

Treating Addiction As A Chronic Disease

John F. Kelly, PhD, ABPP

Michael M. Davis Lecture, CHAS, University of Chicago, April 2018



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outline

From the “War on Drugs” to “The War on the War on Drugs”
Where are we now in addiction? From where have we come?

Shift toward Public Health approaches in addiction

Rationale for Addiction as Chronic Disease

Long-term Treatment and Recovery Support Services

1971



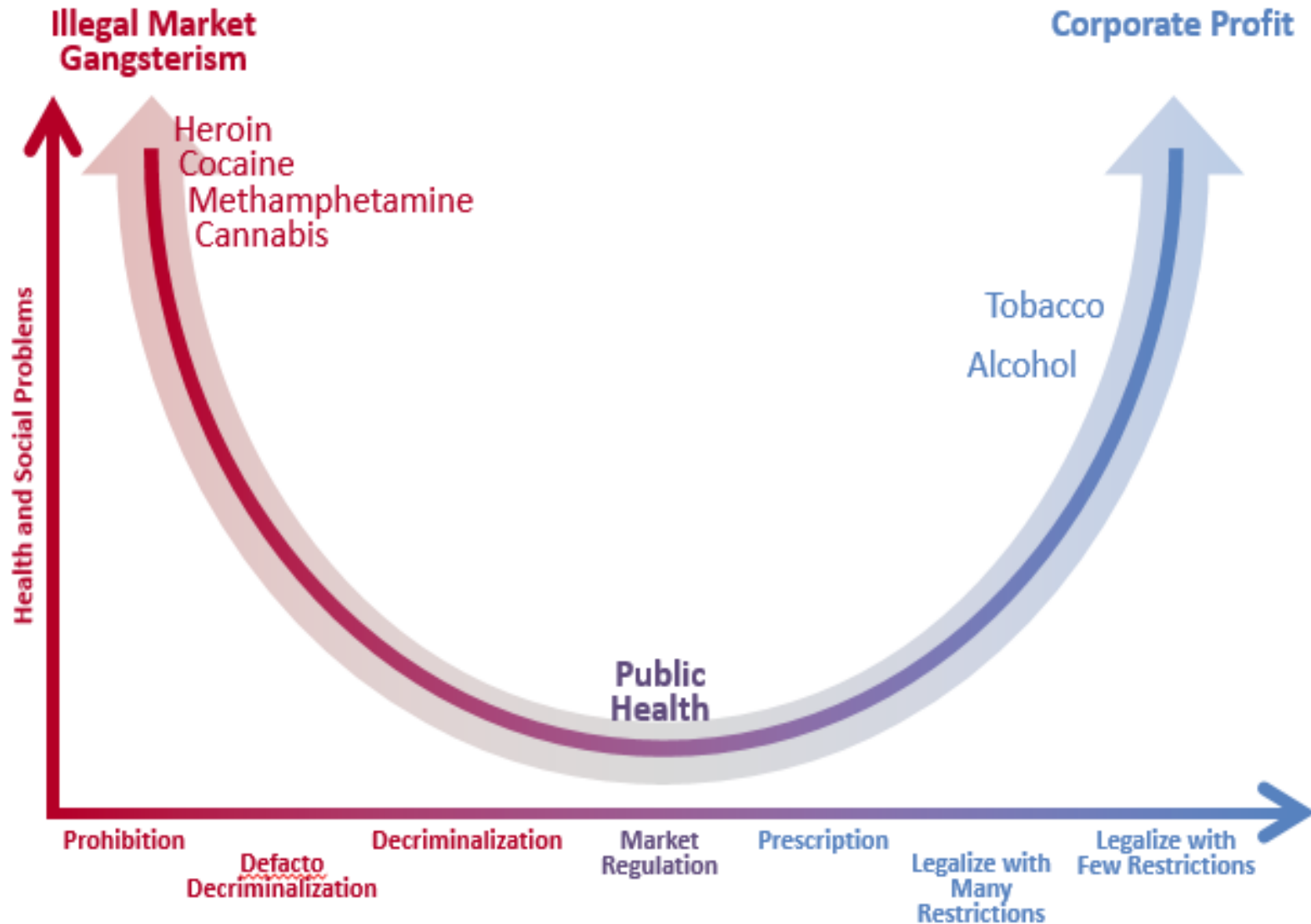
PUBLIC ENEMY NUMBER ONE
in the
United States

IS DRUG ABUSE



NIXON

Risks and Consequences with differing policies



From “the War on drugs”

to... the “war on the ‘war on drugs’ ”....

BUT... not just about interdiction, supply reduction, incarceration....

It signaled a concerted Federal focus on the “drug problem” which also produced included demand reduction ...

Quality control and supply reduction





NIDA

NATIONAL INSTITUTE

ON DRUG ABUSE



CSAT
Center for Substance
Abuse Treatment
SAMHSA

NSDUH Report

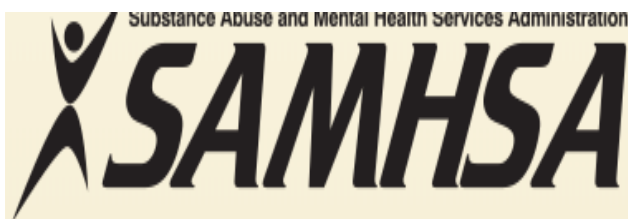


Youth Risk Behavior Survey

YRBS

NREPP

SAMHSA's National Registry of
Evidence-based Programs and Practices



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Statement of Elinore F. McCance-Katz, MD, PhD, Assistant Secretary for Mental Health and Substance Use regarding the National Registry of Evidence-based Programs and Practices and SAMHSA's new approach to implementation of evidence-based practices (EBPs)

Thursday, January 11, 2018

Reorganizational Plan No. 2

Creation of the Drug Enforcement Agency (DEA), consolidating a number of different entities to form a single federal agency to enforce government drug control policy.

Charitable Choice

Charitable choice allows direct U.S. government funding of religious organizations to provide substance use prevention & treatment.

Sober Truth on Preventing Underage Drinking Act (STOP Act)

Passed in 2006, the STOP act created a grant program to target underage drinking within communities & established the federal Interagency Coordinating Committee on the Prevention of Underage Drinking (ICCPUD) with high-level leadership from across 15 federal agencies to coordinate government efforts to address underage drinking.

Fair Sentencing Act

Passed in 2010, the act reduces the sentencing disparity between crack & powder cocaine from 100:1 to an 18:1 ratio.

Comprehensive Addiction & Recovery Act (CARA)

Passed in 2016, CARA increased access to overdose treatment, naloxone (overdose reversal medication), & medication assisted treatments (MAT), reauthorized an opioid treatment program for pregnant & postpartum women, & allocated money for creation of opioid epidemic response plans on the state level.

1973

1996

2006

2010

2016

The Last 50 Years in Addiction Laws

1970

1986-1988

2008

2010

Controlled Substances Act (CSA):

Part of the larger Comprehensive Drug Abuse Prevention & Control Act of 1970, the CSA established U.S. drug control policy & created 5 schedules (classifications) of drugs to determine the legality of a substance & corresponding legal ramifications.

Anti-Drug Abuse Act

1st passed in 1986, & then ammended in 1988, the act created the policy goal of a drug-free America, created the Office of National Drug Control Policy (ONDCP), changed the federal probation & release system from a rehabilitative to a punitive (punishment focused) model, enacted minimum mandatory sentencing for drug posession & distribution (100:1 crack/powder cocaine sentencing disparity), & prohibited controlled designer drugs.

Mental Health Parity & Addiction Equity Act (MHPAEA)

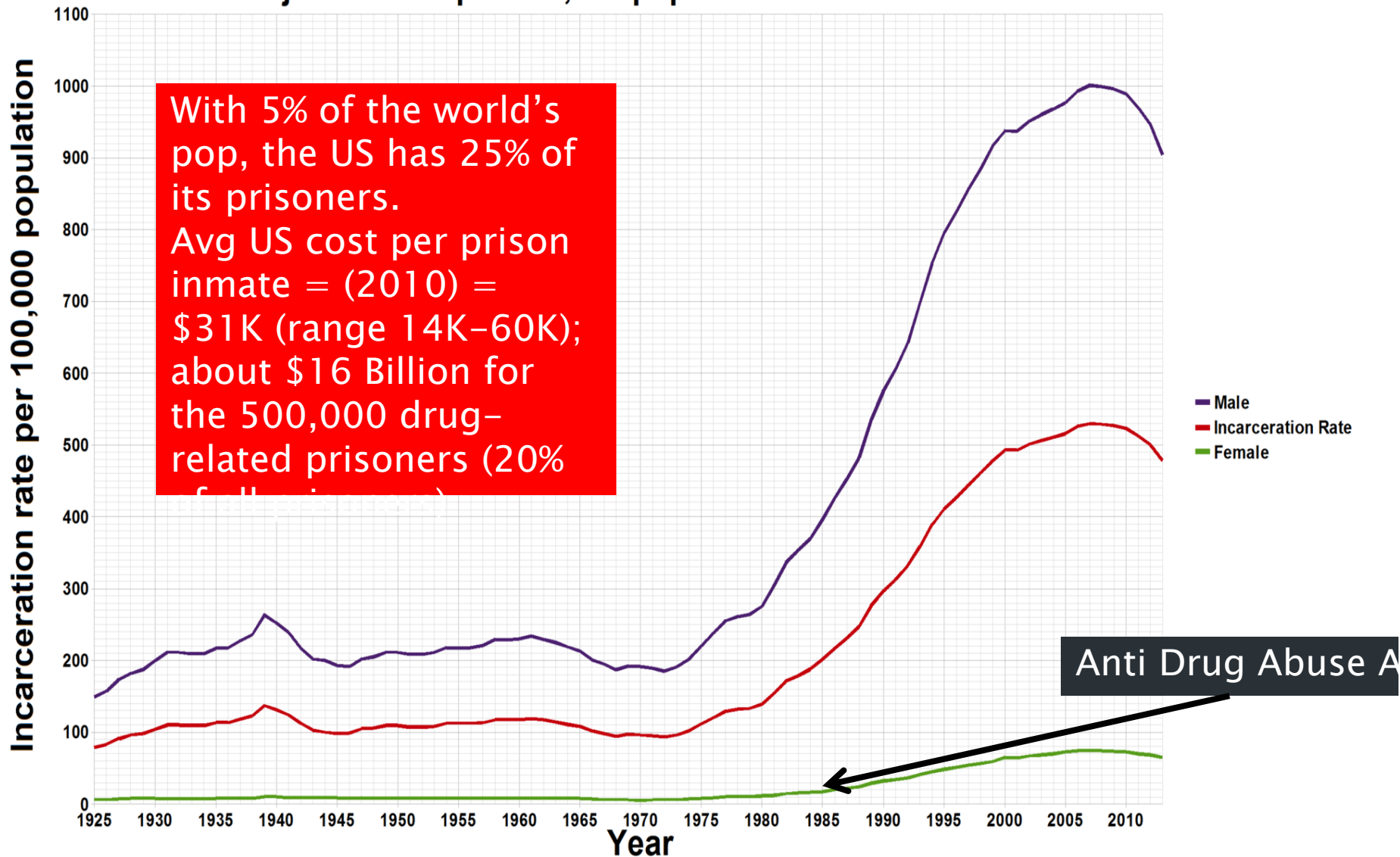
Enacted in 2008, the MHPAEA closed loopholes in the Mental Health Parity Act of 1996 by requiring insurance companies to offer coverage for mental & substance use disorders that is equal to the coverage or benefits offered for other medical or surgical care (e.g. deductibles, co-pays, out-of-pocket maximums, treatment limitations).

The Patient Protection & Affordable Care Act (ACA)

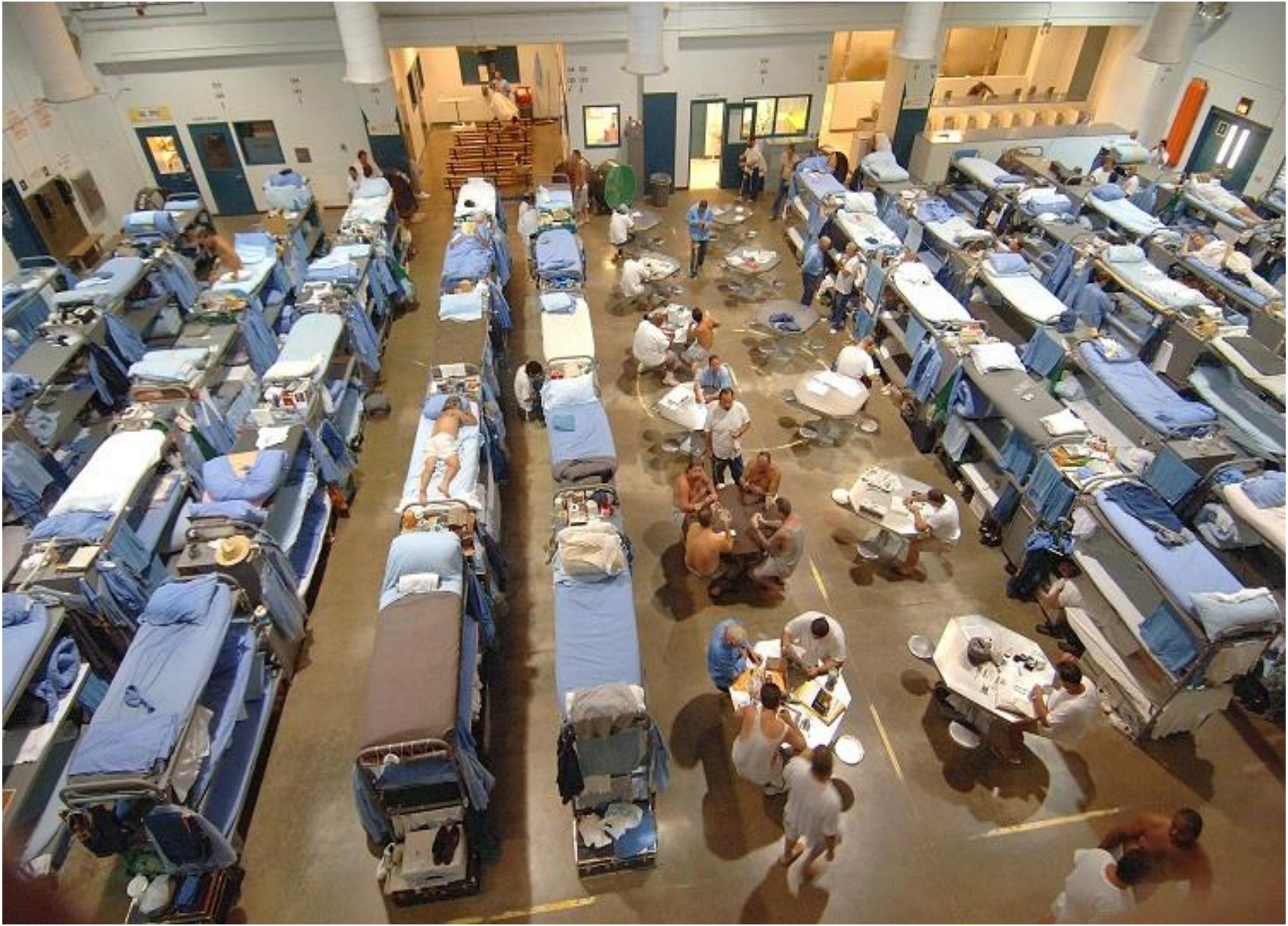
Healthcare legislation enacted in 2010, declared substance use disorders 1 of the 10 *elements of essential health benefits* in the U.S., requiring that Medicaid & all insurance plans sold on the *Health Insurance Exchange* provide services for addiction treatment equal to other medical procedures (closing insurance exemption gaps of the 2008 MHPAEA). Commonly referred to as the Affordable Care Act or "Obamacare".

