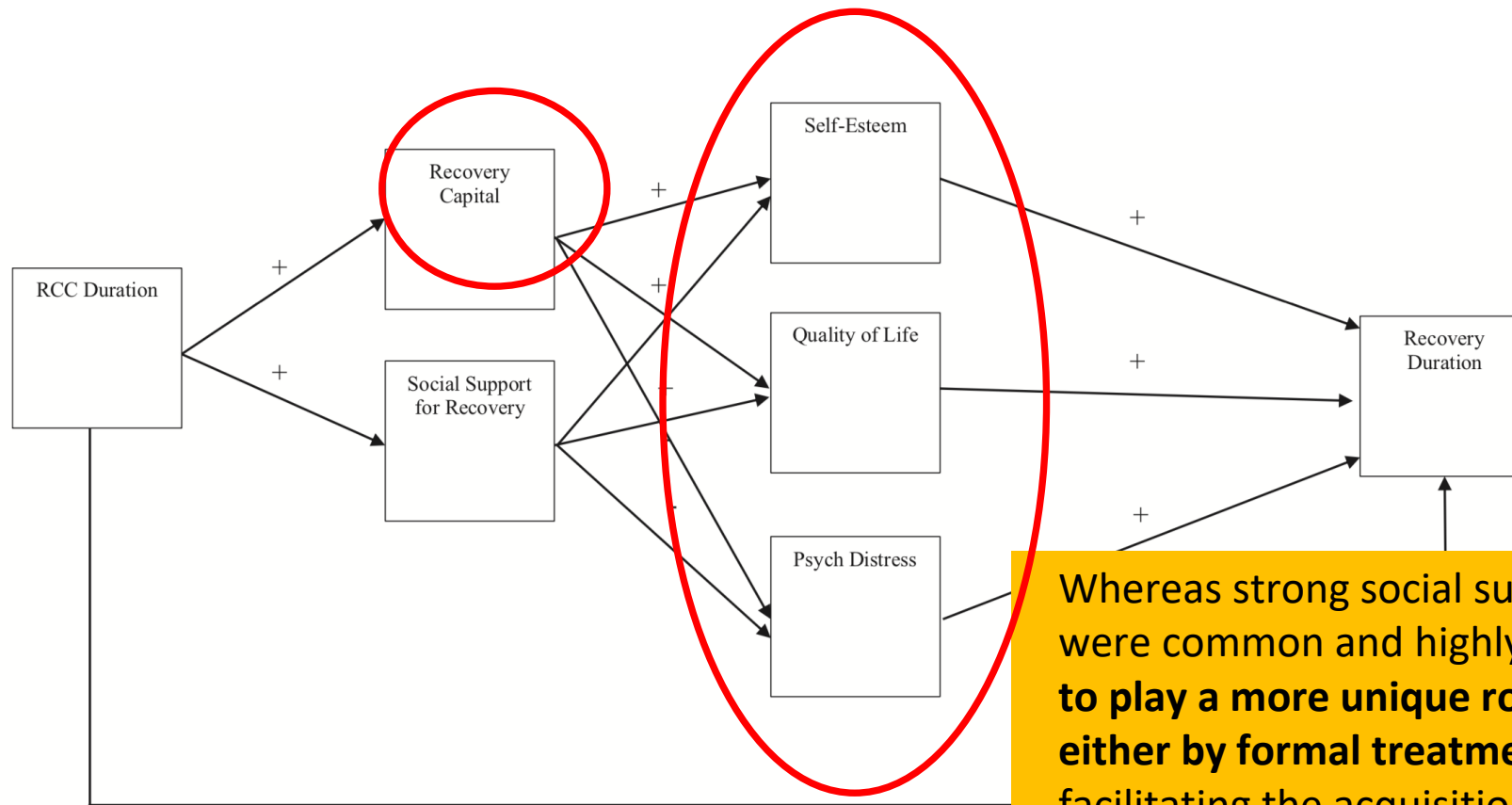
The Official Journal of the
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International Society for Biomedical
Research on Alcoholism



Founded in 1977 by the National Council on Alcoholism
(Now National Council on Alcoholism and Drug Dependence, Inc.)

Services provided

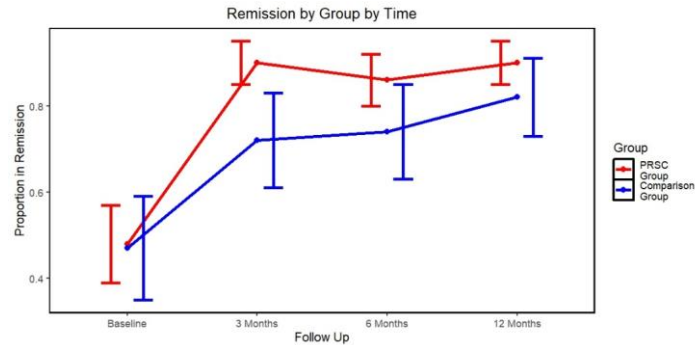




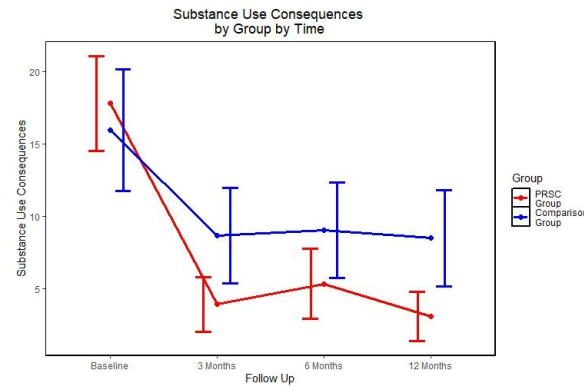
Whereas strong social supportive elements were common and highly rated, **RCCs appear to play a more unique role not provided either by formal treatment or by MHOs** in facilitating the acquisition of recovery capital and thereby enhancing functioning and quality of life.

Fig. 1. Conceptual model of the theorized relationships among RCC duration and length of recovery. “+” = theorized positive association among linked variables; “-” = theorized negative association among linked variables.

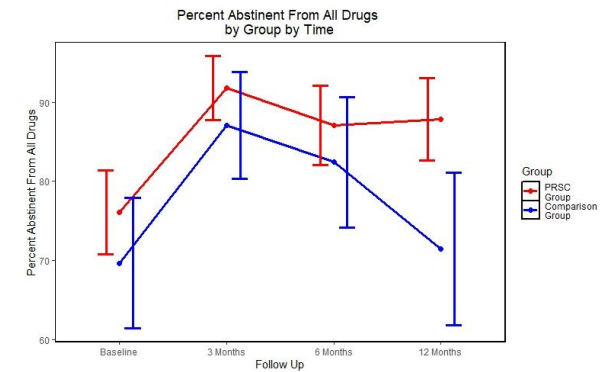
Higher Remission Rates



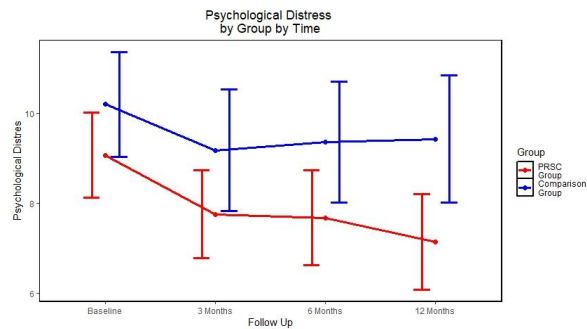
Fewer Substance-Related Consequences



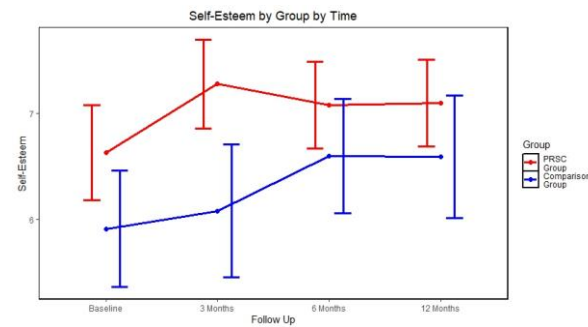
Higher Abstinence Rates



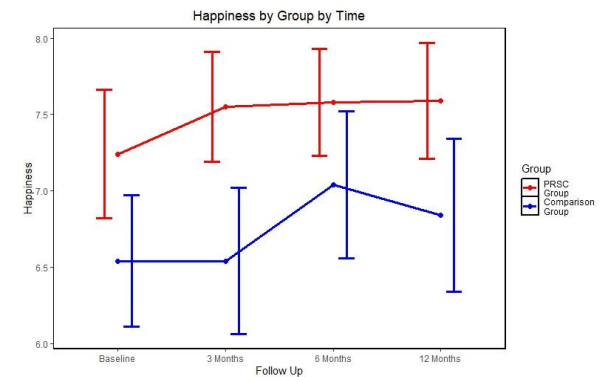
Fewer Psychiatric Problems



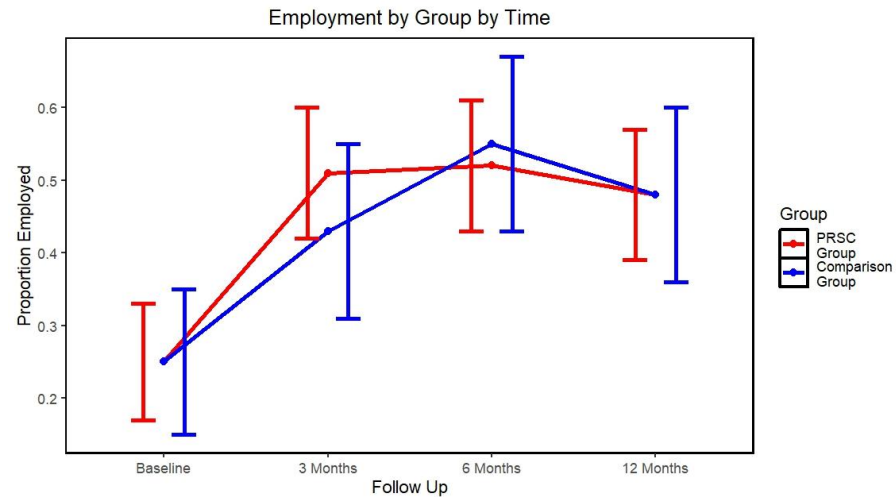
Higher Self-Esteem and Pos. Soc. Identity