2017

Incarceration rate of inmates incarcerated under state and federal jurisdiction per 100,000 population 1925-2013



Prisons overcrowding: 20% (500,000) of US prisoners are in prison due to drug offences; the majority of inmates meet criteria for substance use disorder/psych illness





BRIEFING ROOM

ISSUES

THE ADMINISTRATION

PARTICIPATE

1600 PENN



HOME - BLOG

ONDCP Hosts First-Ever Drug Policy Reform Conference

DECEMBER 11, 2013 AT 10:57 AM ET BY CAMERON HARDESTY



On Monday, Director Kerlikowske and Deputy Director... discussion at the White House on the future of drug policy... approximately 140 people attended to engage in a conference... hundreds more watched online. Limited video on demand...

2013 ONDCP Director Kerlikowske declares move away from “war on drugs” toward broader public health approach





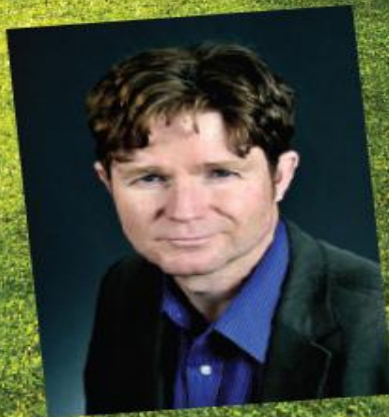
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Words matter



The words we use to describe drug and alcohol use disorders contribute to stigma around the conditions, psychologist John F. Kelly told attendees at a recent White House Conference on Drug Policy Reform.

Substance Use Disorder (SUD) may be most stigmatized condition around the world...

- ▶ Across 14 countries and 18 of the most stigmatized conditions... *(Centre for Social Research on Alcohol and Drugs)*
 - Illicit drug addiction ranked 1st
 - Alcohol addiction ranked 4th
- ▶ People hold more negative attitudes towards persons with SUD than mental illness. *(Barry et al., Psychiatric Services Journal)*
- ▶ People with SUD viewed as having themselves to blame for their disorder... *(Crisp et al., British Journal of Psychiatry)*
 - Only 7% rate people with schizophrenia in this way

Factors that influence stigma have language that is associated with them...

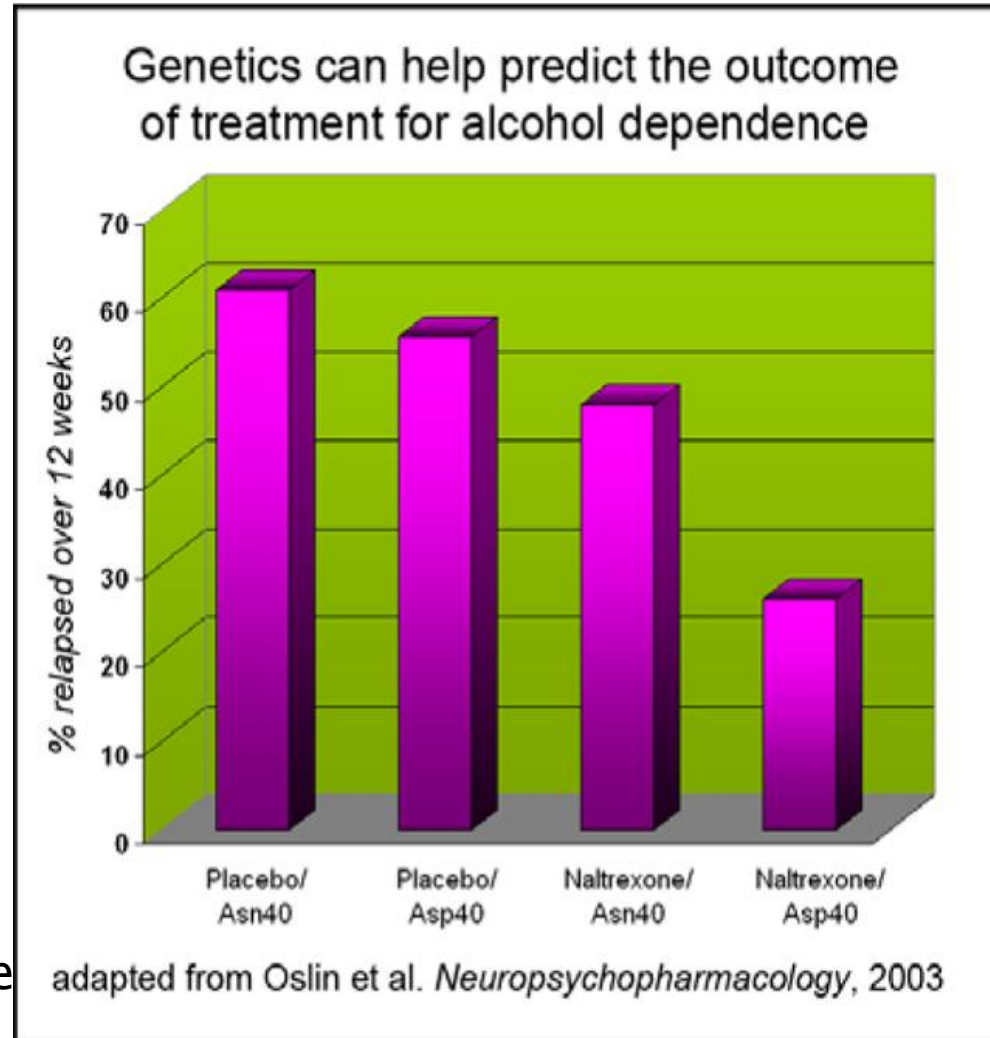
Cause	Controllability	Stigma
“It’s not their fault”	“They can’t help it”	Decreases
“It <u>is</u> their fault”	“They really <u>can</u> help it”	Increases

CAUSE: If drugs are so pleasurable, Why aren't we all addicted?

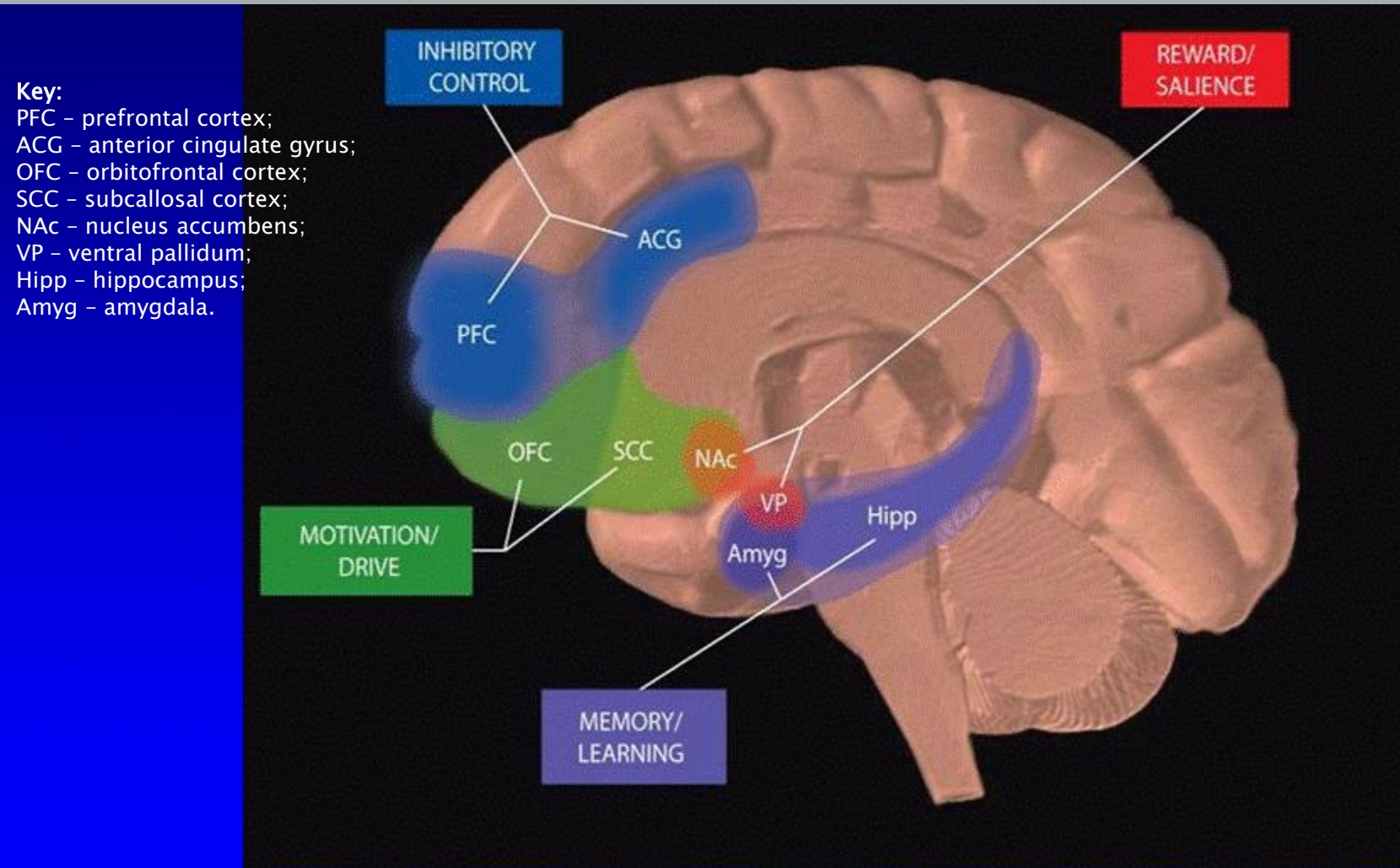
Genetically mediated Reward sensitivity...



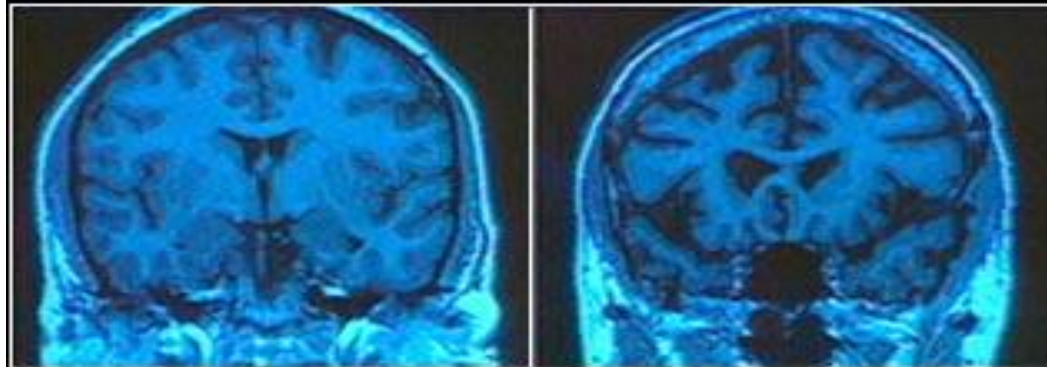
- Approx. 50% of the risk for addiction is genetic
- Genetic differences affect the degree of reward people experience from different substances/activities
- Genes also can be used to enhance the effectiveness in matching treatments



CONTROLLABILITY: Addiction is a result of neurological changes ...



All of these brain regions must be considered in developing strategies to effectively treat addiction



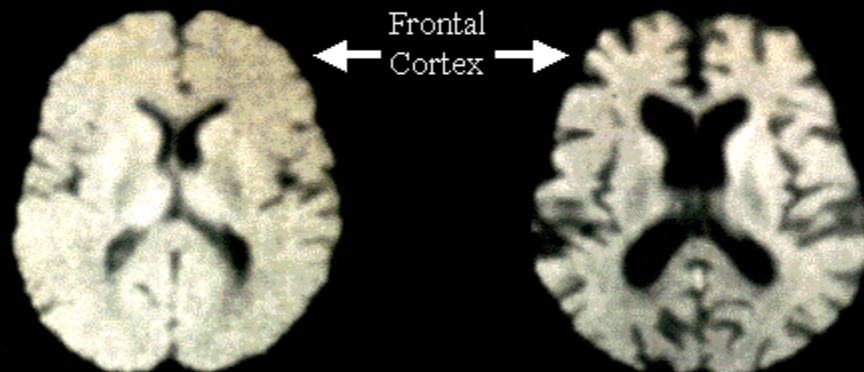
Normal
43-year-old

Alcoholic
43-year-old

HUMAN BRAIN IMAGES

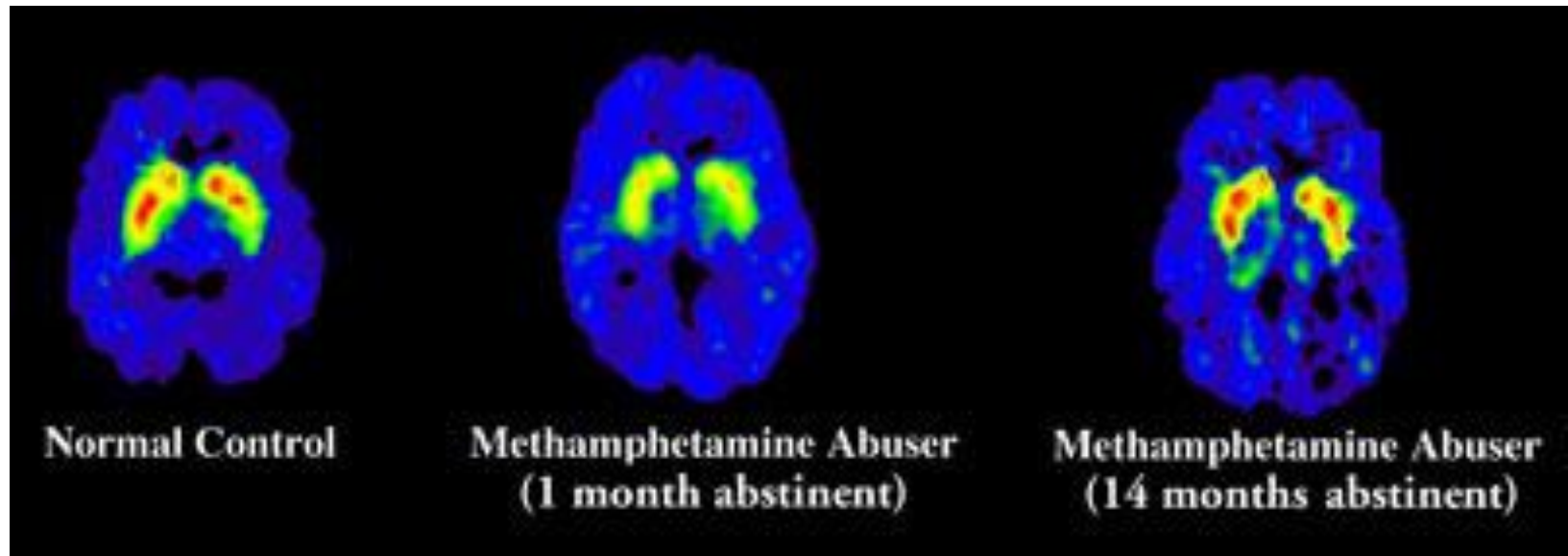
Moderate Drinker

Alcoholic



Axial magnetic resonance images from a healthy 57-year-old man (left) and a 57-year-old man with a history of alcoholism (right). D. Pfefferbaum

A disease of the brain, from which most people will recover....



Language and Terminology Considerations in Addiction

- ▶ The language we use reflects and influences our policies and approaches to addiction
- ▶ Different terms convey different meanings and can affect perceptions cause and controllability, punishment or treatment
- ▶ Goes beyond mere “political correctness”
- ▶ Can implicitly affect judgment that can perpetuate stigma/discrimination against addicted individuals



People with eating-related conditions are always referred to as “having an eating disorder”, never as “food abusers”.



So why are people with substance-related conditions referred to as “substance abusers” and not as “having a substance use disorder”?

What can we do about stigma and discrimination in addiction?

- ▶ Education about essential nature of these conditions; but also stress that treatment and recovery supports help sustain remission, and a majority of people make full recoveries and have productive lives
- ▶ Personal witness (putting a face and voice on recovery)
- ▶ Change our language/terminology to be consistent with the nature of the condition and the policies we wish to implement to address it

Two commonly used terms...

- Major policy approaches (“war on drugs” vs. public health approaches) has corresponding rhetoric.
- Referring to someone as...
 - **“a substance abuser”** – implies **willful misconduct** (it is their fault and they can help it); because people are choosing to do it they should be **punished**
 - **“having a substance use disorder”** – implies a **medical malfunction** (it’s not their fault and they cannot help it) people are choosing NOT to do it but still do it (using AGAINST their will) they should be **treated**
 - But, does it really matter how we refer to people with these (highly stigmatized) conditions?
 - Can’t we just dismiss this as a well-meaning point, but merely “semantics” and “political correctness”?

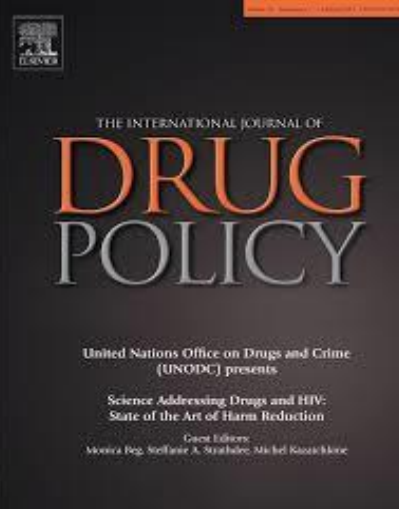
How we talk and write about these conditions and individuals suffering them does matter



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Research paper

Does it matter how we refer to individuals with substance-related conditions? A randomized study of two commonly used terms[☆]

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ABSTRACT

Objective: Stigma is a frequently cited barrier to help-seeking for many with substance-related conditions. Common ways of describing individuals with such problems may perpetuate or diminish stigmatizing attitudes yet little research exists to inform this debate. We sought to determine whether referring to an individual as “a substance abuser” vs. “having a substance use disorder” evokes different judgments about behavioral self-regulation, social threat, and treatment vs. punishment.

Method: A randomized, between-subjects, cross-sectional design was utilized. Participants were asked to read a vignette containing one of the two terms and to rate their agreement with a number of related statements. Clinicians ($N=516$) attending two mental health conferences (63% female, 81% white, M age 51; 65% doctoral-level) completed the study (71% response rate). A Likert-scaled questionnaire with three subscales [“perpetrator-punishment” ($\alpha=.80$); “social threat” ($\alpha=.86$); “victim-treatment” ($\alpha=.64$)] assessed the perceived causes of the problem, whether the character was a social threat, able to regulate substance use, and should receive therapeutic vs. punitive action.

Results: No differences were detected between groups on the social threat or victim-treatment subscales. However, a difference was detected on the perpetrator-punishment scale. Compared to those in the “substance use disorder” condition, those in the “substance abuser” condition agreed more with the notion that the character was personally culpable and that punitive measures should be taken.

Conclusions: Even among highly trained mental health professionals, exposure to these two commonly used terms evokes systematically different judgments. The commonly used “substance abuser” term may perpetuate stigmatizing attitudes.

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“Substance Abuser”

Mr. Williams is a substance abuser and is attending a treatment program through the court. As part of the program Mr. Williams is required to remain abstinent from alcohol and other drugs. He has been compliant with program requirements, until one month ago, when he was found to have two positive urine toxicology screens which revealed drug use and a breathalyzer reading which revealed alcohol consumption. Within the past month there was a further urine toxicology screen revealing drug use. Mr. Williams has been a substance abuser for the past few years. He now awaits his appointment with the judge to determine his status.

“Substance Use Disorder”

Mr. Williams has a substance use disorder and is attending a treatment program through the court. As part of the program Mr. Williams is required to remain abstinent from alcohol and other drugs. He has been compliant with program requirements, until one month ago, when he was found to have two positive urine toxicology screens which revealed drug use and a breathalyzer reading which revealed alcohol consumption. Within the past month there was a further urine toxicology screen revealing drug use. Mr. Williams has had a substance use disorder for the past few years. He now awaits his appointment with the judge to determine his status.

Compared to those in the “substance use disorder condition”, those in the “substance abuser” condition agreed with the idea that the individual was personally culpable and more in need of punishment

DOES OUR CHOICE OF SUBSTANCE-RELATED TERMS INFLUENCE PERCEPTIONS OF TREATMENT NEED? AN EMPIRICAL INVESTIGATION WITH TWO COMMONLY USED TERMS

JOHN F. KELLY, SARAH J. DOW, CARA WESTERHOFF

Substance-related terminology is often a contentious topic because certain terms may convey meanings that have stigmatizing consequences and present a barrier to treatment. Chief among these are the labels, "abuse" and "abuser." While intense rhetoric has persisted on this topic, little empirical information exists to inform this debate. We tested whether referring to an individual as "a substance abuser (SA)" versus "having a substance use disorder" (SUD) evokes different judgments about treatment need, punishment, social threat, problem etiology, and self-regulation. Participants (N = 314, 76% female, 81% White, M age 38) from an urban setting completed an online 35-item assessment comparing two individuals labeled with these terms. Dependent t-tests were used to examine subscale differences. Compared to the SUD individual, the SA was perceived as engaging in willful misconduct, a greater social threat, and more deserving of punishment. The "abuser" label may perpetuate stigmatizing attitudes and serve as a barrier to help-seeking.

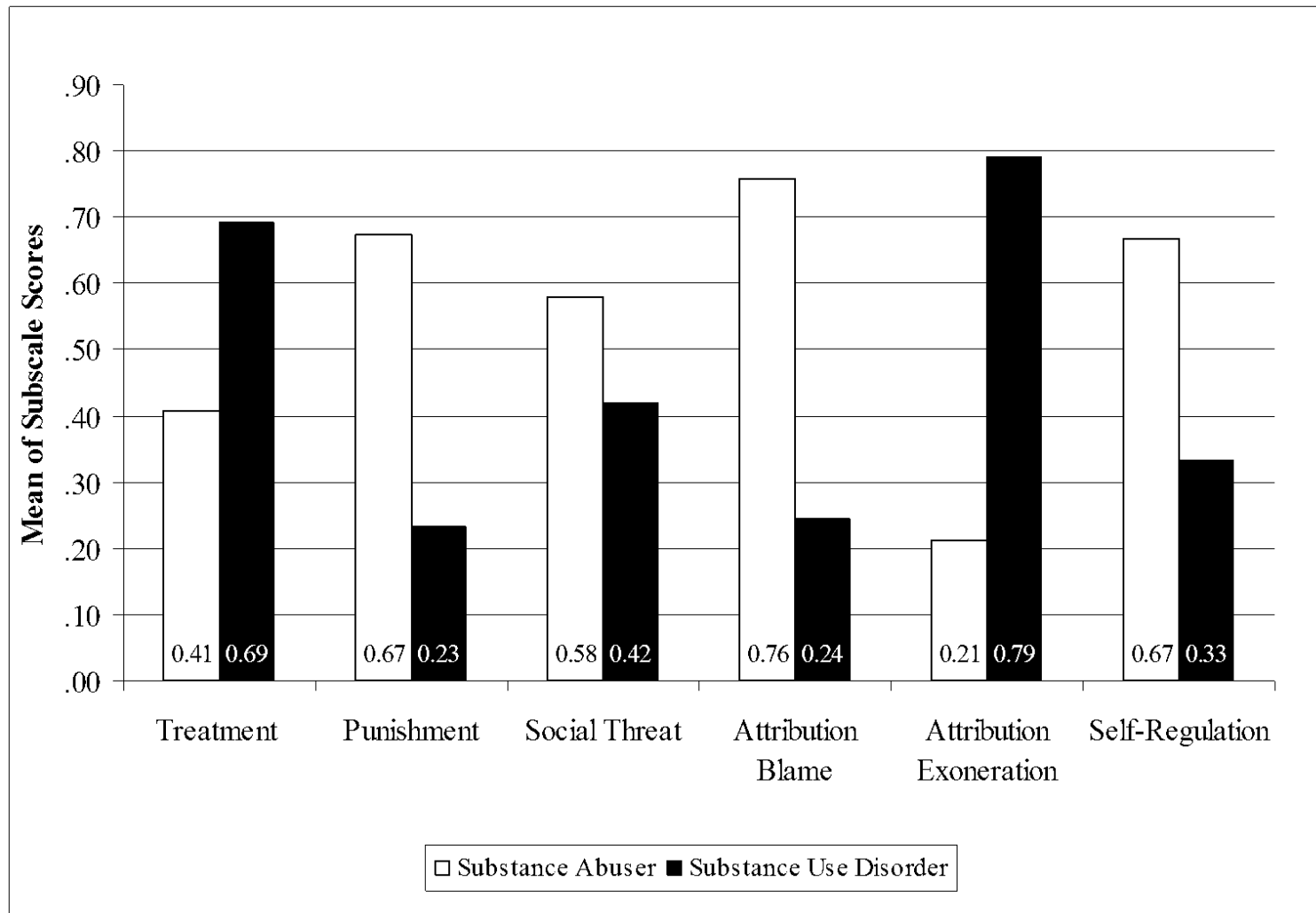


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The Journal of Drug Issues provides a forum for the most current, relevant, and original research on drug use, abuse, and addiction, as well as the social, legal, and policy issues surrounding drug use and abuse.

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DOI: 10.1007/s12631-010-9100-0

Figure 1. Subscales comparing the “substance abuser” and “substance use disorder” descriptive labels



Kelly, JF, Dow, SJ, Westerhoff, C. Does our choice of substance-related terms influence perceptions of treatment need? An empirical investigation with two commonly used terms (2010) *Journal of Drug Issues*

Implications

- Even well-trained doctoral clinicians judged *same individual* differently and *more punitively depending* on to *which term* they were exposed
- **Use of the “abuser” term may activate an implicit cognitive bias** that perpetuates stigmatizing attitudes – these could have broad stroke societal ramifications for treatment/funding
- Let’s learn from our colleagues treating allied disorders: Individuals with “eating-related conditions” are uniformly described as “having an eating disorder” NEVER as “food abusers”
- Referring to individuals as suffering from “substance use disorders” is likely to diminish stigma and may enhance treatment and recovery

Kelly JF, Westerhoff C. Does it matter how we refer to individuals with substance-related problems? A randomized study with two commonly used terms. *Int J Drug Policy*, 21 (2010), pp. 202–207

Kelly JF, Dow SJ, Westerhoff C. Does our choice of substance-related terms influence perceptions of treatment need? An empirical investigation with two commonly used terms *J Drug Issues*, 40 (2010), pp. 805–818

Stop talking dirty

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AJM

Stop Talking 'Dirty': Clinicians, Language, and Quality of Care for the Leading Cause of Preventable Death in the United States

A patient with diabetes has “an elevated glucose” level. A patient with cardiovascular disease has “a positive exercise tolerance test” result. A clinician *within* the health care setting addresses the results. An “addict” is not “clean”—he has been “abusing” drugs and has a “dirty” urine sample. Someone *outside* the system that cares for all other health conditions addresses the results. In the worst case, the drug use is addressed by incarceration.

On December 9, 2013, the first ever national drug policy reform summit was held at the White House. A major thrust of this summit was to mark a philosophical shift away from the “war on drugs” and toward a broader public health approach. Much of the summit was devoted to addressing the stigma surrounding addiction and the under-recognized importance of language.

Stigma is defined as an attribute, behavior, or condition that is socially discrediting. It is important because of the 23 million Americans who meet criteria for a substance use disorder each year, only 10% access treatment, and stigma is a major barrier to seeking help.¹ A World Health Organization study of the 18 most stigmatized social problems (including criminal behavior) in 14 countries found that drug addiction was ranked number 1, and alcohol addiction was ranked number 4.²

despite harmful consequences. Yet, despite evidence of a strong causal role for genetics and impairment in inhibitory control, stigma is alive and well. Research is now revealing that one contributory factor to the perpetuation of stigma may be the type of language we use.

Use of the more medically and scientifically accurate “substance use disorder” terminology is linked to a public health approach that captures the medical malfunction inherent in addiction. Use of this term may decrease stigma and increase help-seeking. In contrast, tough, punitive, language, including the word “war,” in “war on drugs,” is intended to send an uncompromising message, “You use, you lose,” in the hopes of deterring drug involvement. Accompanying this aggressive rhetoric are terms such as drug “abuse” and drug “abusers,” implying willful misconduct (ie, “they *can* help it and it *is* their fault”). This language increases stigma and reduces help-seeking.

Since the 1970s, such language has become the norm. Even our federal health institutions that address addictions have the term “abuse” in their names (eg, National Institute on Drug Abuse), and their materials often refer to affected individuals as substance “abusers.” But, does it really matter what we call it? Rhetorical opposition has persisted regarding the use of stigmatizing language, but there was


- ▶ Avoid
“dirty,”
“clean,”
“abuser”
 - “Negative urine” test for drugs

International Society of Addiction Journal Editors Budapest Consensus Statement adopted Sept 2015

iCloud x ISAJE Meetings 2015 x Screenshot windows - Google x

www.parint.org/isajewebsite/terminology.htm

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ADDICTION TERMINOLOGY STATEMENT

The International Society of Addiction Journal Editors recommends against the use of terminology that can stigmatize people who use alcohol, drugs, other addictive substances or who have an addictive behavior.