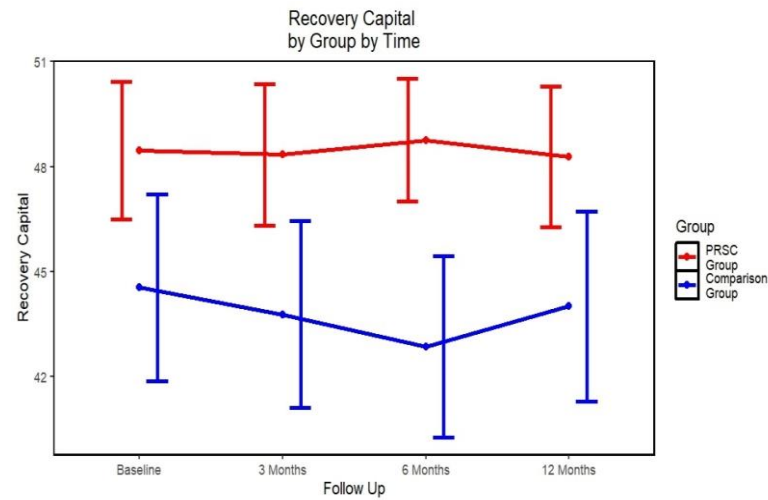
Higher Life Satisfaction



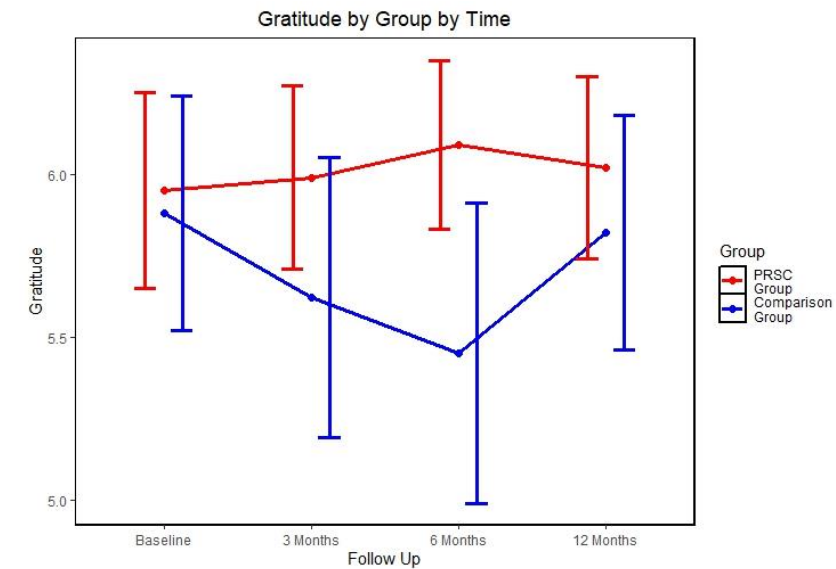
Double Employment Rates



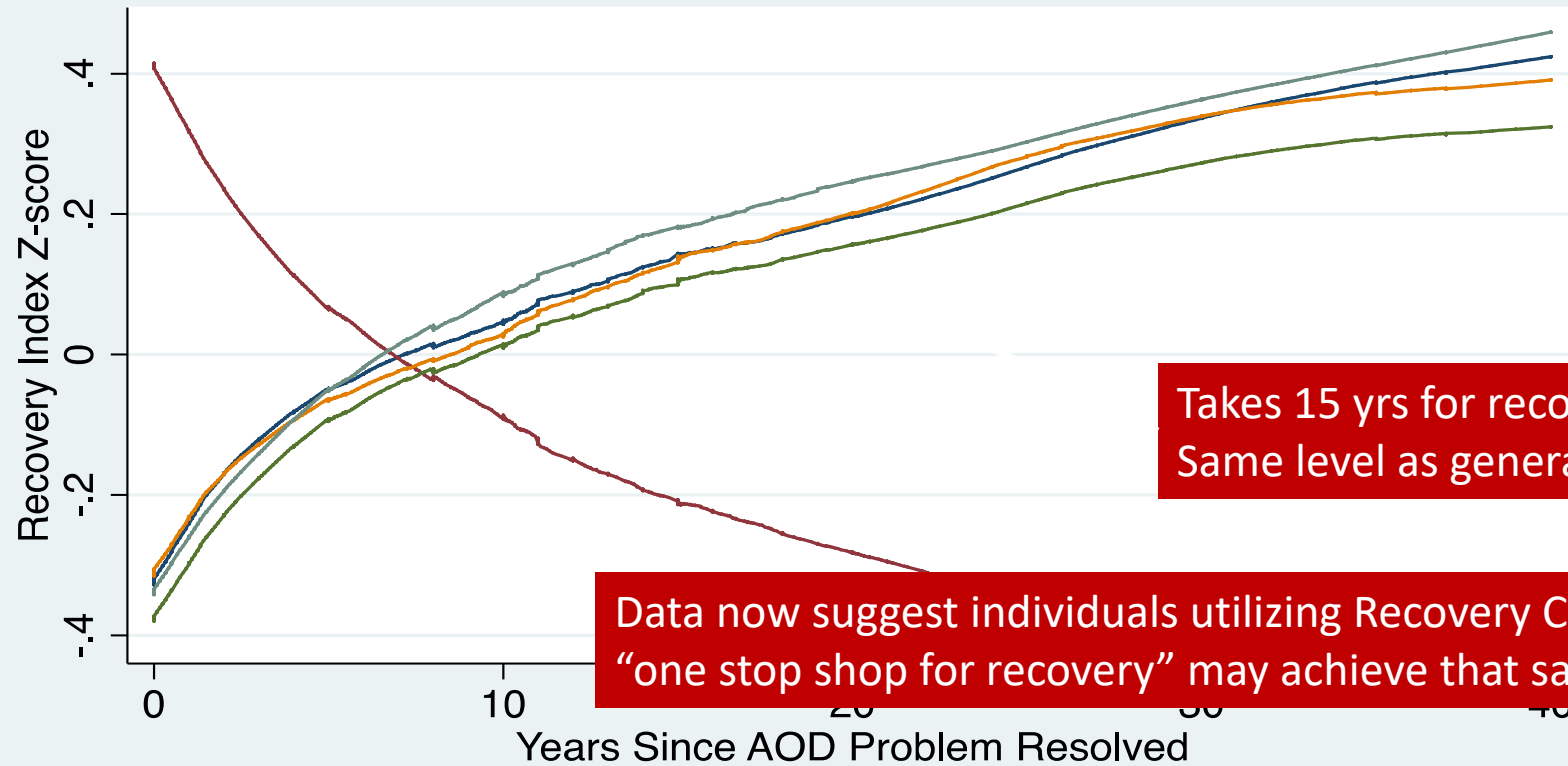
Higher Recovery Capital Rates



Greater Gratitude



Recovery Indices by Years Since Problem Resolution



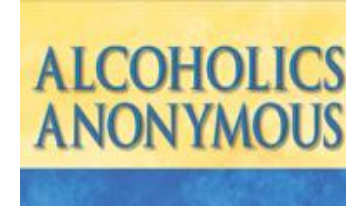
Takes 15 yrs for recovering pop to reach Same level as general pop.

Data now suggest individuals utilizing Recovery Community Centers' "one stop shop for recovery" may achieve that same level in just 5 yrs!

Recovery support services have grown intended to facilitate access to conducive and supportive environments and recovery capital ...



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What if Really Treated Addiction Like a Chronic Disease?

The Recovery Management Check-Up Paradigm

Some of the common goals of these models include:

1. **proactively** tracking patients and providing regular “checkups”
2. **screening** patients for early evidence of problems
3. **motivating** people to maintain or make changes including the return to more aggressive treatment when necessary
4. **negotiating access to additional formal care** and potential barriers to it
5. **emphasizing early formal reintervention** when problems do arise.

Core assumption of these approaches is that earlier detection and re-intervention will improve long-term outcomes...

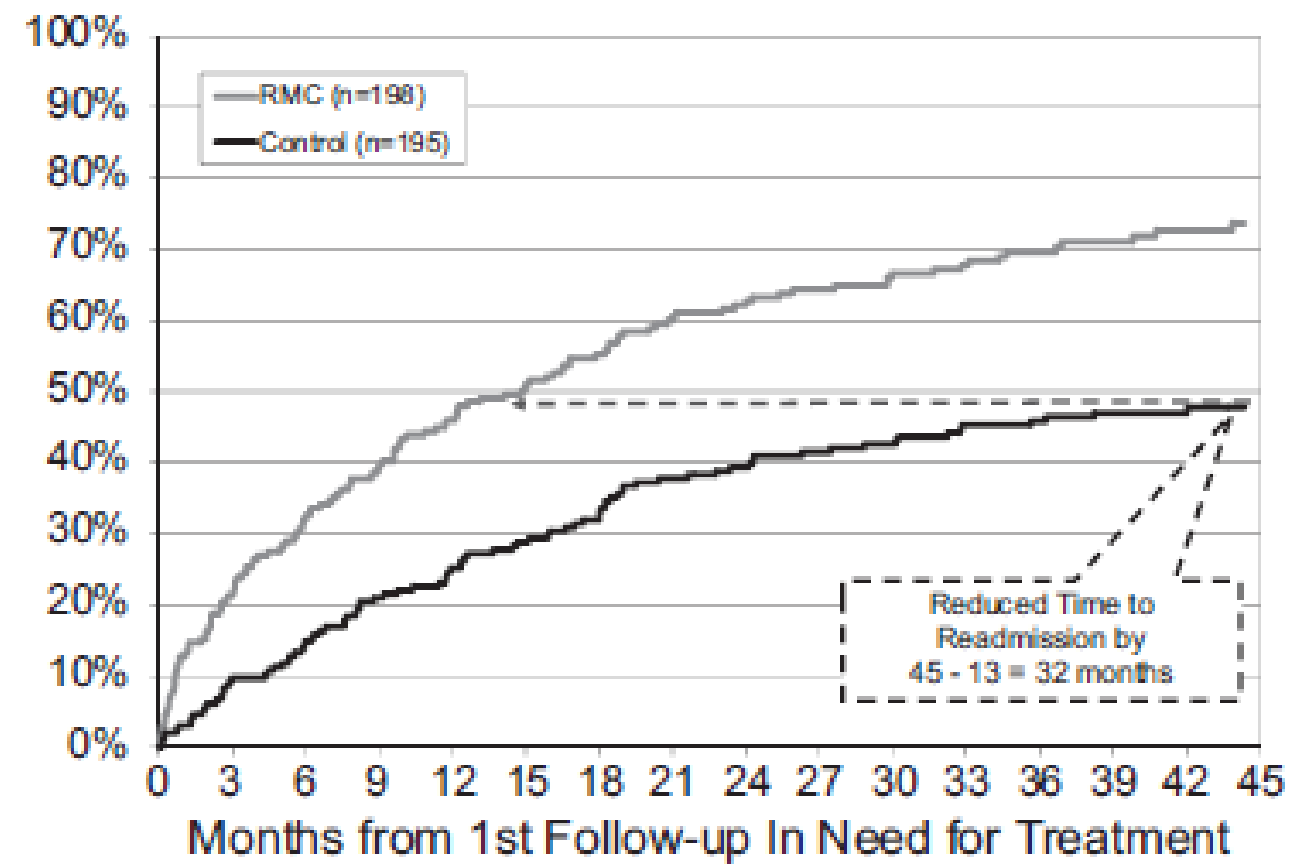
Clinical Monitoring: 4-year outcomes using Recovery Management Checkups (RMCs)

- N=446 adults with SUD, mean age = 38, 54% male, 85% African-American
- Randomly assigned to either
 - Quarterly assessment only
 - Quarterly assessment plus RMC
- RMCs
 - Linkage manager who used MI to review participant's substance use, discuss treatment barrier/solutions, schedule an appointment for treatment re-entry, and accompany participant through intake
 - If no substance use in previous quarter, linkage manager reviewed how abstinence has changed their lives and methods used to maintain abstinence