Rationale: Terms that stigmatize can affect the perception and behavior of patients/clients, their loved ones, the general public, scientists, and clinicians (Broyles et al., 2014; Kelly, Dow & Westerhoff, 2010; Kelly, Wakeman & Saitz, 2015). For example, Kelly and Westerhoff (2010) found that the terms used to refer to individuals with substance-related conditions affected clinician perceptions. Clinicians who read a clinical vignette about “abuse” and an “abuser” agreed more with notions of personal culpability and an approach that involved punishment than did those who read an identical vignette that replaced “abuse” and “abuser” with “substance use disorder” and “person with a substance use disorder.”

ISAJE is aware that terminology in the addiction field varies across cultures and countries and over time. It is thus not possible to give globally relevant recommendations about the use or non-use of specific terms. “Abuse” and “abuser” or equivalent words in other languages should, however, in general be avoided, unless there is particular scientific justification (an example of scientific justification of the use of “abuse” is when referring to a person who meets criteria for a Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, alcohol abuse; that person would be said to have “alcohol abuse”). Another example of stigmatizing language is describing people as “dirty” (or “clean”) because of a urinalysis that finds the presence (or absence) of a drug (Kelly, Wakeman & Saitz, 2015). Instead, the test results and clinical condition should be described.

The above was approved by the International Society of Addiction Journal Editors at its 2015 annual meeting (Budapest, Hungary, August 31-September 2, 2015).

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Broyles, L. M., Binswanger, I. A., Jenkins, J. A., Finnell, D. S., Faseru, B., Cavaola, A., Pugatch, M., & Gordon, A. J. (2014). Confronting inadvertent stigma and pejorative language in addiction scholarship: A recognition and response. *Substance Abuse*, 35, 217–221.

Kelly, J. F., Dow, S. J., & Westerhoff, C. (2010). Does our choice of substance-related terms influence perceptions of treatment need? An empirical investigation with two commonly used terms. *Journal of Drug Issues*, 40, 805–818.

Kelly, J. F., Wakeman, S. E., & Saitz, R. (2015). Stop talking 'dirty': Clinicians, language, and quality of care for the leading cause of preventable death in the United States. *American Journal of Medicine*, 128, 8–9.

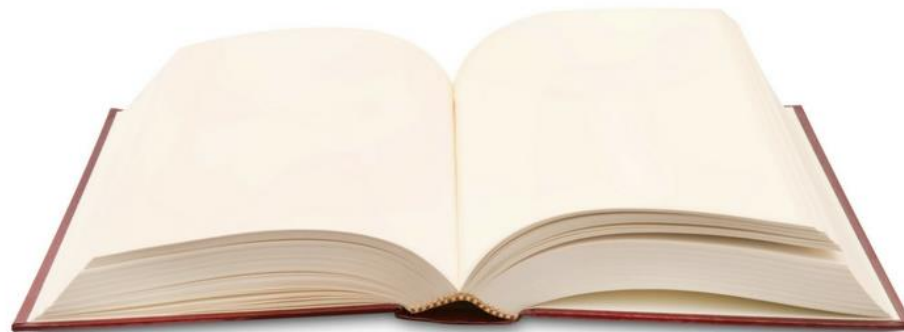
Kelly, J. F., & Westerhoff, C. M. (2010). Does it matter how we refer to individuals with substance-related problems? A randomized study with two commonly used terms. *International Journal of Drug Policy*, 21, 202–207.

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ADDICTION-ARY

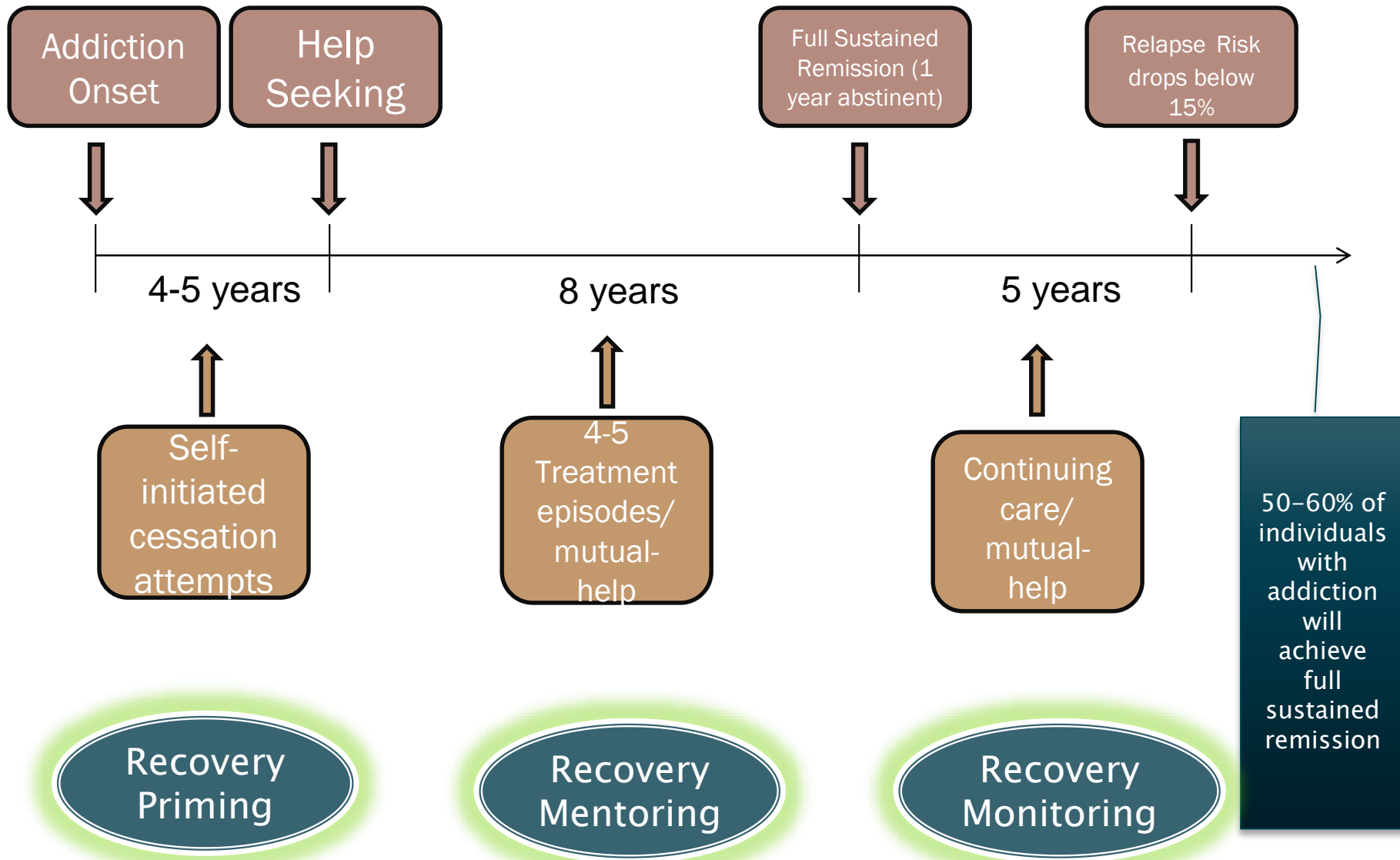
IF WE WANT ADDICTION
DESTIGMATIZED,
WE NEED A LANGUAGE THAT'S
UNIFIED.



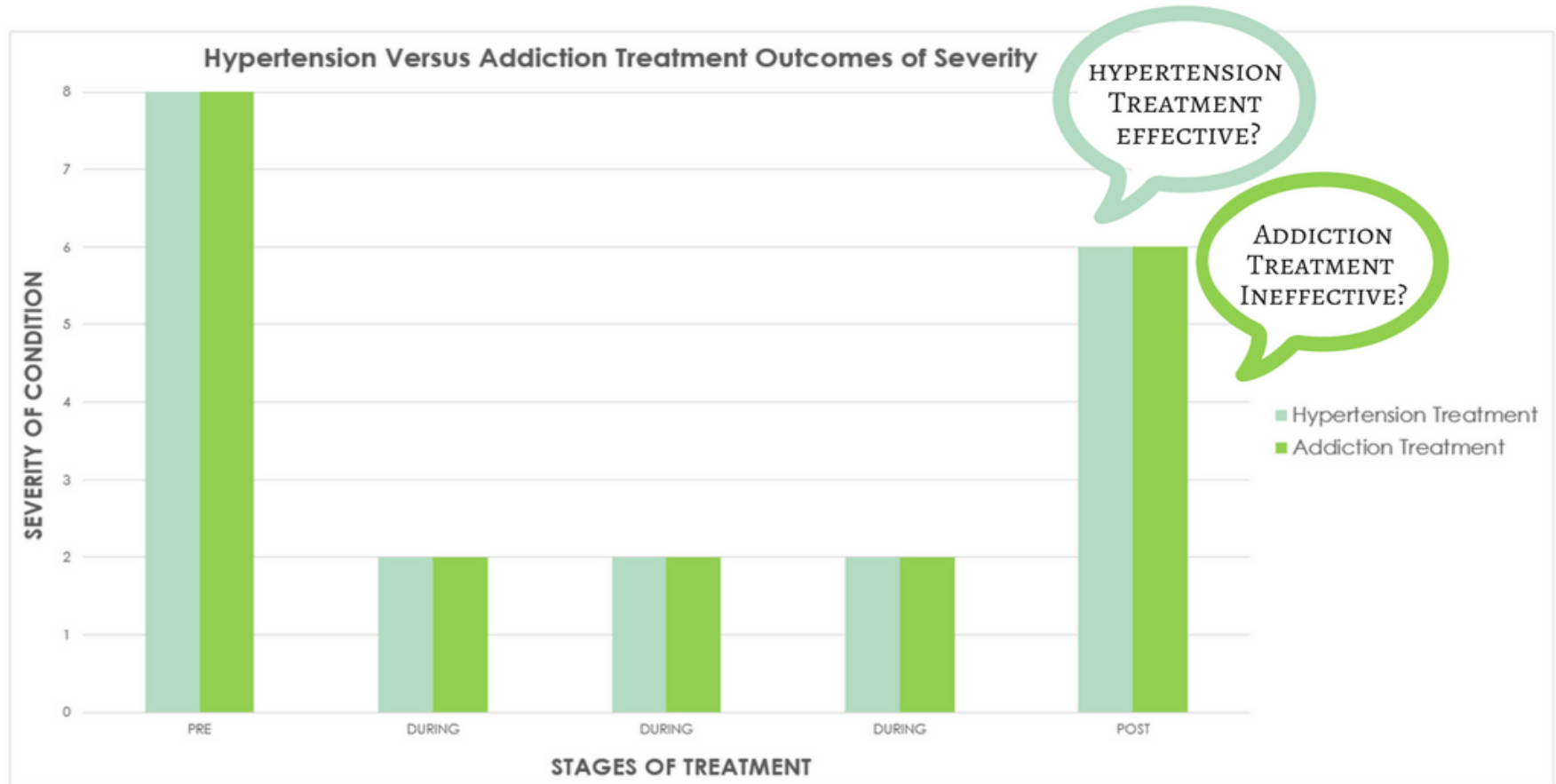
The words we use matter. Caution needs to be taken, especially when the disorders concerned are heavily stigmatized as in substance use disorders.



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



Why are treatments of addiction & hypertension evaluated differently?



The successful treatment of hypertension is seen as an ongoing process.

The successful treatment of addiction is seen as something that begins after treatment stops.



Traditional addiction treatment approach: Burning building analogy

- ▶ Putting out the fire –good job (detox/stabilization/cessation)
- ▶ Preventing it from re-igniting (relapse prevention) – less good
- ▶ Architectural planning (recovery plan) – almost totally neglected
- ▶ Re-building materials (recovery capital) – largely absent
- ▶ Granting “rebuilding permits” – (removing legal/structural barriers to recovery capital e.g., criminal records)– rarely considered/poor job



Post-acute withdrawal effects:

- ▶ More stress and lowered ability to experience normal pleasures

Increased sensitivity to stress via...

- Increased activity in hypothalamic-pituitary-adrenal axis (HPA-axis) and CRF/Cortisol release

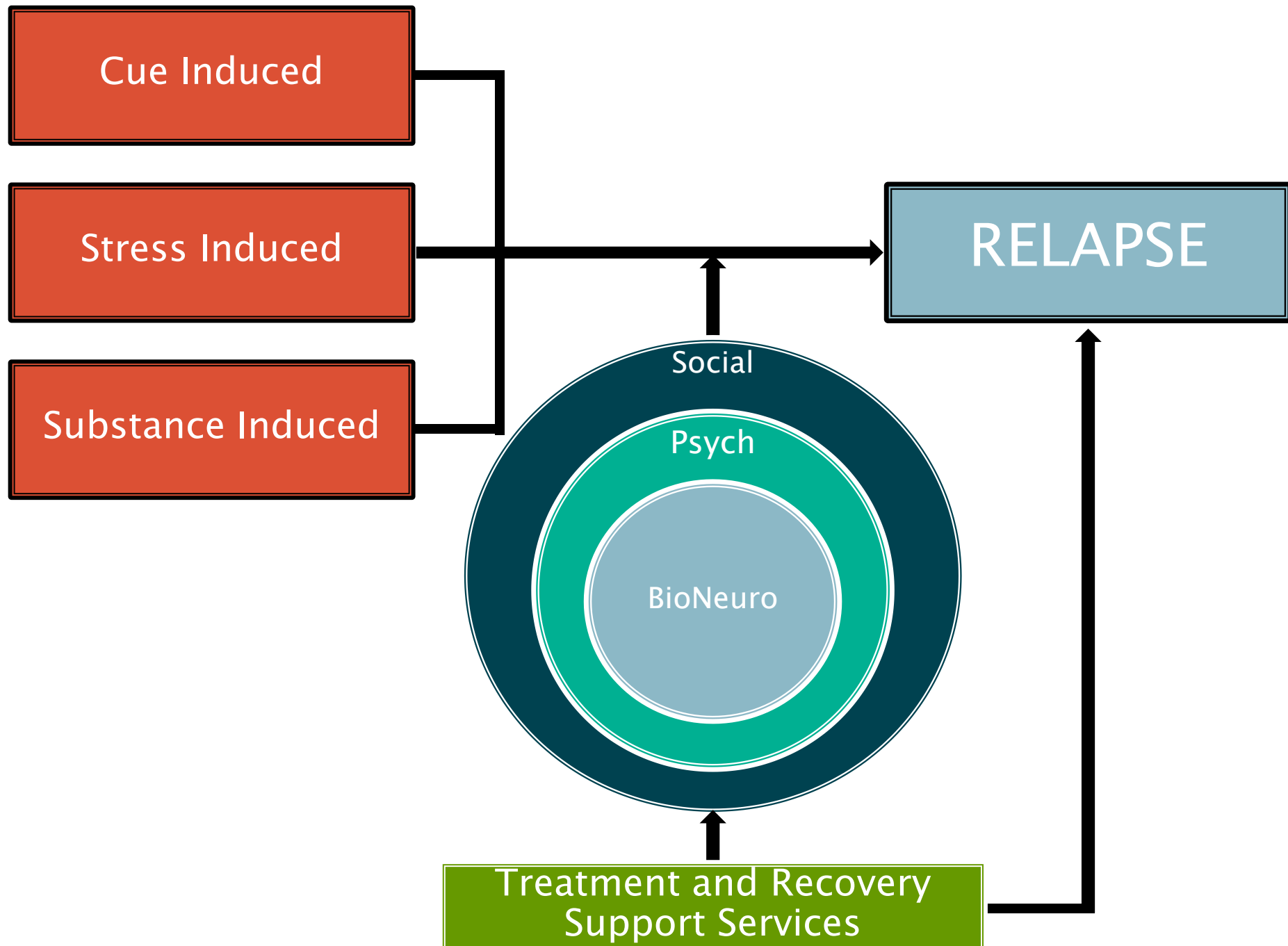
Lowered ability to experience normal levels of reward via...

- Down-regulated dopamine D2 receptor volume increasing risk of protracted dysphoria/anhedonia and relapse risk

Physiological Theories

General Adaptation Syndrome (Selye, 1956)

Alarm---- Resistance---Exhaustion



Treatment and Recovery Support Services

To help offset long-term relapse risk a number of indigenous community-based treatment and recovery support services have emerged and grown; these help build “recovery capital” to sustain remission



Changing the “soil” of communities so that recovery can grow and flourish



Clinically, we are trained to address the psychiatric and medical pathology; RSSs address recovery capital....

Example:

Clinical Pathology: Two 30 yr old men enter treatment with **clinically identical** levels of severity of opioid and alcohol addiction and psychiatric and medical problems and report the same level of distress and impairment

Treatment Plan: Patients are matched based on these clinical profiles to receive the **same** array of interventions to address clinical needs

Clinically, we are trained to address the psychiatric and medical pathology; RSSs address recovery capital....

But....

One man is single, he's from a neighborhood that has a high crime rate/drug and alcohol-related arrests; he didn't graduate High School, has a father with active AUD with whom he lives, and is unemployed with a criminal record.

The other is from a low crime neighborhood, is married with two children, a supportive family, has a master degree and is employed as an engineer with a good job and income. His father has 17yrs of sobriety in AA.

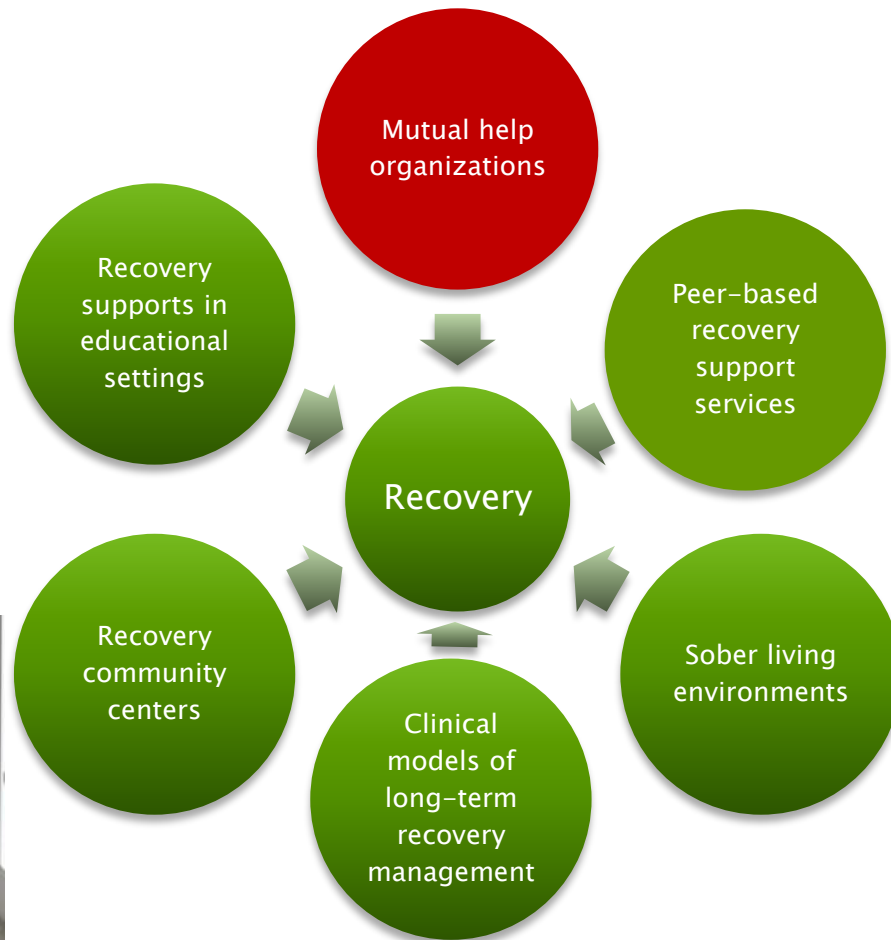
Which is more likely to achieve and sustain remission?

Move from a "Treatment Plan" to "Recovery Plan" based on pathology AND available recovery capital

Treating Addiction as a Chronic Disease: Treatment and Recovery Support Services



Mutual help Organizations



T
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TSF Delivery Modes

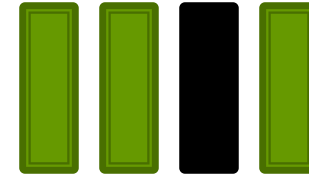
Stand alone
Independent therapy



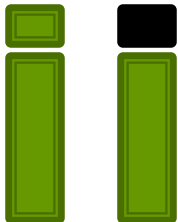
Integrated into an existing
therapy



Component of a treatment
package (e.g., an
additional group)



As Modular appendage
linkage component



In past 25 years, MHO research has gone from contemporaneous correlational research to rigorous RCTs

Facilitating involvement in Alcoholics Anonymous during out-patient treatment: a randomized clinical trial

Kimberly S. Walitzer, Kurt H. Dermen & Christopher Barrick

Research Institute on Addictions/University at Buffalo, The State University of New York, Buffalo, NY, USA

Addiction (1998) 93(9), 1313–1333

RESEARCH REPORT

Network support for drinking Anonymous and long-term

RICHARD LONGABAUGH¹, PHILIP W. WIRTZ²,
ALLEN ZWEBEN³ & ROBERT L. STOUT⁴

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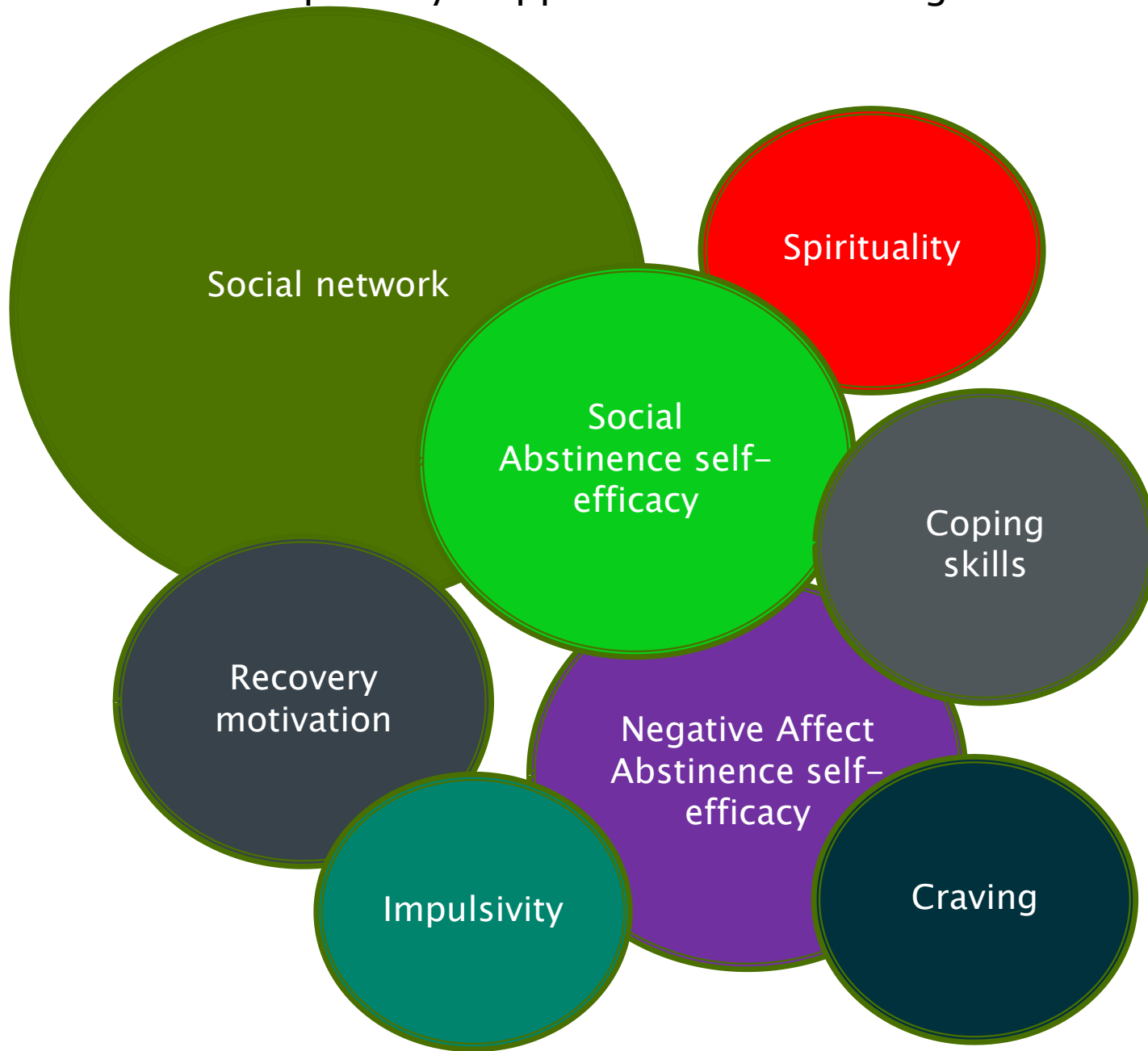
Abstract

Aims. (1) To examine the matching hypothesis that Twelve Step Facilitation Therapy (TSF) is more

TSF often produces significantly better outcomes relative to active comparison conditions (e.g., CBT)

Although TSF is not “AA”, its beneficial effect is explained by AA involvement post-treatment.

Empirically-supported MOBCs through which AA confers benefit



AA participation in turn is explained by these factors which are similar to the mechanisms operating in formal treatment...

Estimating the Efficacy of Alcoholics Anonymous without Self-Selection Bias: An Instrumental Variables Re-Analysis of Randomized Clinical Trials

Keith Humphreys, Janet C. Blodgett, and Todd H. Wagner

Background: Observational studies of Alcoholics Anonymous (AA) involvement are subject to self-selection bias because individuals choose whether or not to attend AA. To address this, we therefore, employed an innovative statistical technique to derive causal estimates of AA impact.

Methods: Six data sets from 5 National Institutes of Health (NIH) funded randomized independent parallel arms) of AA facilitation interventions were analyzed using instrumental variables models. Alcohol-dependent individuals in one of the data sets were randomized to AA or control. The rest of sample ($n = 1,582$ individuals pooled from 5 data sets) were not randomized. Randomization itself was used as the instrumental variable.

Results: Randomization was a good instrument in both data sets. AA attendance that could not be attributed to self-selection. For analysis, increased AA attendance that was attributable to randomization (i.e., free of self-selection bias) was effective at increasing days of abstinence at 3-month follow-up ($B = 0.42, p = 0.04$). However, in the remaining data sets, AA attendance was much higher, further increases in AA involvement caused by randomization intervention did not affect drinking outcome.

Conclusions: For most individuals seeking help for alcohol use disorder, AA leads to short- and long-term decreases in alcohol consumption. However, for populations with high preexisting AA involvement, further AA attendance may have little impact.

Key Words: Alcoholics Anonymous, Self-Help, Mutual Support, Treatment Outcome.

OBSERVATIONAL RESEARCH LONG ago established that Alcoholics Anonymous (AA) involvement is associated with better outcomes on alcohol-related, psychological, and social measures (Emrick et al., 1993; Humphreys, 2004; Tonigan et al., 1996). Researchers and clinicians hotly debated for many years whether this correlation reflected AA's effectiveness or was merely an artifact of self-selection (e.g., those who attend AA are more motivated to change). In the past decade, the former explanation received a major boost as a series of scientific teams conducted randomized clinical trials in which professionally provided AA-involvement facilitation interventions were

shown to be effective (e.g., Humphreys et al., 2009). These findings suggest that AA is a genuine, possibly the most effective, intervention for alcohol use disorder. However, the extent to which these findings can be generalized to the general population of individuals with alcohol use disorder remains uncertain. Some studies have estimated the causal impact of AA on drinking outcomes in the first year of treatment (e.g., Humphreys et al., 2009).

Instrumental variables (IV) analysis is a statistical technique used to estimate causal effects in the presence of self-selection bias. IV analysis is used to estimate the causal effect of a treatment on an outcome when the treatment is not randomly assigned. IV analysis is used to estimate the causal effect of a treatment on an outcome when the treatment is not randomly assigned. IV analysis is used to estimate the causal effect of a treatment on an outcome when the treatment is not randomly assigned.

Also, state of the art instrumental variables analyses, as well as propensity score matching (Ye and Kaskutas, 2013) that help to remove self-selection biases, indicate AA has a causal impact on enhancing abstinence and remission rates.