Source: Dennis & Scott (2012). Drug and Alcohol Dependence, 121, 10-17

Results - Return to treatment

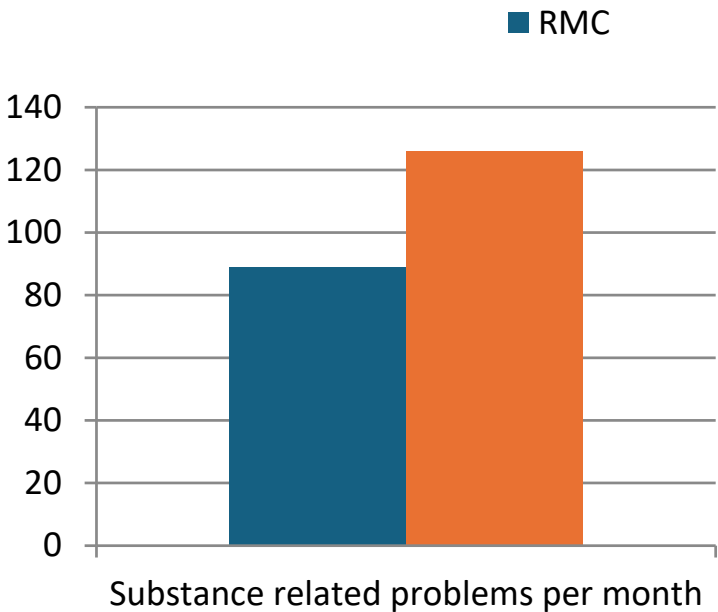
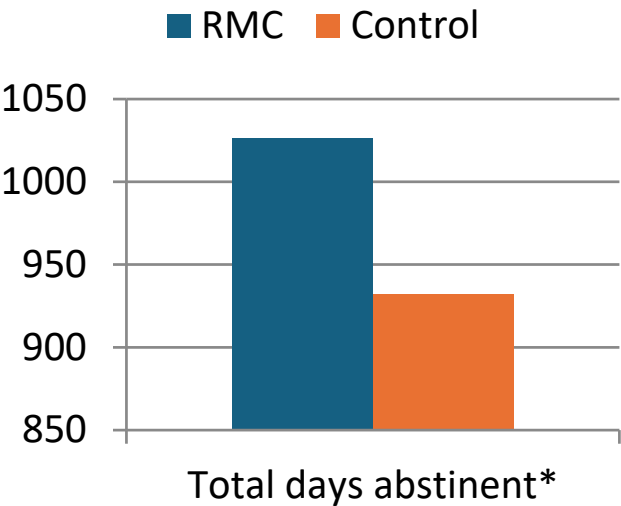
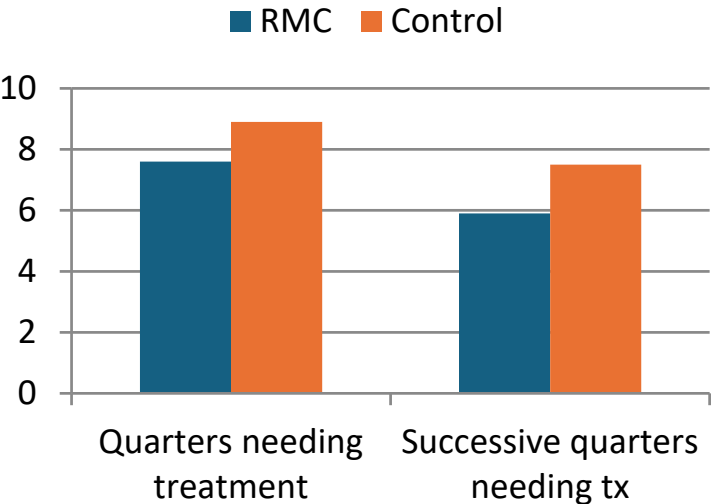
RMC participants needing treatment were sig. more likely to return to treatment sooner



Source: Dennis & Scott (2012). Drug and Alcohol Dependence, 121, 10-17

RMC Results

Use and problems outcomes benefits for RMC participants



Markers and Mechanisms of Long-Term Relapse and Implications for Disease Management





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EDITED BY
Fernando Hinostroza,
Universidad Católica del Maule, Chile

REVIEWED BY
Michele Mahr,
Texas Tech University Health Sciences Center,
United States
Monica Wilson,
Northcentral University, United States

*CORRESPONDENCE
John F. Kelly
✉ jkelly11@mgh.harvard.edu

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Long-term relapse: markers, mechanisms, and implications for disease management in alcohol use disorder

John F. Kelly*, Morgan Klein, Katherine Zeng, Sydney Manske
and Alexandra Abry

Department of Psychiatry, Recovery Research Institute, Massachusetts General Hospital, Harvard
Medical School, Boston, MA, United States

Objective: Much has been theorized and documented about factors involved in alcohol use disorder (AUD) relapse during the early months following a recovery attempt where biobehavioral classical conditioning ("cues/triggers") and neurophysiological explanatory theories predominate. Little has been documented, however, about long-term relapse (LTR) factors following sustained AUD remission where self-regulation and stress and coping theories may predominate because LTR precursors are centered less around neurophysiological dysregulation and cue reactivity and more around factors such as lowered recovery vigilance, avoidant coping, or changes in recovery-support services (RSS) usage. Greater knowledge of factors involved in LTR could sensitize and empower clinicians to deliver more effective disease management protocols to monitor and intervene upon such risks prior to AUD recurrence.

Methods: Cross-sectional, retrospective study of individuals in recovery from primary AUD ($N = 50$; 44% Female; 50% White) who had experienced LTR within the past 5 years following at least 1 year of remission (M years remitted prior to relapse = 3.6; range = 1–23) and assessed for any change in bio-psycho-social domains or RSS usage during the year prior to LTR, along with their attributions of factors' contribution to relapse (risk "potency"; i.e., didn't contribute, possibly, probably, or definitely, contributed). Research questions focused on the year preceding the LTR assessing: (1) prevalence and nature of the bio-psycho-social and RSS use changes and degree of attributed LTR risk potency; (2) number and type of definitely-contributing relapse factors within participants; (3) dynamic temporal onset and nature of high-risk LTR precipitants; (4) single most influential LTR risk factor.

Results: Several bio-psycho-social and RSS changes occurred during the year preceding LTR varying in prevalence and potency. Some were prevalent, but not potent, in terms of definitely contributing to LTR (e.g., sleep, energy); others occurred infrequently, but were potent (e.g., physical pain, recreational drug use); others were both highly prevalent and highly potent (e.g., change in recovery vigilance). Within participants, median number of definitely contributing LTR factors = 4, covering 2 different domains, on average. Temporal accumulation of LTR risks tended to intensify toward the relapse horizon over the preceding year. The single most important relapse factor tended to cluster in psychological (e.g., recovery vigilance, mental health) and social domains.

Conclusions: Findings have implications for long-term disease management during AUD recovery providing a set of potential preliminary markers and mechanisms that might be assessed, monitored, and, when necessary,