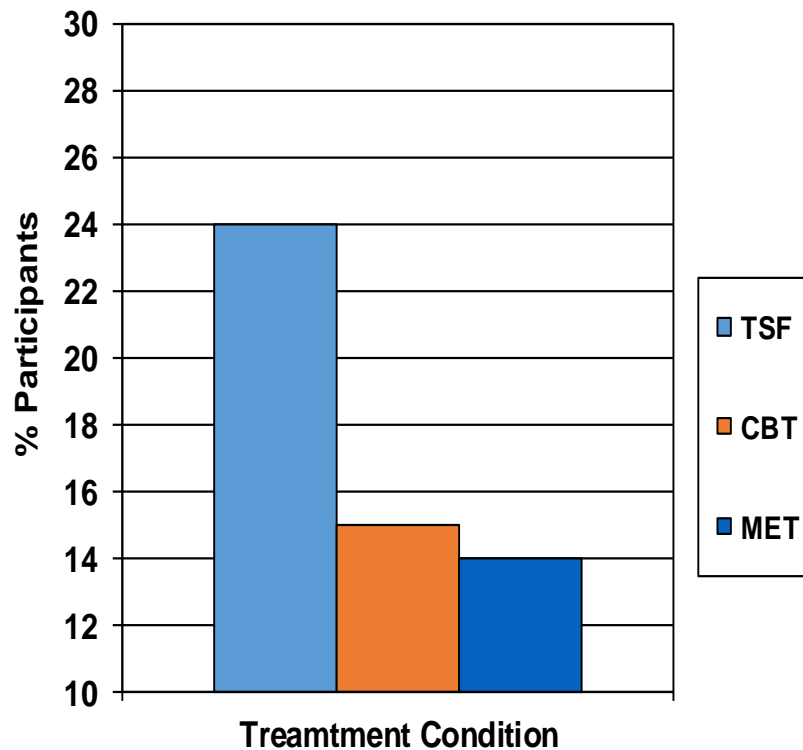
From the Center for Innovation to Implementation (KH, JCB, THW), VA Palo Alto Health Care System, Menlo Park, California; Department of Psychiatry and Behavioral Sciences (KH, JCB, THW) Stanford University, Palo Alto, California; and C2i, VAPAHCs (152-

Linkage to MHO like AA can lead to much higher rates of full sustained remission

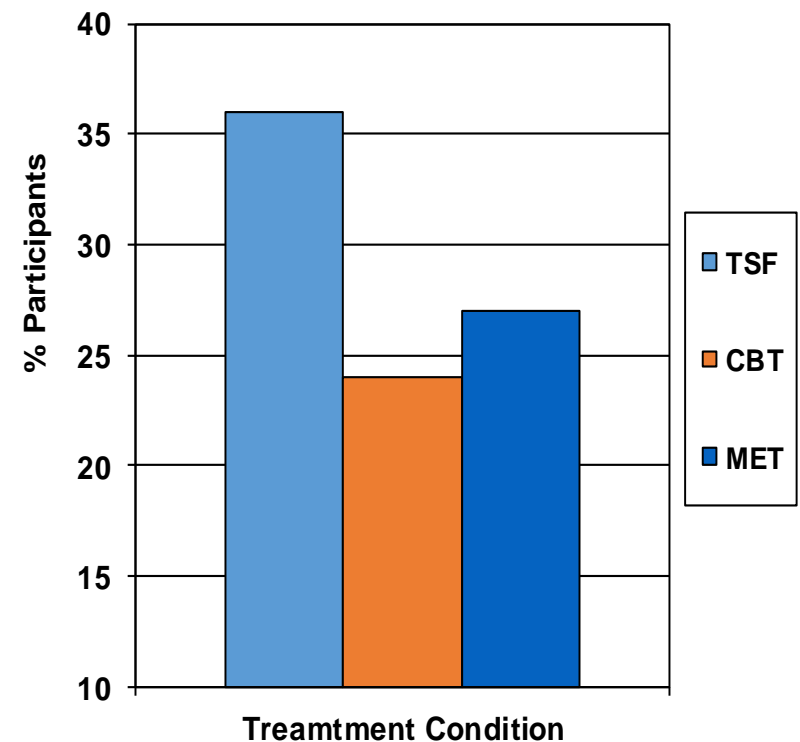
(Project MATCH, 1997)

TSF treatment can lead to much higher rates of full sustained remission

Continuous Abstinence Rates during year following treatment (4-15 Months)

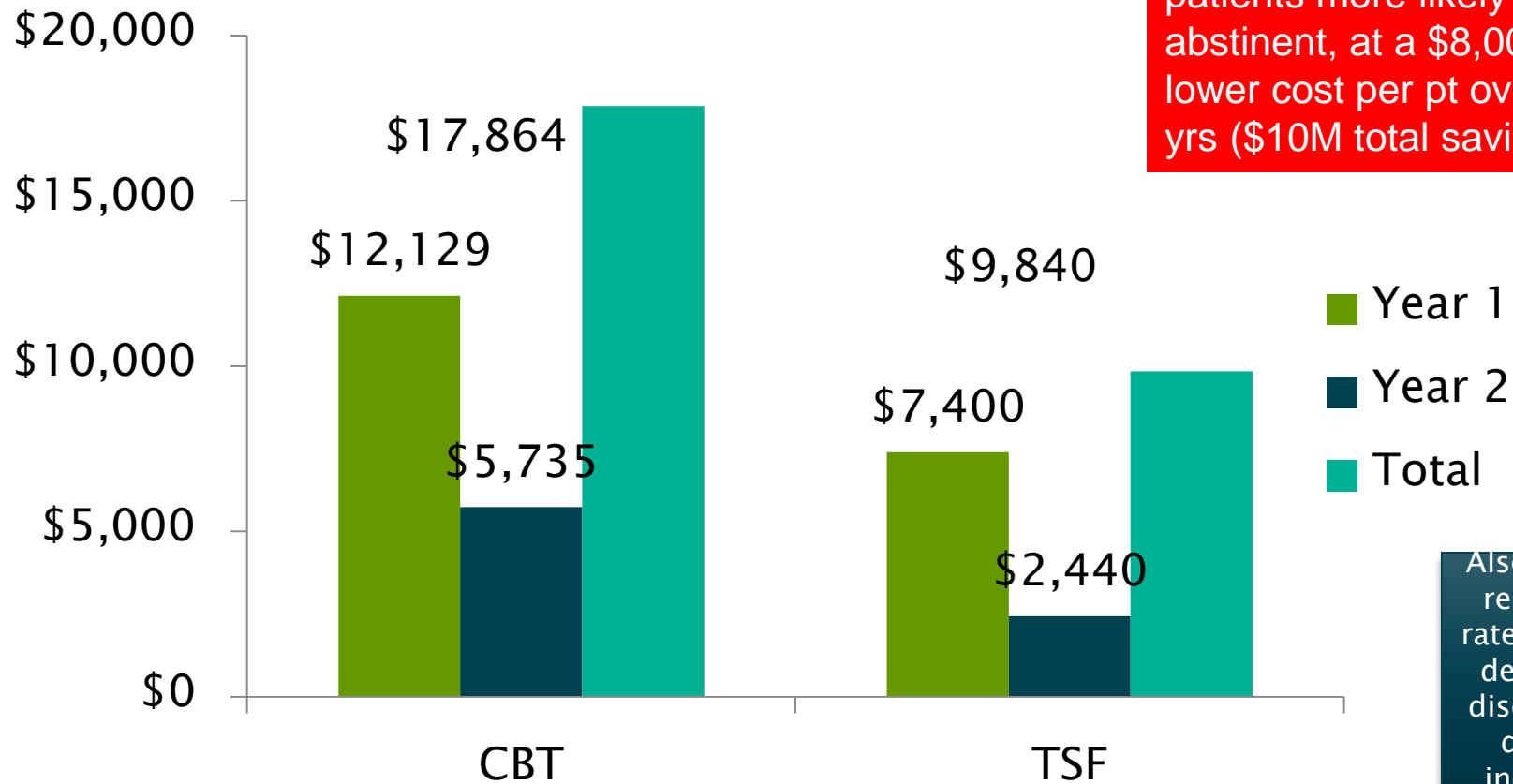


Continuous Abstinence Rates past 90 days- 3 Years



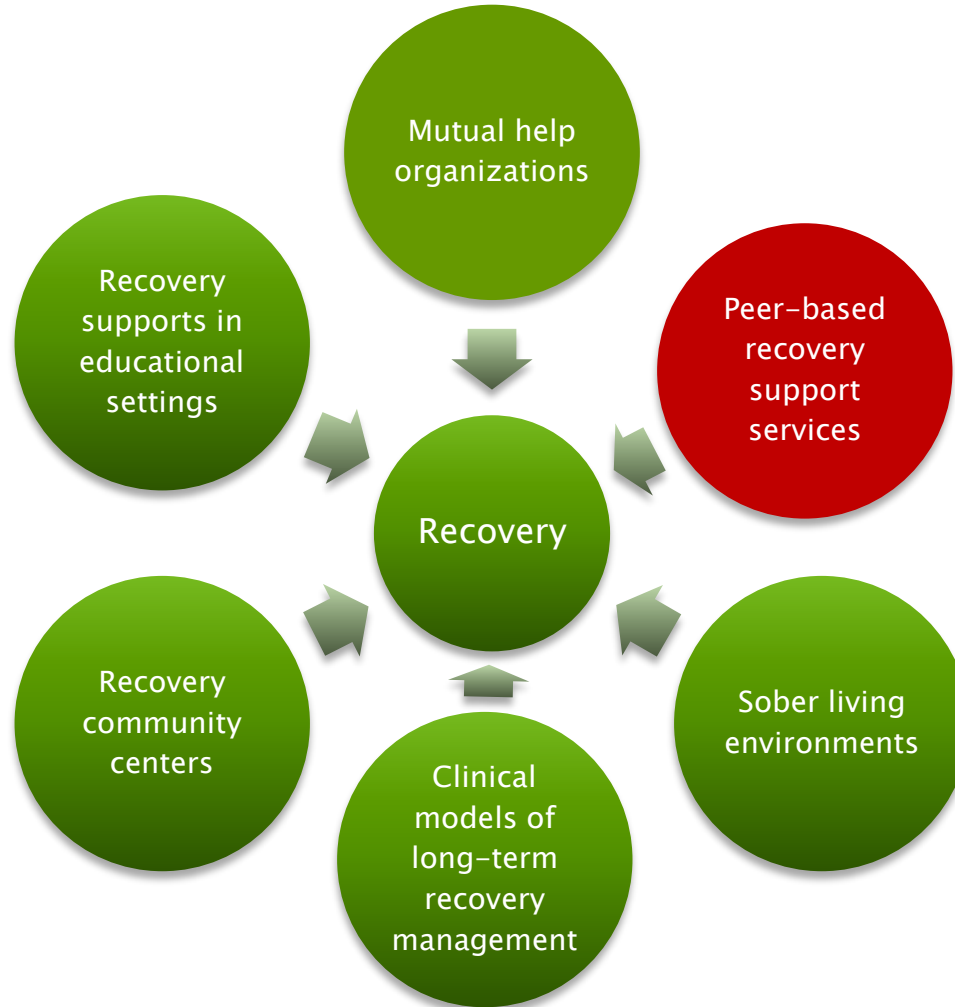
HEALTH CARE COST OFFSET CBT VS 12-STEP RESIDENTIAL TREATMENT

Compared to CBT-treated patients, 12-step treated patients more likely to be abstinent, at a \$8,000 lower cost per pt over 2 yrs (\$10M total savings)



Also, higher remission rates, means decreased disease and deaths, increased quality of life for sufferers and their families

Peer-based Recovery Support Services



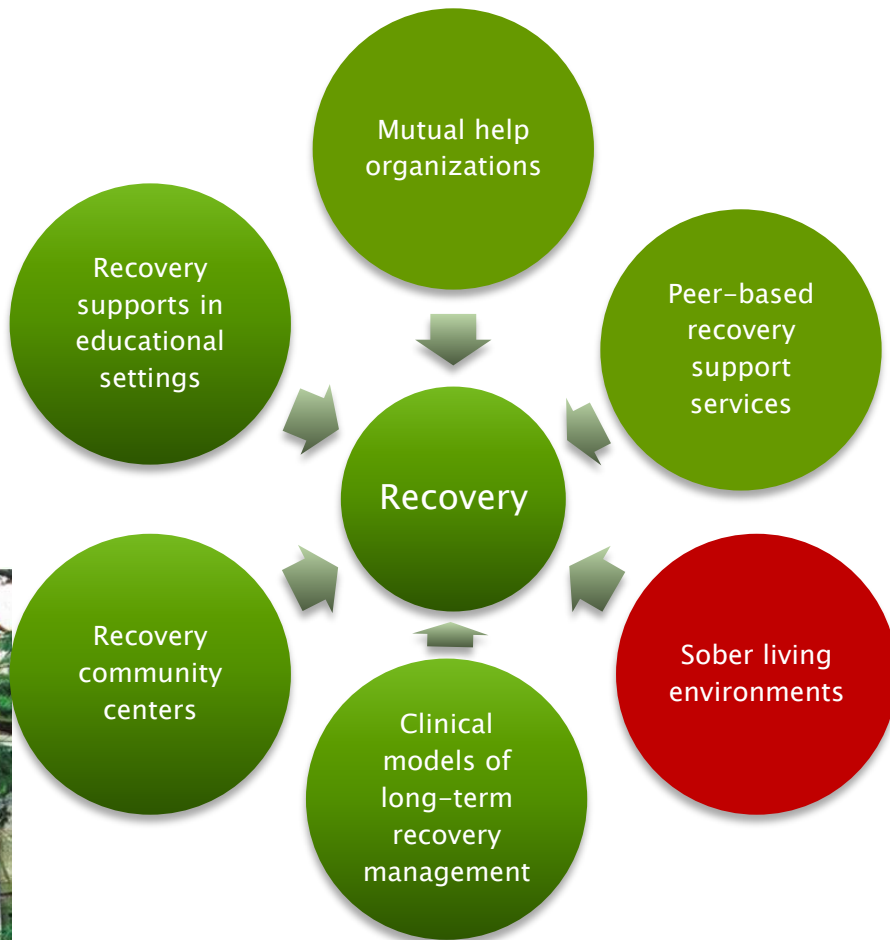
Formal Peer Support: Recovery Coaching

- ▶ Interacting with peers who have lived experience of addiction and long-term recovery and who support recovery help reduce relapse risk. They can facilitate...
 - Acquisition of coping skills
 - Increases in abstinence self-efficacy
 - Maintenance of recovery motivation
 - Serve as a healthy recovery role model and social contact
 - Provide community service
 - linkages and emotional support



Sober Living Environments

Peer Run/Self-Governing



Societal Benefits of Oxford Houses

- **Sample:** 150 individual completing treatment in the Chicago metropolitan area
- **Design:** Randomized controlled trial
- **Intervention:** Oxford House vs. community-based aftercare services (usual care)
- **Follow-up:** 2 years
- **Outcome:** Substance use, monthly income, incarceration rates