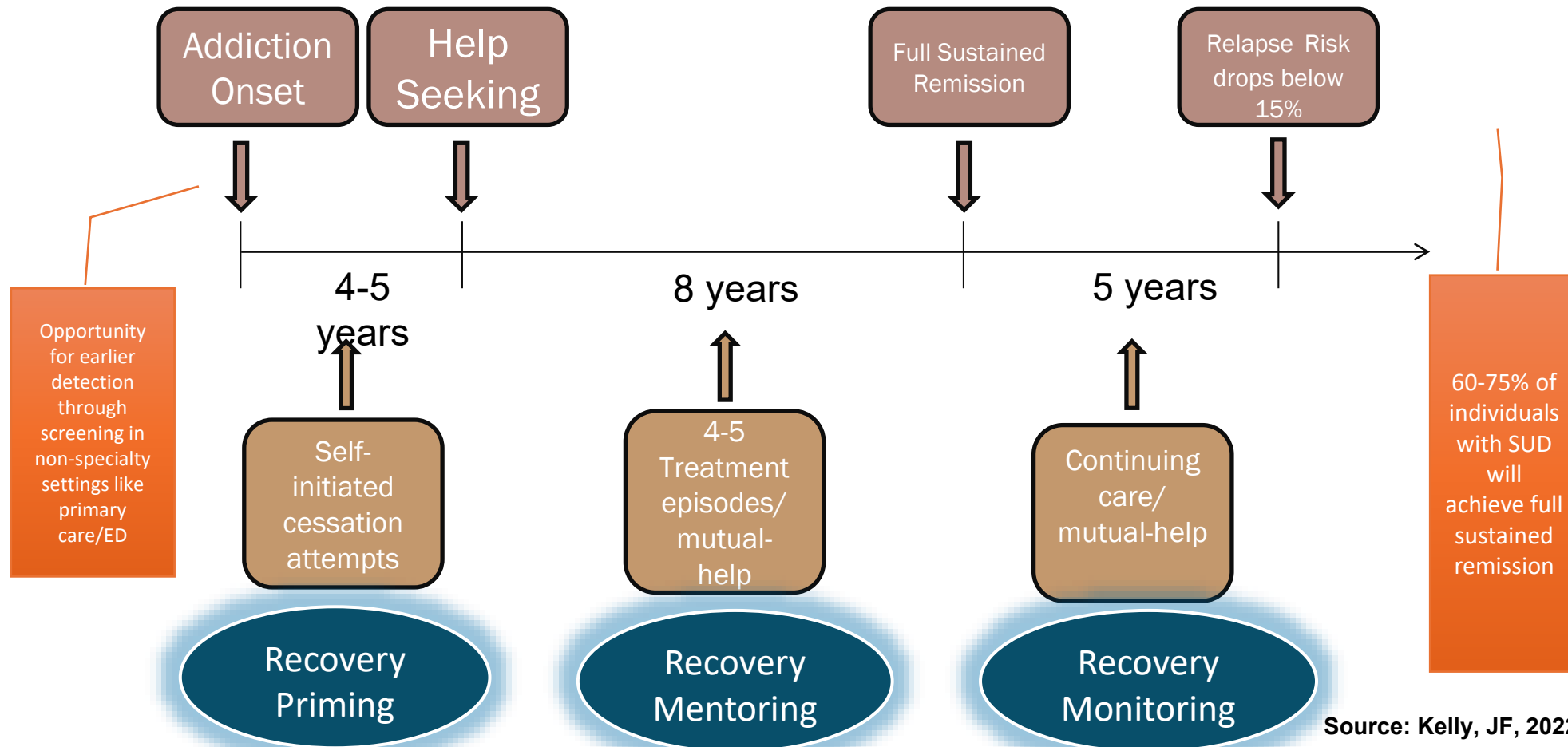


frontiers



frontiers in Public Health

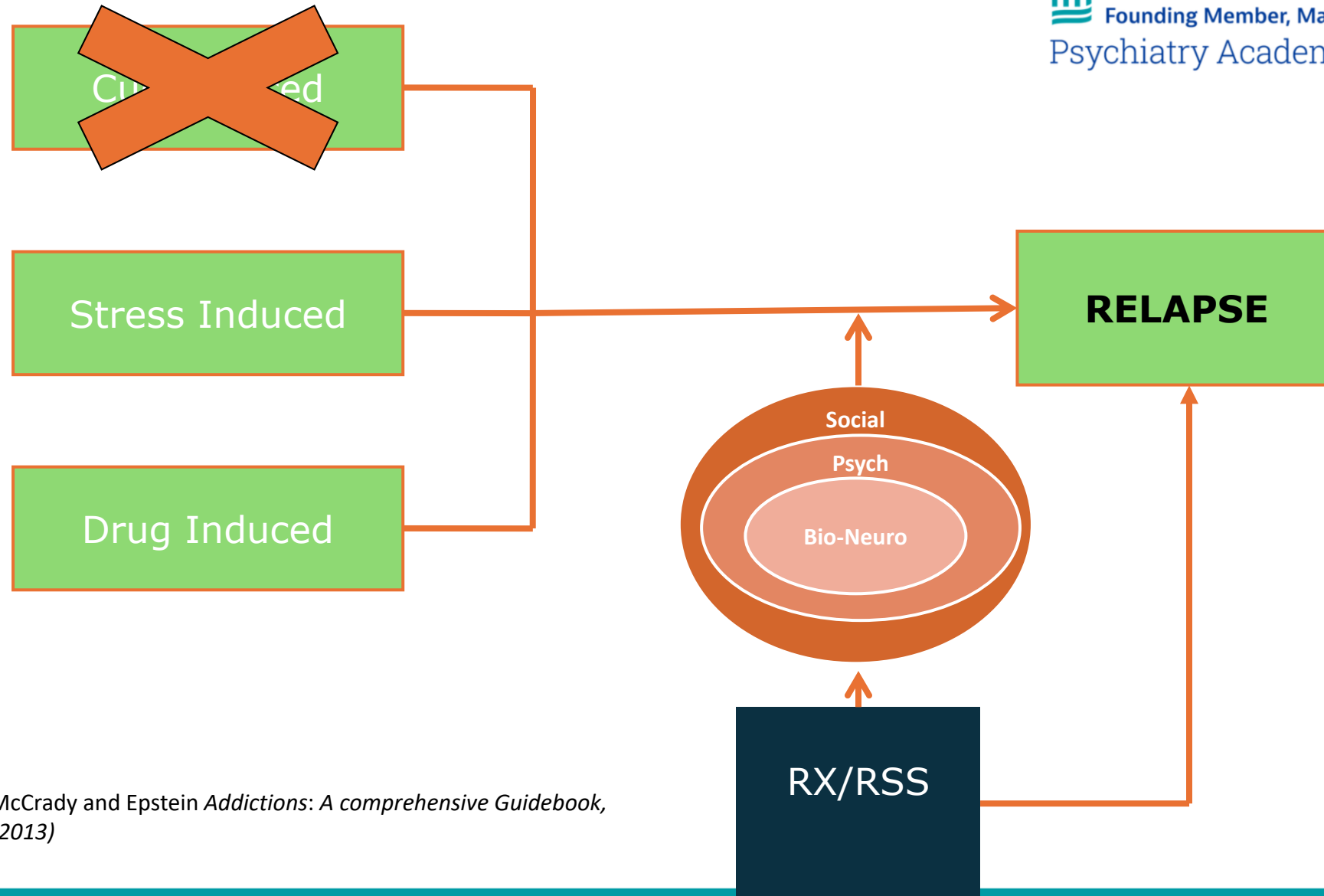
Most with AUD remit, but instability and relapse vulnerability persists especially during early years of remission...



Source: Kelly, JF, 2022; Kelly and Stout, 2025

Background and Rationale (1)

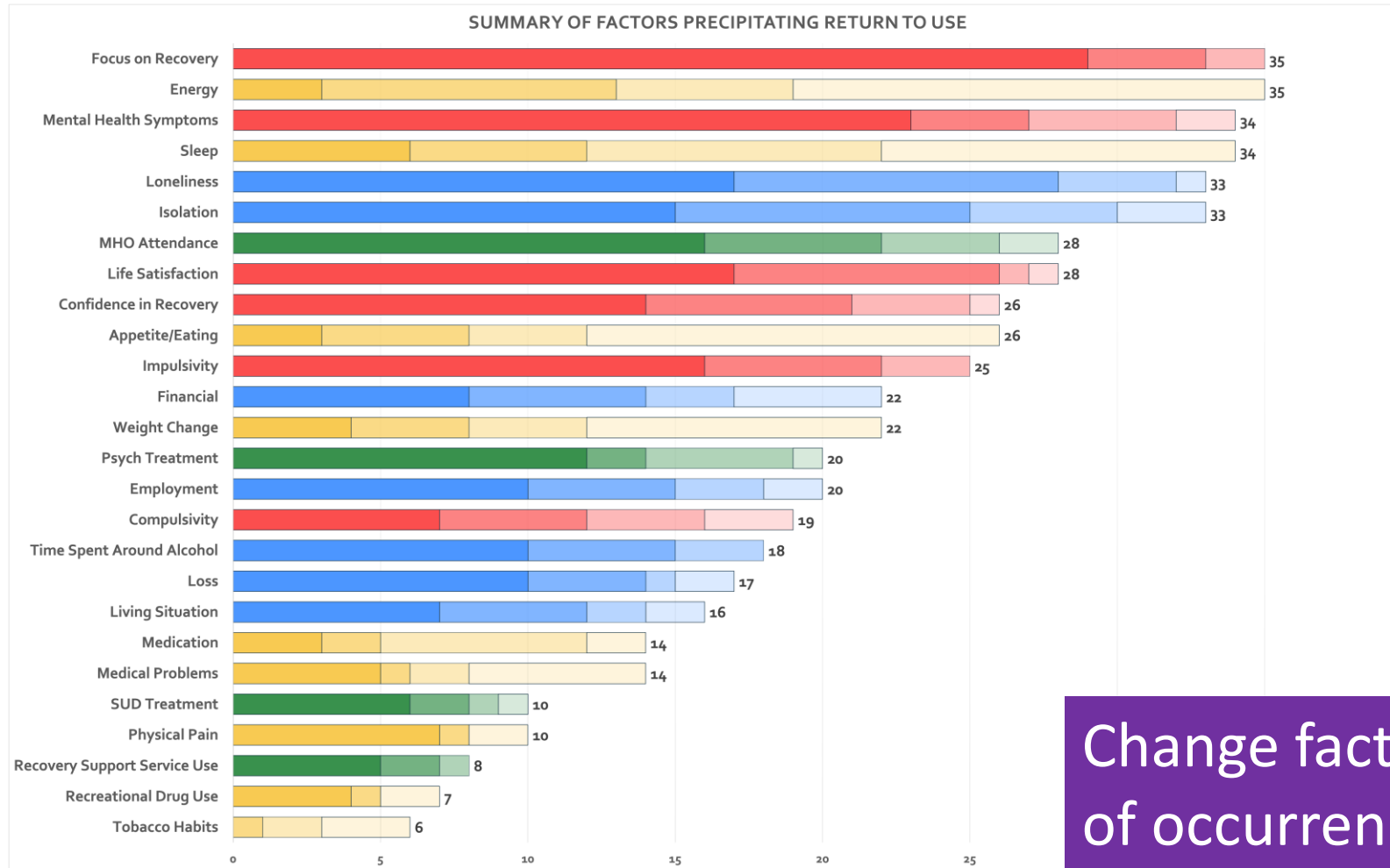
- **Relapse risk remains especially elevated for the first 5 yrs following FSR**
 - Relative to general population, incidence of alcohol/drug use disorder remains elevated for at least 5 years among people in FSR who've already had it
- **Models of Long-Term Disease Management Hindered**
 - hindered by lack of biomarkers that can be monitored during abstinence/low risk use that predict disorder recurrence
- **Little known about precursors of LTR**
 - Almost nothing known empirically about nature/timing, of bio-psycho-social risks that predict relapse following FSR despite persisting risk across first 5 yrs **Much theorized and documented about factors** involved in addiction relapse during the **early weeks and months** following a recovery attempt.
- Focus on **withdrawal - operant and classically conditioned “triggers”** (people, places, things, time of day/day of the week)



Kelly, JF Yeterian, JD In: McCrady and Epstein *Addictions: A comprehensive Guidebook*,
Oxford University Press (2013)

Results: Research Questions

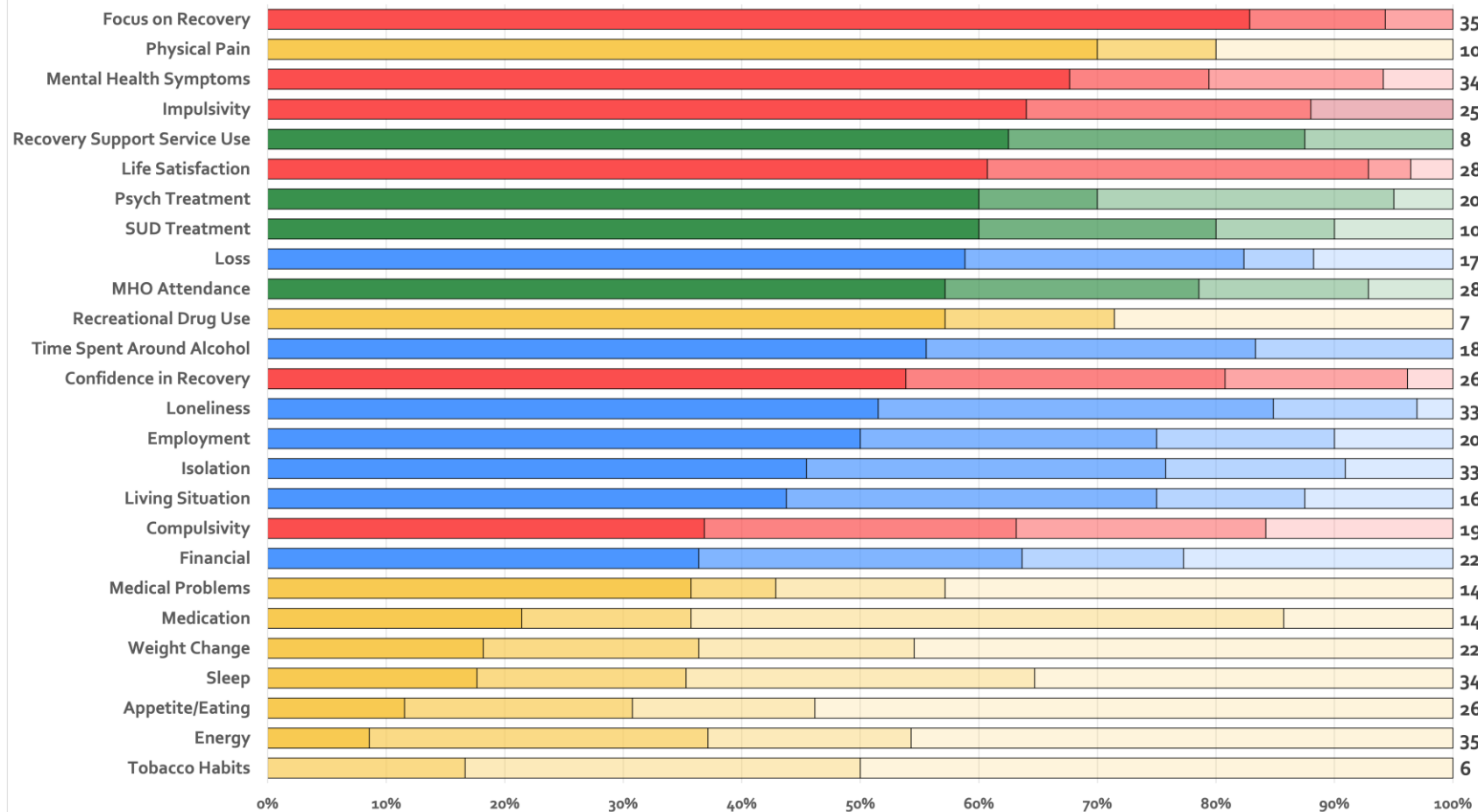
- 1. What are the commonly reported bio-psycho-social and health service use changes that occur in the year prior to a relapse following full sustained remission for individuals recovering from AUD and to what degree of certainty do such individuals attribute such changes as contributing to their relapse.
- 2. What is the nature and prevalence of the reported contributing relapse factors
- 3. When do such potential high-risk warning signs occur during the year prior to a long-term relapse.
- 4. What is the single most influential reported contributor of relapse among individuals in prior full sustained remission who have subsequently relapsed.



Change factors ranked by frequency of occurrence

■ Psychological
 ■ Social
 ■ Treatment & Recovery Services
 ■ Biological

FACTORS PRECIPITATING RETURN TO USE

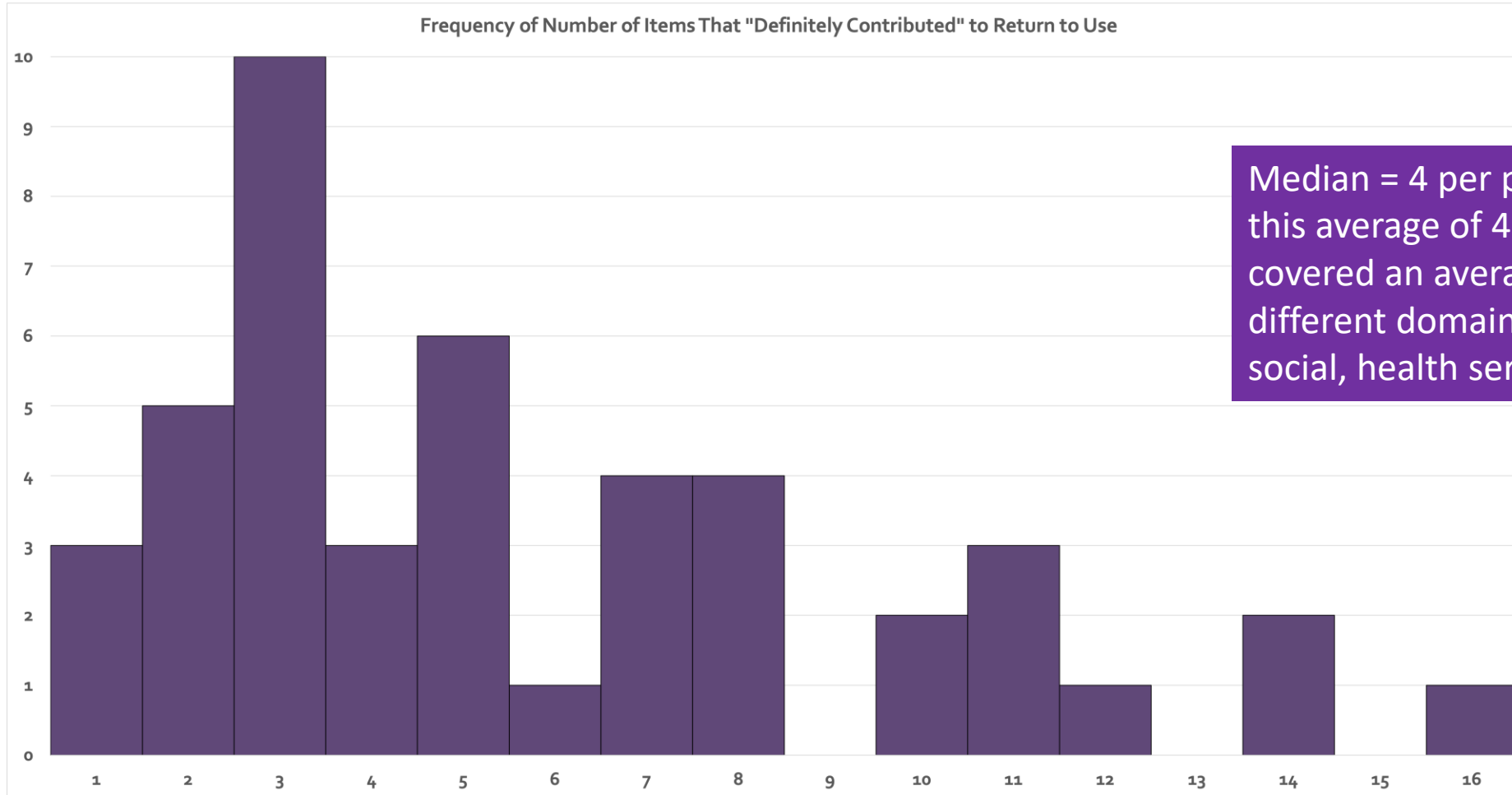


■ Psychological
 ■ Social
 ■ Treatment & Recovery Services
 ■ Biological

Change
 factors
 ranked by
 risk potency
 (degree to
 which they
 “definitely”
 contributed
 to relapse)

Results: Research Questions

- 1. What are the commonly reported bio-psycho-social and health service use changes that occur in the year prior to a relapse following full sustained remission for individuals recovering from AUD and to what degree of certainty do such individuals attribute such changes as contributing to their relapse.
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- 3. When do such potential high-risk warning signs occur during the year prior to a long-term relapse.
- 4. What is the single most influential reported contributor of relapse among individuals in prior full sustained remission who have subsequently relapsed.

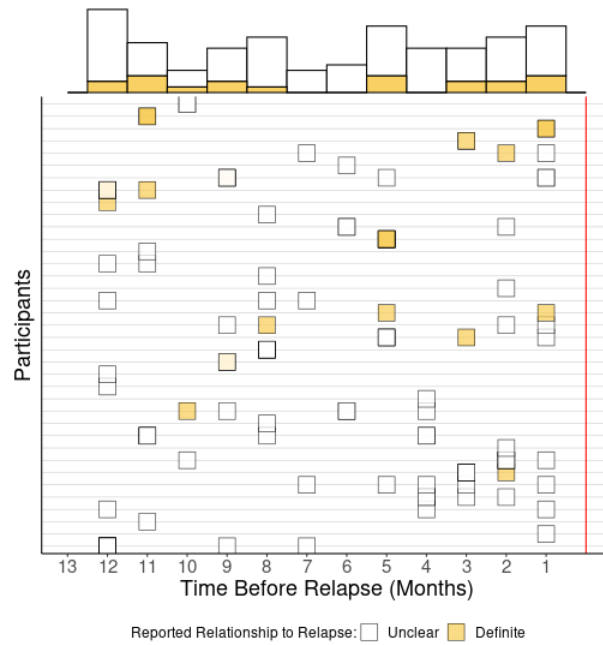


Median = 4 per person ($M=5.2$, $SD=4.05$) and this average of 4 definitely contributing factors, covered an average mean=2.3 ($SD=1.17$) different domains (biological, psychological, social, health services)

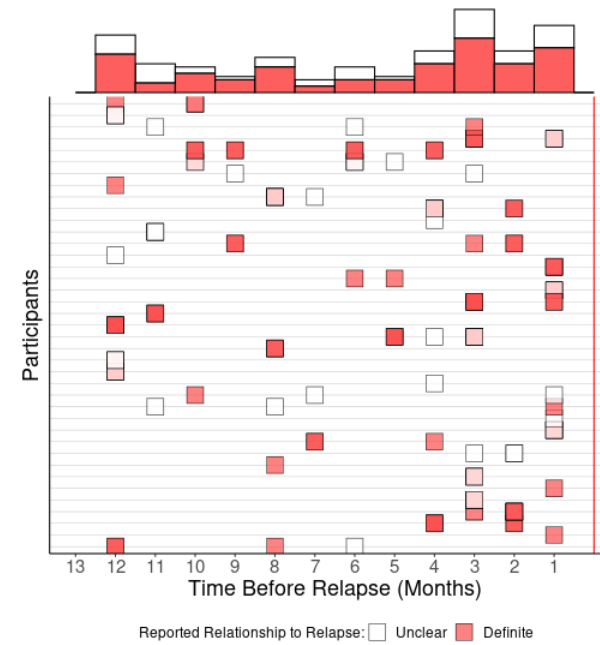
Results: Research Questions

- 1. What are the commonly reported bio-psycho-social and health service use changes that occur in the year prior to a relapse following full sustained remission for individuals recovering from AUD and to what degree of certainty do such individuals attribute such changes as contributing to their relapse.
- 2. What is the nature and prevalence of the reported contributing relapse factors
- 3. When do such potential high-risk warning signs occur during the year prior to a long-term relapse.
- 4. What is the single most influential reported contributor of relapse among individuals in prior full sustained remission who have subsequently relapsed.