FIELD ACTION REPORT

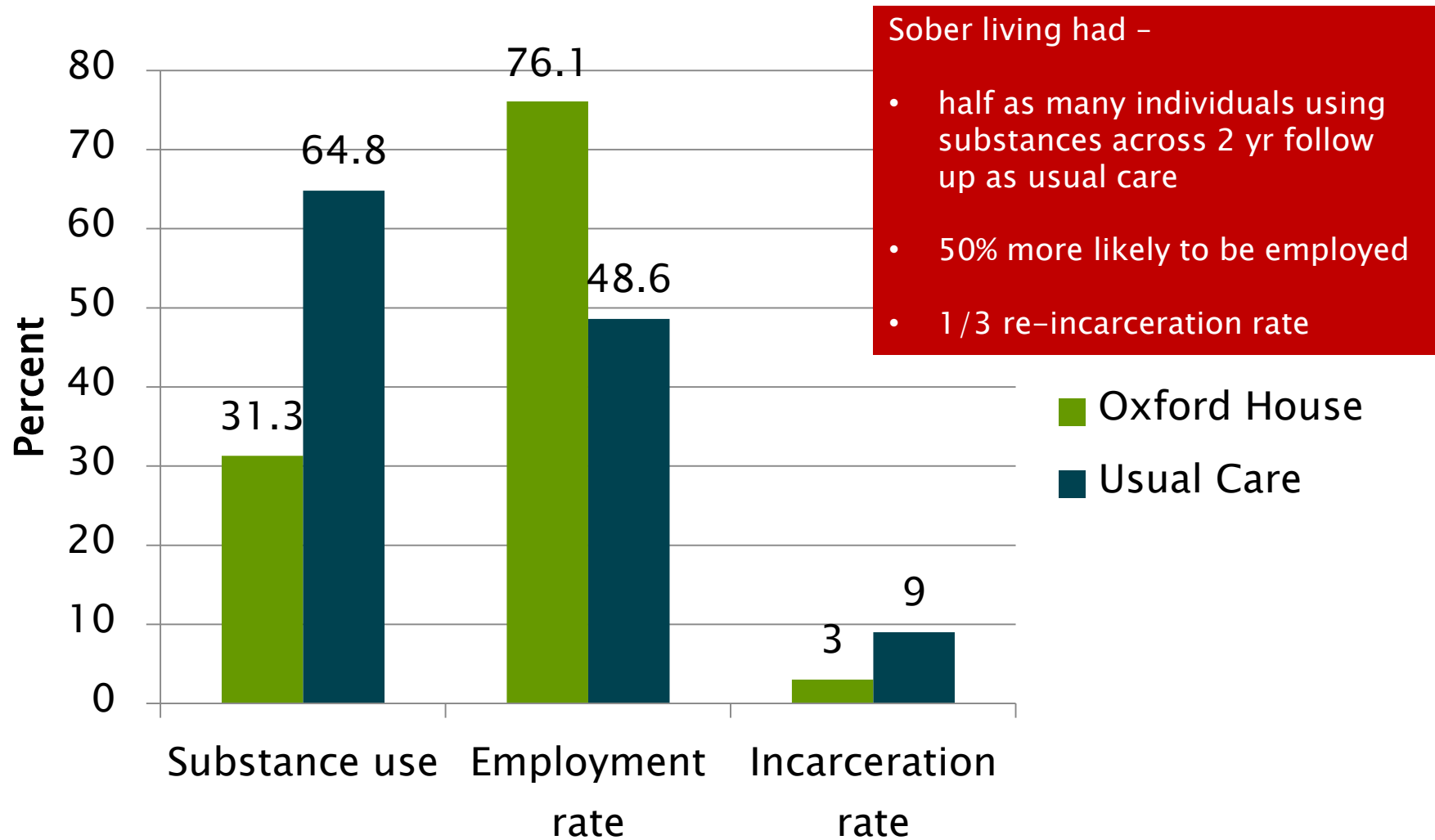
Communal Housing Settings Enhance Substance Abuse Recovery

| Leonard A. Jason, PhD, Bradley D. Olson, PhD, Joseph R. Ferrari, PhD, and Anthony T. Lo Sasso, PhD

Oxford Houses are democratic, mutual help-oriented recovery homes for individuals with substance abuse histories. There are more than 1200 of these houses in the United States, and each home is operated independently by its residents, without help from professional staff.

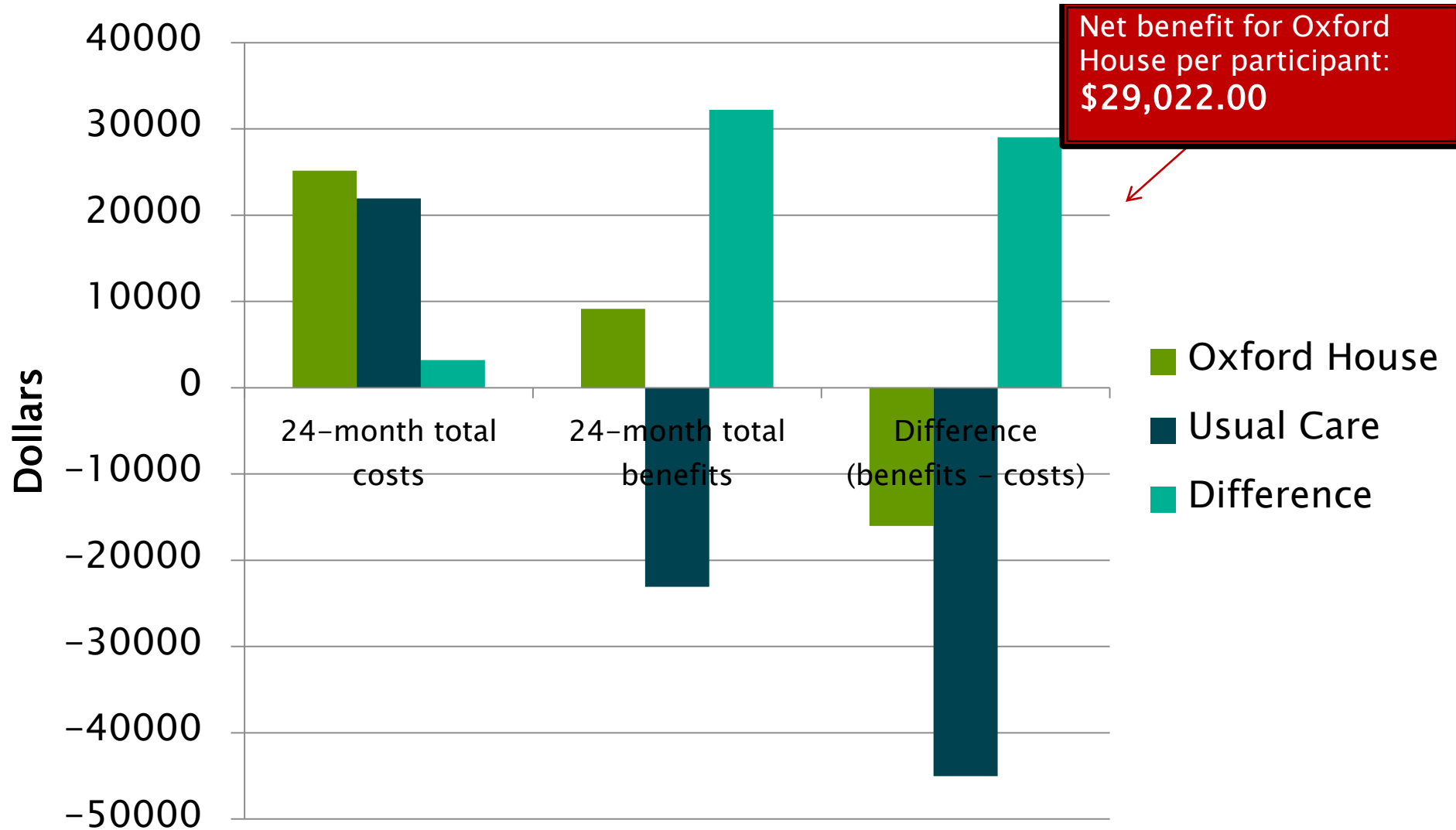
In a recent experiment, 150 individuals in Illinois were randomly assigned to either an Oxford House or usual-care condition (i.e., outpatient treatment or self-help groups) after substance abuse treatment discharge. At the 24-month follow-up, those in the Oxford House condition compared with the usual-care condition had significantly lower substance use, significantly higher monthly income, and significantly lower incarceration rates. (*Am J Public Health*. 2006;96:1727–1729. doi:10.2105/AJPH.2005.070839)

Sober Living Environments are effective... Oxford House vs. Usual Care



...and, cost-effective

Mean per-person societal benefits and costs



Clinical Models of Long-term Recovery Management



Recover Management Check-ups

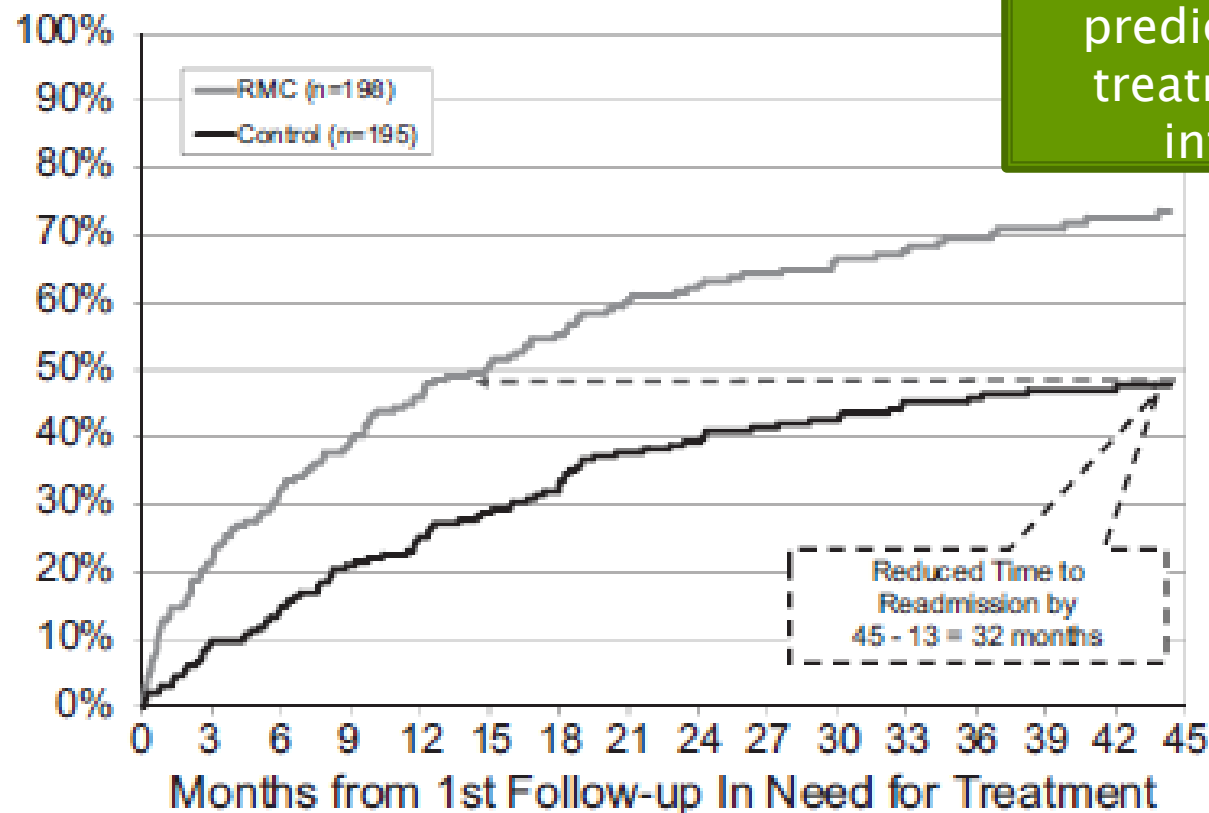
4-year outcomes from the Early Re-Intervention experiment using Recovery Management Checkups

- ▶ N=446 adults with SUD, mean age = 38, 54% male, 85% African-American
 - randomly assigned to two conditions:
 - quarterly assessment only
 - quarterly assessment plus RMC
- ▶ Recovery Management Checkups
 - 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 the intake
 - If participants reported no substance use in previous quarter, linkage manager reviewed how abstinence has changed their lives and what methods have worked to maintain abstinence

Results 1

Return to treatment

- Participants in RMC condition sig. more likely to return to treatment sooner



Of 18 vars tested, the only variables that predicted return to treatment was the intervention

Cost-effectiveness analysis of Recovery Management Checkups (RMC) for adults with chronic substance use disorders: evidence from a 4-year randomized trial

Kathryn E. McCollister¹, Michael T. French², Derek M. Freitas³, Michael L. Dennis⁴, Christy K. Scott⁵ & Rodney R. Funk⁴

Department of Public Health Sciences, Miller School of Medicine, University of Miami, Miami, FL, USA,¹ Department of Sociology, University of Miami, Coral Gables, FL, USA,² New York University, School of Medicine, New York, NY, USA,³ Chestnut Health Systems, Normal, IL, USA⁴ and Chestnut Health Systems, Chicago, IL, USA⁵

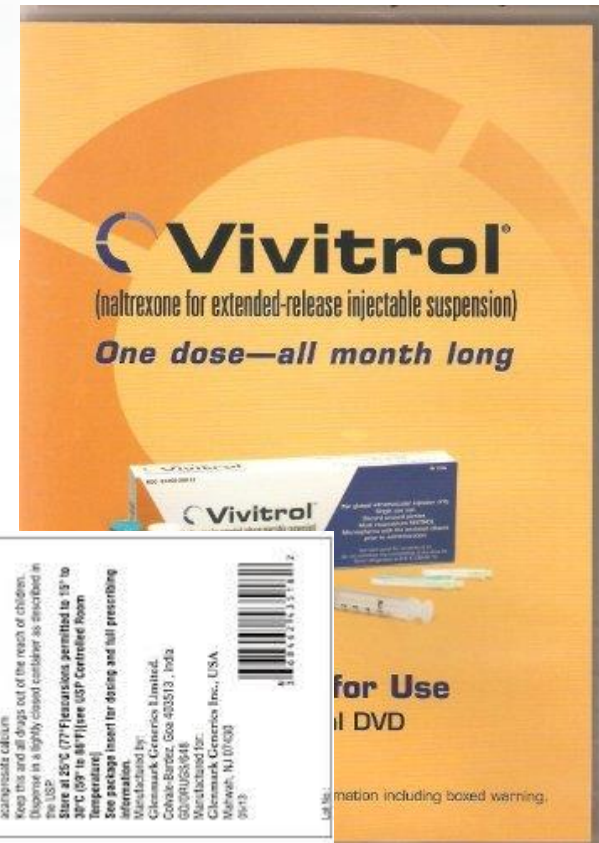
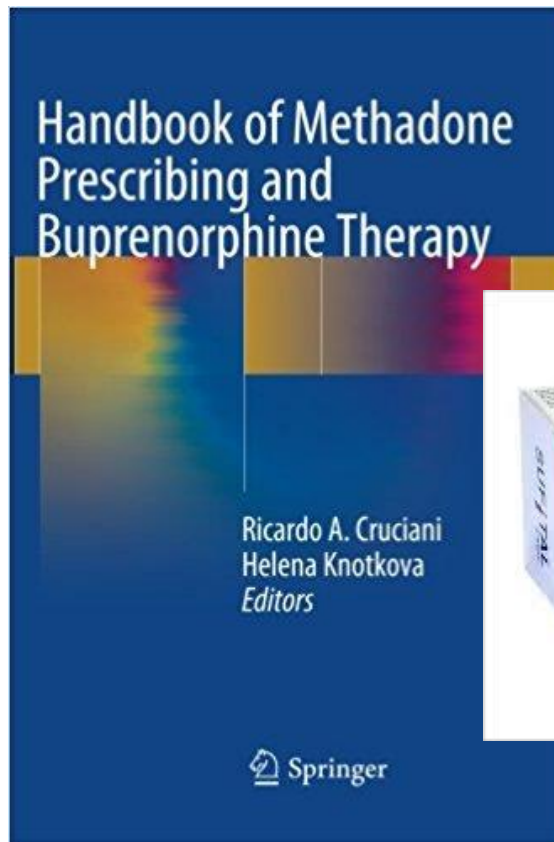
ABSTRACT

Aims This study performs the first cost-effectiveness analysis (CEA) of Recovery Management Checkups (RMC) for adults with chronic substance use disorders. **Design** Cost-effectiveness analysis of a randomized clinical trial of RMC. Participants were assigned randomly to a control condition of outcome monitoring (OM-only) or the experimental condition OM-plus-RMC, with quarterly follow-up for 4 years. **Setting** Participants were recruited from the largest central intake unit for substance abuse treatment in Chicago, Illinois, USA. **Participants** A total of 446 participants who were 38 years old on average, 54% male, and predominantly African American (85%). **Measurements** Data on the quarterly cost per participant come from a previous study of OM and RMC intervention costs. Effectiveness is measured as the number of days of abstinence and number of substance use-related problems. **Findings** Over the 4-year trial, OM-plus-RMC cost on average \$2184 more than OM-only ($P < 0.01$). Participants in OM-plus-RMC averaged 1026 days abstinent and had 89 substance use-related problems. OM-only averaged 932 days abstinent and reported 126 substance use-related problems. Mean differences for both effectiveness measures were statistically significant ($P < 0.01$). The incremental cost-effectiveness ratio for OM-plus-RMC was \$23.38 per day abstinent and \$59.51 per reduced substance-related problem. When additional costs to society were factored into the analysis, OM-plus-RMC was less costly and more effective than OM-only. **Conclusions** Recovery Management Checkups are a cost-effective and potentially cost-saving strategy for promoting abstinence and reducing substance use-related problems among chronic substance users.