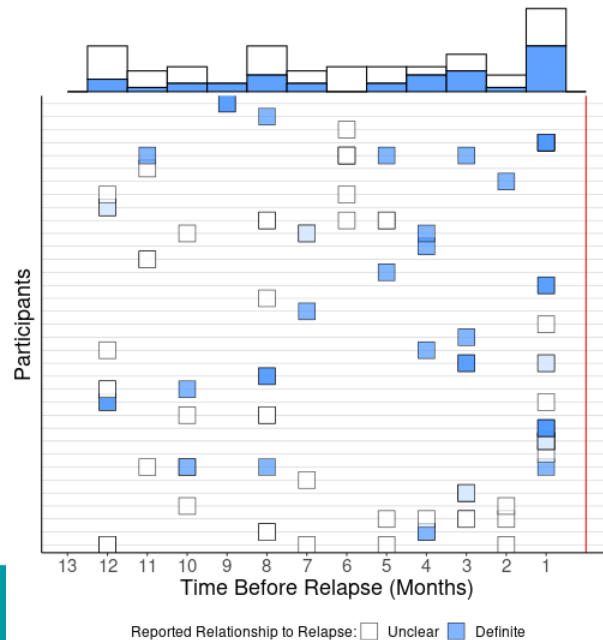
Biological Factors



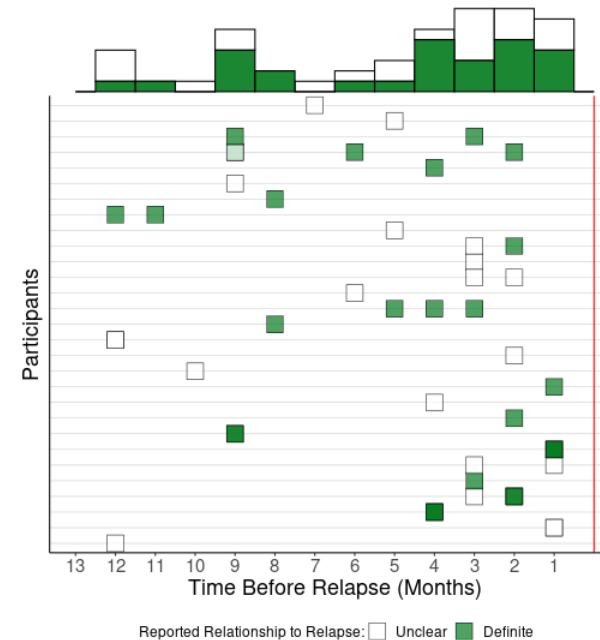
Psychological Factors



Social Factors



Recovery Service Factors

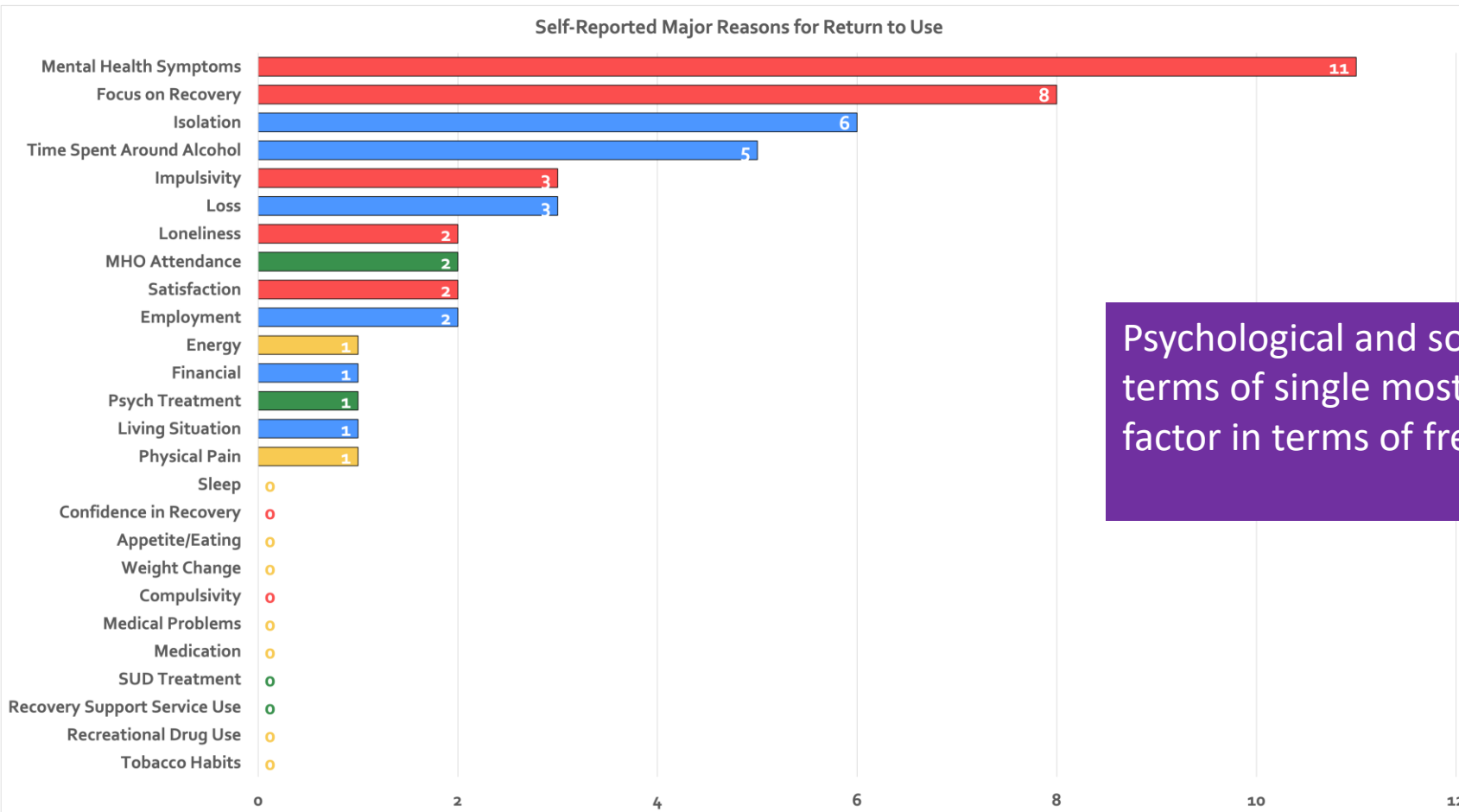


Marginal graphs show change in frequency of reported change factors across 12 months prior to relapse horizon - darker colors represent proportion that “definitely contributed” across the entire sample

Note: boxes represent factors reported to have changed in the year prior to relapse.
Darker boxes result from an overlap of multiple changes indicated on the same time point.

Results: Research Questions

- 1. What are the commonly reported bio-psycho-social and health service use changes that occur in the year prior to a relapse following full sustained remission for individuals recovering from AUD and to what degree of certainty do such individuals attribute such changes as contributing to their relapse.
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Psychological and social factors predominate in terms of single most definitely contributing factor in terms of frequency....

Implications

- Addiction recovery journeys **involve long-term accommodation and assimilation of many positive changes as well as many challenges** (eustress and distress).
- **Lack of awareness** of risk/risk potency, and **avoidant coping** or **inadequate coping/management** of bio-psycho-social and health services changes may present **destabilization markers** that may precipitate long-term relapse
- **As hypothesized**, the predominance of psychological and social change factors relative to physical/biological suggest **conceptual models** that help explain short-term relapse risk (classical conditioning/cue reactivity inducing craving) **may be better explained by stress and coping/self-regulation theories**
- **Temporal analysis** of cumulative risk across the year prior to the long-term relapse **suggest a crescendo towards the relapse horizon** but **some** factors that “definitely” contributed to relapse **begin as far as 12 months prior and across the year...**

Clinical Implications for Long-Term Disease Management

- **Checklist** for patients to complete prior to ongoing visits involved in long-term disease management
 - In addition to the great need for more research into this important clinical and public health area, the array of psychological, social, recovery health services, and biological factor changes that occurred in the year preceding long-term AUD relapse detected in this study, highlight several markers and potential mechanisms that could be incorporated into a **checklist** for patients to complete prior to ongoing visits involved in long-term disease management.
- **Checklist may serve as stimulus and foundation for broader clinical discussion...**
 - Such a list as those factors reported in this study the presence of one or more of which, could **alert a clinician to focused discussion and intervention; or otherwise, serve as a stimulus and foundation for broader clinical discussion about the need for continued AUD recovery focus** and successfully facing and addressing recovery and life course challenges that ultimately may help prevent further morbidity and mortality that can arise from AUD recurrence

APPENDIX I

POTENTIAL DISEASE MANAGEMENT AND MONITORING QUESTIONNAIRE FOR USE IN CLINICAL RESEARCH ON ALCOHOL USE DISORDER RECOVERY AND LONG-TERM RELAPSE BASED ON STUDY FINDINGS

Rate your level of agreement with the following statements about significant changes you may have experienced since your last appointment

Biological

	Not at all	A little bit	Moderately	Quite a bit	A lot
	0	1	2	3	4
I have been having problems with sleep.					
I have been experiencing changes in my energy levels.					
I have been having problems with appetite and/or eating habits.					
I have been experiencing significant weight changes.					
I have been suffering from chronic/ ongoing pain.					
I have been using recreation drugs to get high or change how I am feeling.					
I have been making changes in my use of tobacco (started using or quitting tobacco).					
I have been having physical health problems.					
My medications have changed.					

Psychological

	Not at all	A little bit	Moderately	Quite a bit	A lot
	0	1	2	3	4
I have been feeling more impulsive than usual					
I have been focusing less on my own recovery					
I have been feeling less confident I can sustain my recovery					
I have been feeling dissatisfied with my life					
I have been feeling more compulsive than usual					
I have been having trouble with mental health symptoms					

Social

	Not at all	A little bit	Moderately	Quite a bit	A lot
	0	1	2	3	4
I have been spending more time around alcohol.					
I have become more socially isolated.					
I have been feeling lonely.					
My employment situation has changed.					
I have been affected by the loss of someone close to me					

Such a clinical checklist might be deployed in long-term disease management (e.g., in recovery management check-ups)...

Limitations

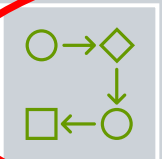
- Self-selecting sample, relatively small
- Recall bias/memory constructive meaning-making
- Relapse risk factors reported were many and several were potentially related to increasing risk within persons...
- underscoring a multifaceted and dynamic long-term relapse risk scenario involving multiple, likely intersecting, factors that warrant continued untangling in terms of their nature and temporal sequencing



How did we get here? A rationale for the new public health and scientific focus on addiction recovery and support services



Ingredients of recovery— facilitating access to the scaffolding, building materials, permits, and supportive environments



Recovery Process – Recovery milestones and their utility. Who needs what, when, for how long, at what intensity?



Recovery Milestones

- Initial 0-3m
- Early 4-12m
- Sustained 1-5yrs
- Stable 5+yrs



What do we know about recovery milestones and trajectories?

Relevant to
inform answers
to Questions
regarding
Treatment and
Recovery
Support
Services...

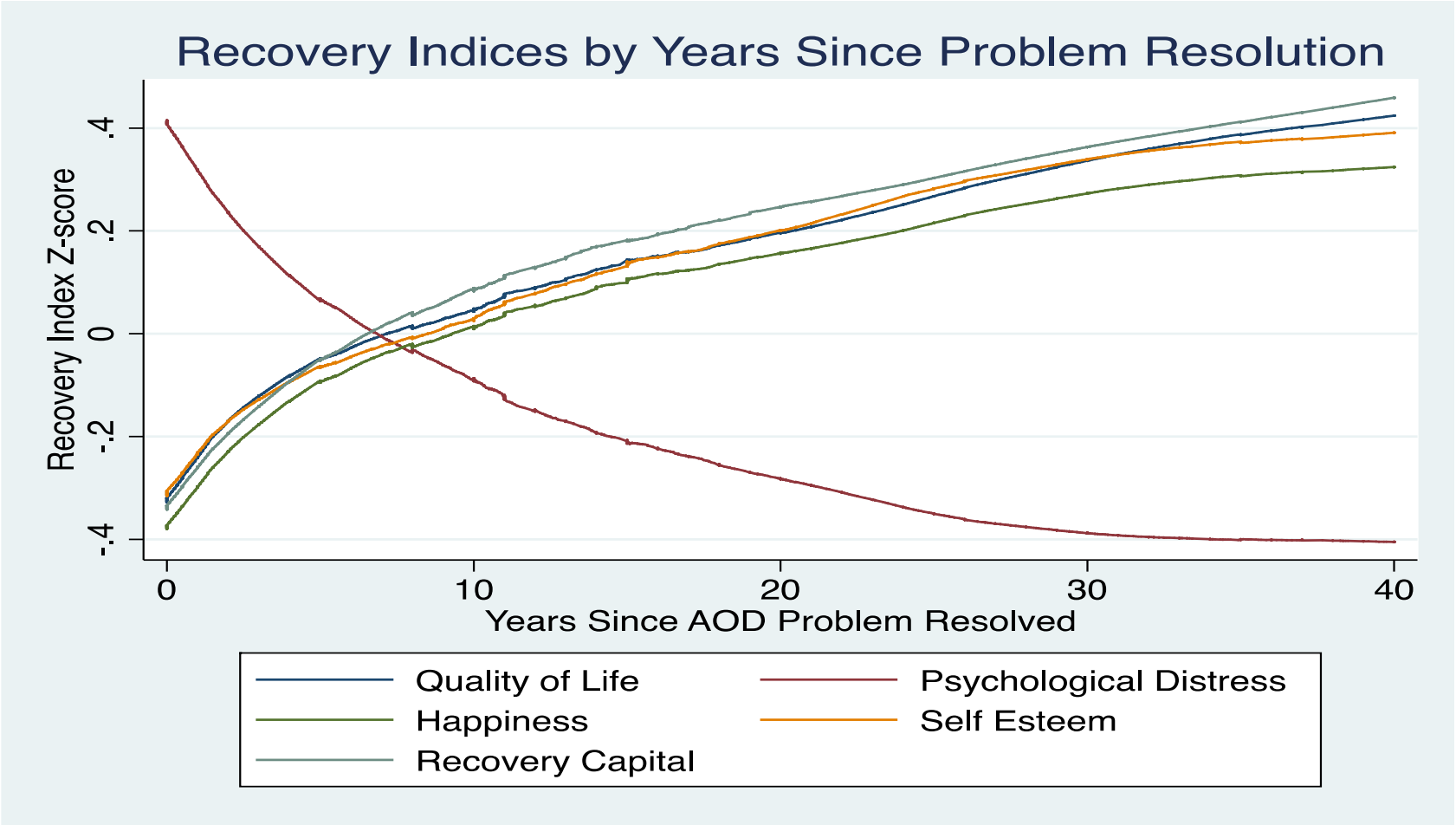
Who needs what type of service?

When in their recovery?

For what duration?

At what intensity?

40-Year Temporal Horizon of Recovery Trajectories



National
Recovery Study
(NRS)
N=2,002

Changes in Recovery Capital and Quality of life Among Different Primary Substance Groups in first 5 yrs of Recovery

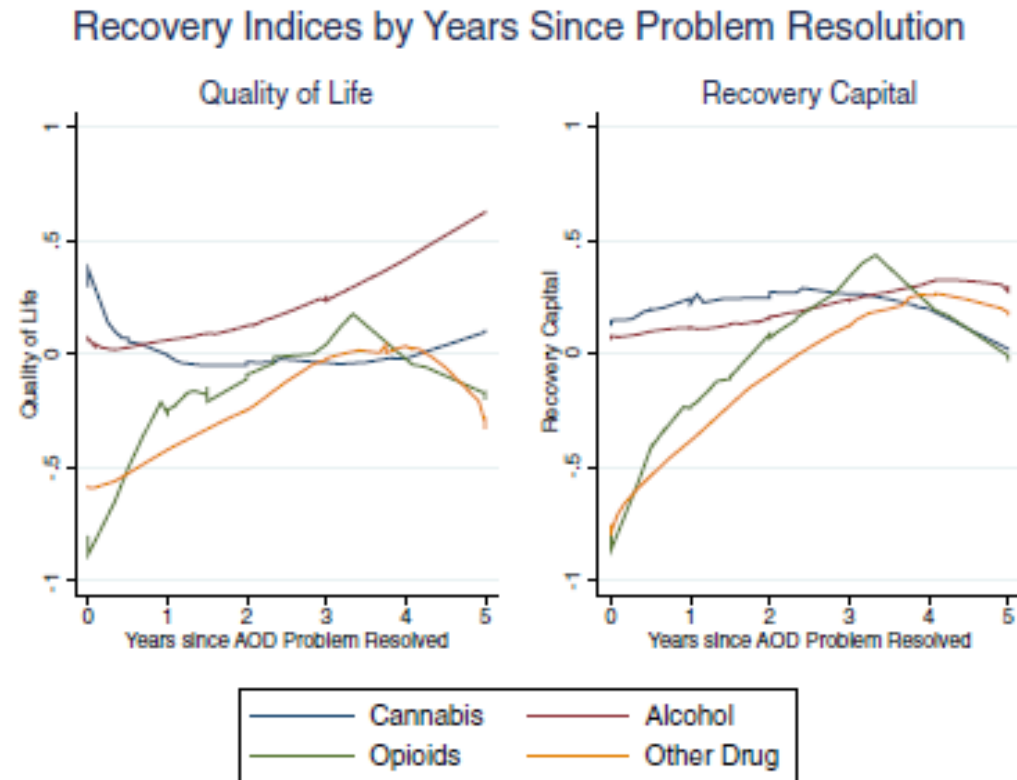
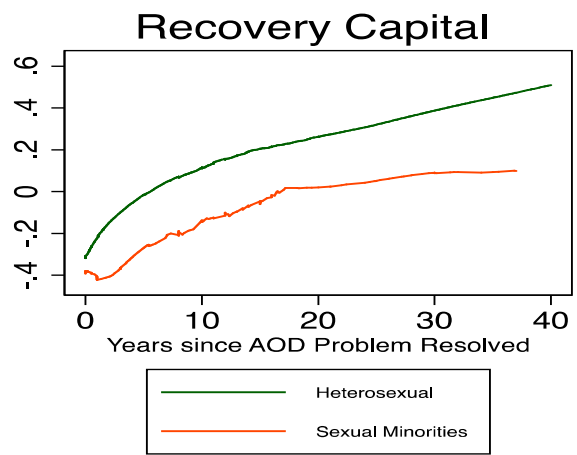
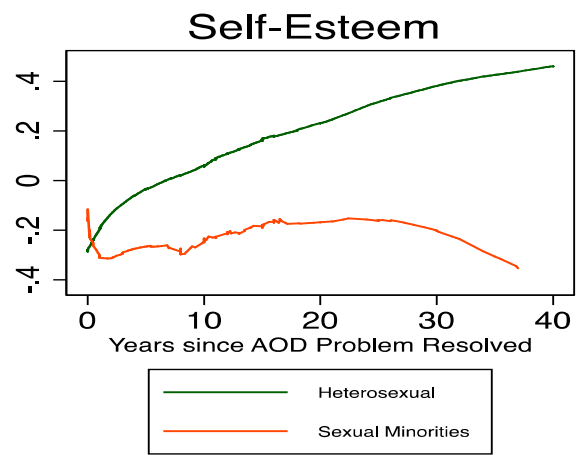
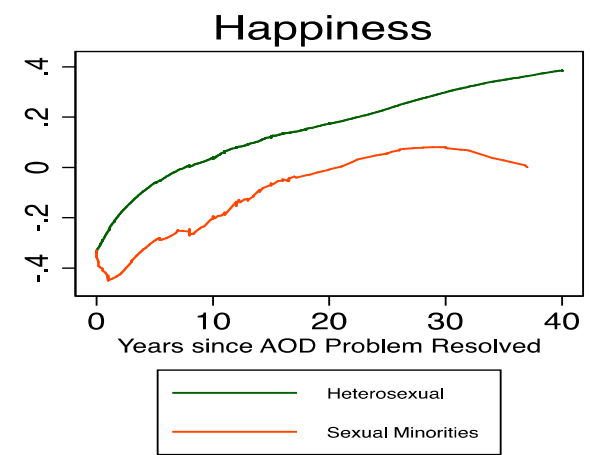
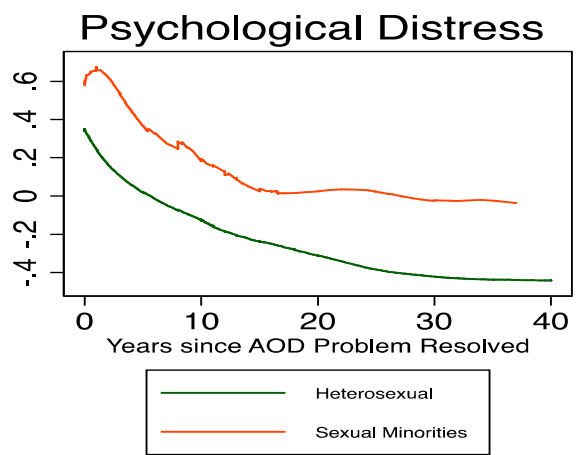
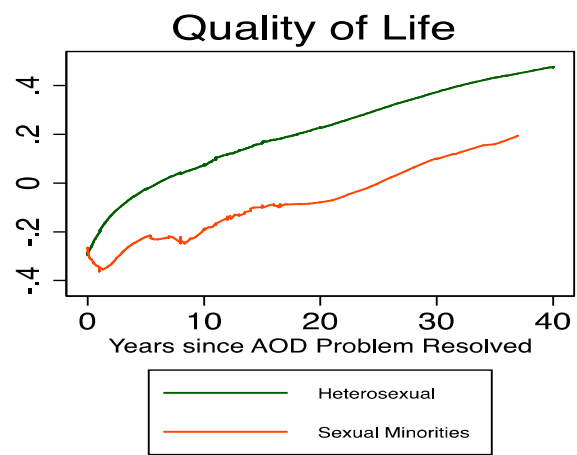
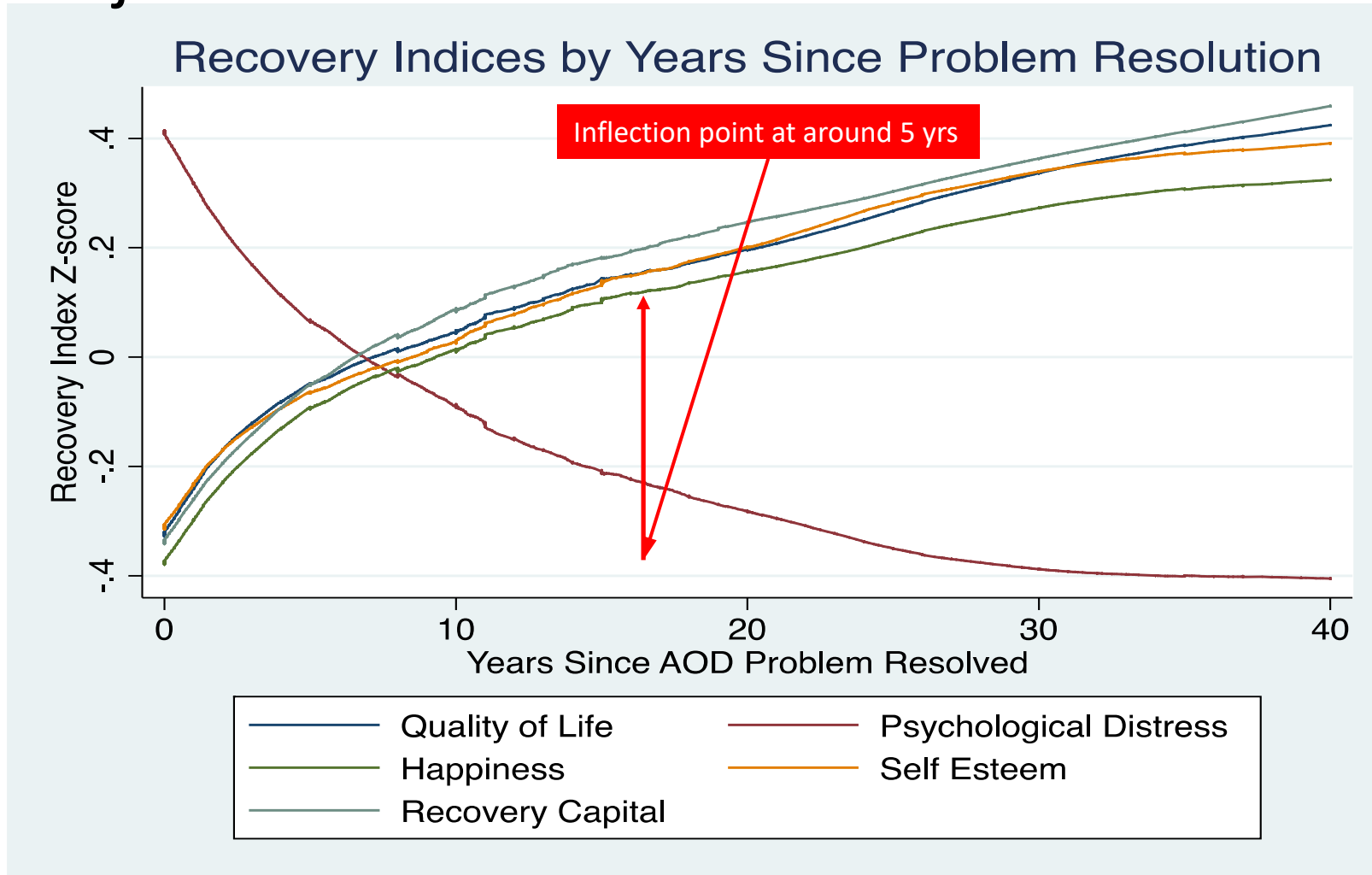


Fig. 5. Locally Weighted Scatterplot Smoothing (LOWESS) analysis of recovery indices by years since problem resolution stratified by primary substance.

Sexual Minority vs Heterosexual Status and Changes in Functional and

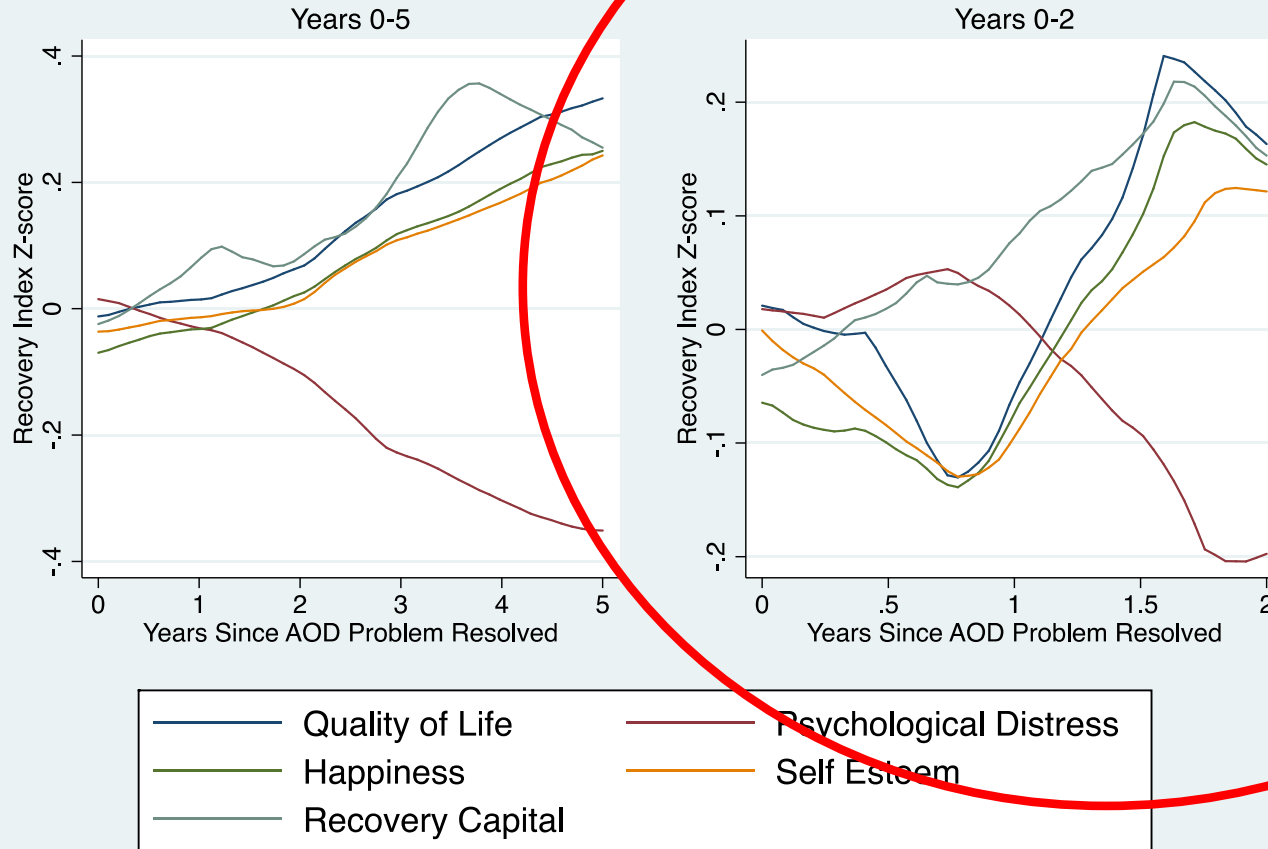


40-Year Temporal Horizon of Recovery Trajectories



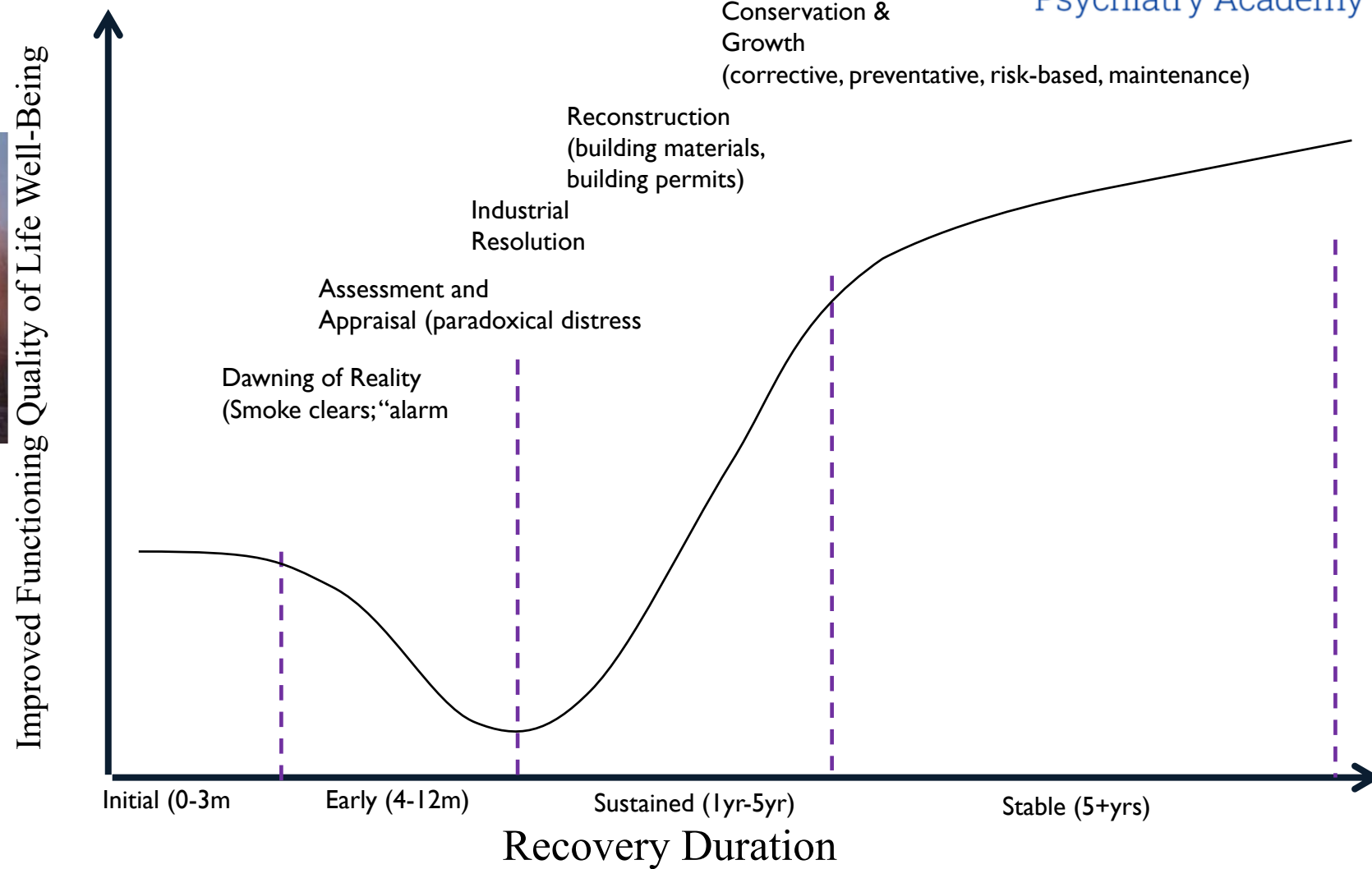
2-yr Year Temporal Horizon of Recovery Trajectories

Recovery Indices by Years Since Problem Resolution



Recovery Curve

Preliminary Data-Based Recovery Milestones and Tasks...



Connecting the Dots

Toward a Recovery-Oriented System of Care (ROSC)

A ROSC is a coordinated network of treatment and community-based services and supports that is person-centered and builds on the strengths and resiliencies of individuals, families, and communities to help achieve remission and improved health, wellness, and quality of life for those with or at risk of alcohol and drug problems

Thank you for your attention!

Contact Information

Dr. John Kelly, Ph.D., ABPP

Recovery Research Institute

Email: jkelly11@mgh.harvard.edu

X: @JohnKellyMGH

LinkedIn: Dr. John Kelly

Website: recoveryanswers.org

Email: info@recoveryanswers.org

X: @RecoveryAnswers

Instagram: @RecoveryAnswers

Facebook: @RecoveryAnswers

LinkedIn: Recovery Research