Keywords Chronic substance use disorder, cost-effectiveness analysis, economic evaluation, Recovery Management Checkups.

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Submitted 10 January 2013; initial review completed 26 March 2013; final version accepted 8 August 2013



FDA approved medications for opioids and alcohol...

OPIOID USE DISORDER & BUPRENORPHINE OUTCOMES

SAMPLE

375 individuals who participated in the Prescription Opioid Addiction Treatment Study (POATS; $n = 653$), a multi-site RCT, and also enrolled in the follow-up study

- Met DSM-IV criteria for OUD due to prescription opioid use, were *not* on opioid agonist therapy and had not used heroin over 4 times in the 30 days prior to enrolling in POATS

DESIGN

Study staff conducted telephone interviews with participants 18, 30, and 42 months after participants entered the first phase of the study

OUTCOMES

Substance use, current opioid dependence, overall health and pain

RESULTS

- 8% of participants reported using heroin for the first time during the follow-up period
- Participants who reported a lifetime history of heroin use at baseline were more likely to meet DSM-IV criteria for opioid dependence at 42 months
 - However 66.7% of participants who reported lifetime heroin use at baseline did not report heroin use in the follow-up period
- At 42 months, 31.7% of participants were abstinent from opioids and not on agonist therapy →**



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Drug Alcohol Depend. 2015 May 1; 150: 112–119. doi:10.1016/j.drugalcdep.2015.02.030.

Long-term Outcomes from the National Drug Abuse Treatment Clinical Trials Network Prescription Opioid Addiction Treatment Study

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Abstract

Background—Despite the growing prevalence of prescription opioid dependence, longitudinal studies have not examined long-term treatment response. The current study examined outcomes over 42 months in the Prescription Opioid Addiction Treatment Study (POATS).

Methods—POATS was a multi-site clinical trial lasting up to 9 months, examining different durations of buprenorphine-naloxone plus standard medical management for prescription opioid dependence, with participants randomized to receive or not receive additional opioid drug counseling. A subset of participants ($N=375$ of 653) enrolled in a follow-up study. Telephone

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Contributors

Drs. Weiss and Potter designed the study and wrote the protocol. Dr. Dreifuss, Mr. Provest, Ms. Dodd, and Ms. McDermott oversaw and participated in the conduct of study assessments. Ms. McDermott and Ms. Srisarajivakul managed the literature searches and summaries of previous related work. Drs. Griffin and Fitzmaurice undertook the statistical analysis. Drs. Weiss and Griffin wrote the first draft of the manuscript. Drs. Potter, McHugh, and Carroll participated in the conceptualization of the paper and reviewed and critically edited ongoing drafts. All authors contributed to and have approved the final manuscript.

Author Disclosures

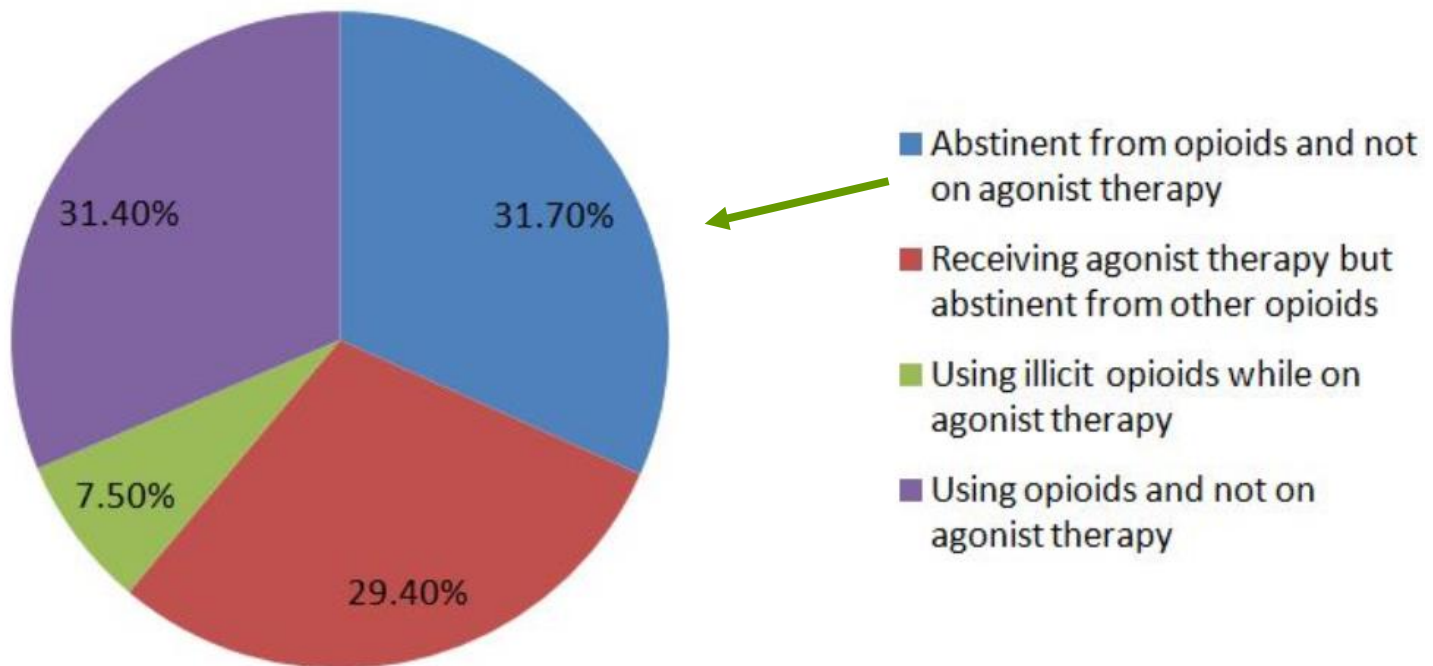
Dr. Weiss has consulted to Reckitt-Benckiser.

Clinical Trial Registration: [ClinicalTrials.gov](http://clinicaltrials.gov); registration number NCT00316277; <http://clinicaltrials.gov/ct2/show/NCT00316277>.

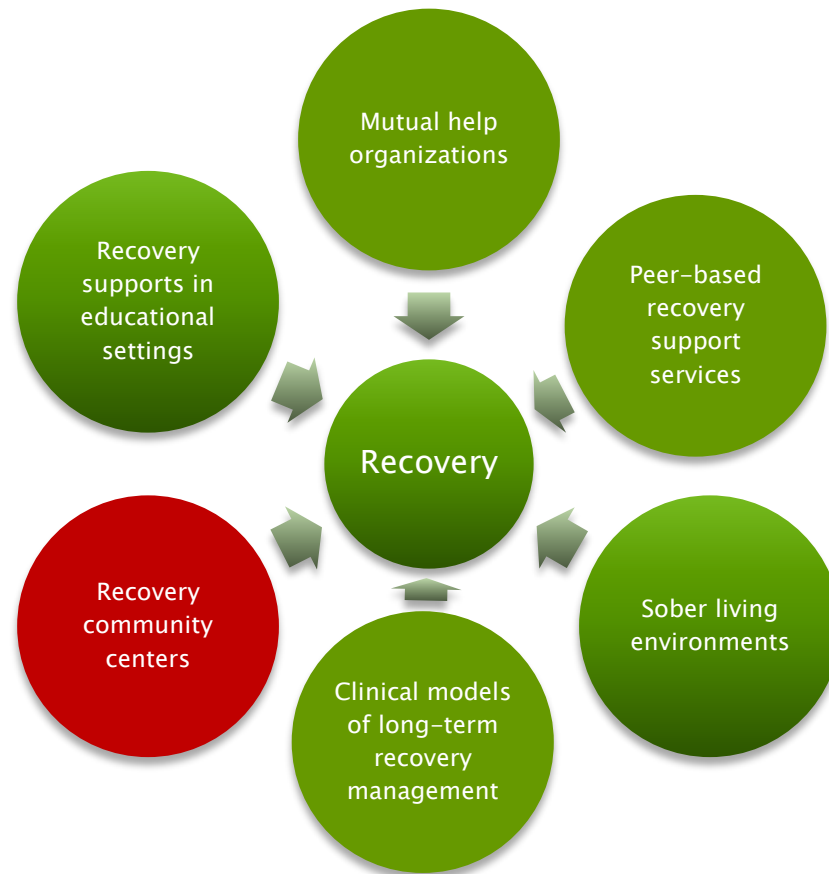
Weiss, RD, Potter JS, Griffin ML, Provest SE, Fitzmaurice GD... Carroll KM. Long-term Outcomes from the National Drug Abuse Treatment Clinical Trials Network Prescription Opioid Addiction Treatment Study. *Drug Alcohol Depend* 2015; 150: 112–119

OPIOID USE DISORDER & BUPRENORPHINE OUTCOMES

Opioid use status at 42 months



Recovery Community Centers



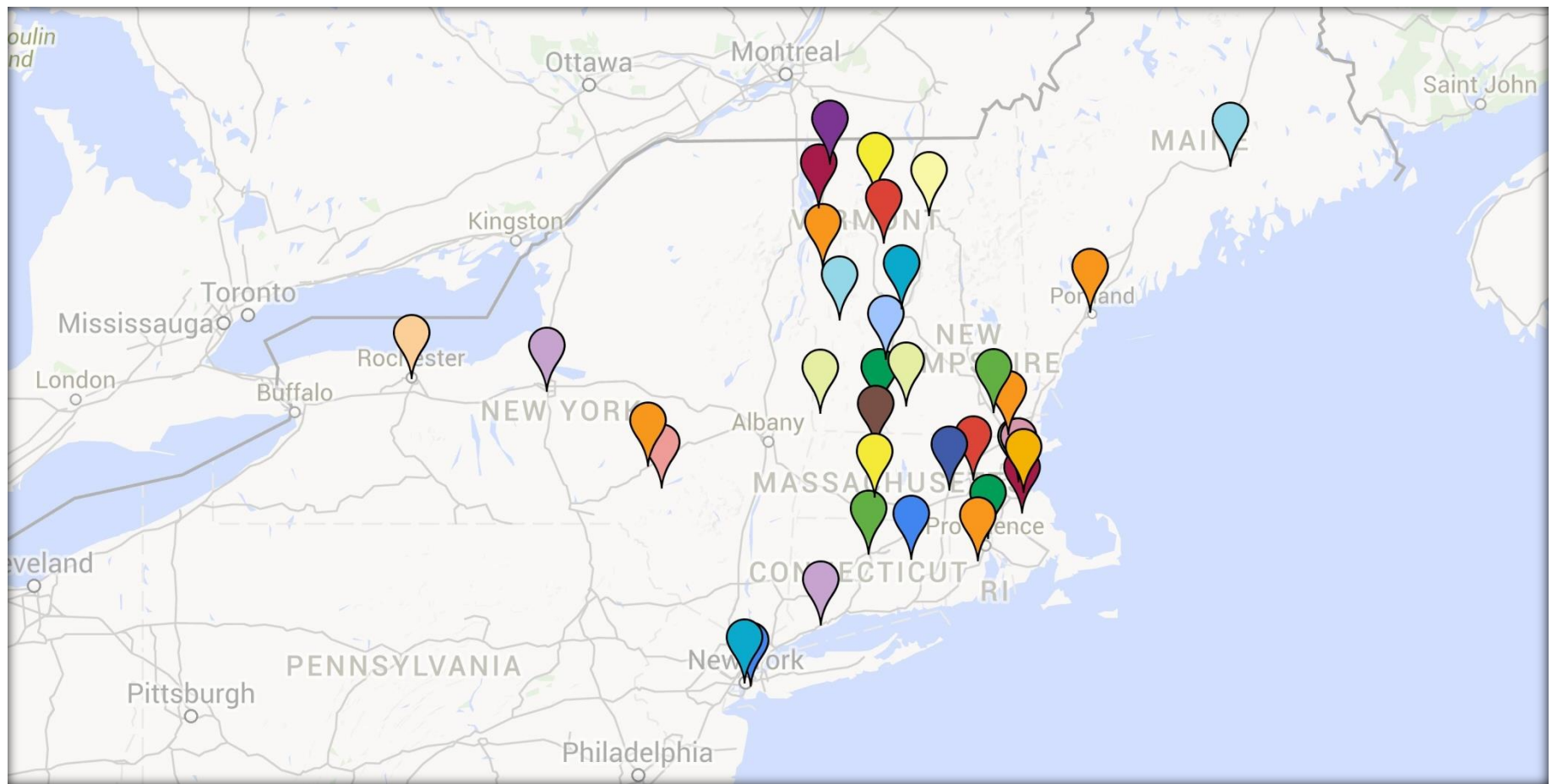
Recovery Community Centers are...

- ▶ locatable sources of community-based recovery support beyond the clinical setting, helping members achieve sustained recovery by building and successfully mobilizing personal, social, environmental, and cultural resources.

RCCs in the United States



There are currently more than 80 centers operating nationally



RCCs in New York and New England

There are 35 centers currently operating throughout New England and New York.

Principles of RCCs

Source of recovery capital at the community level

- Provide different services than formal treatment
- Offer more formal and tangible linkages to social services, employment, training and educational agencies than do mutual-help organizations

There are many pathways to recovery

- RCCs are not allied with any specific recovery philosophy or model

Services offered

All Recovery
Meetings

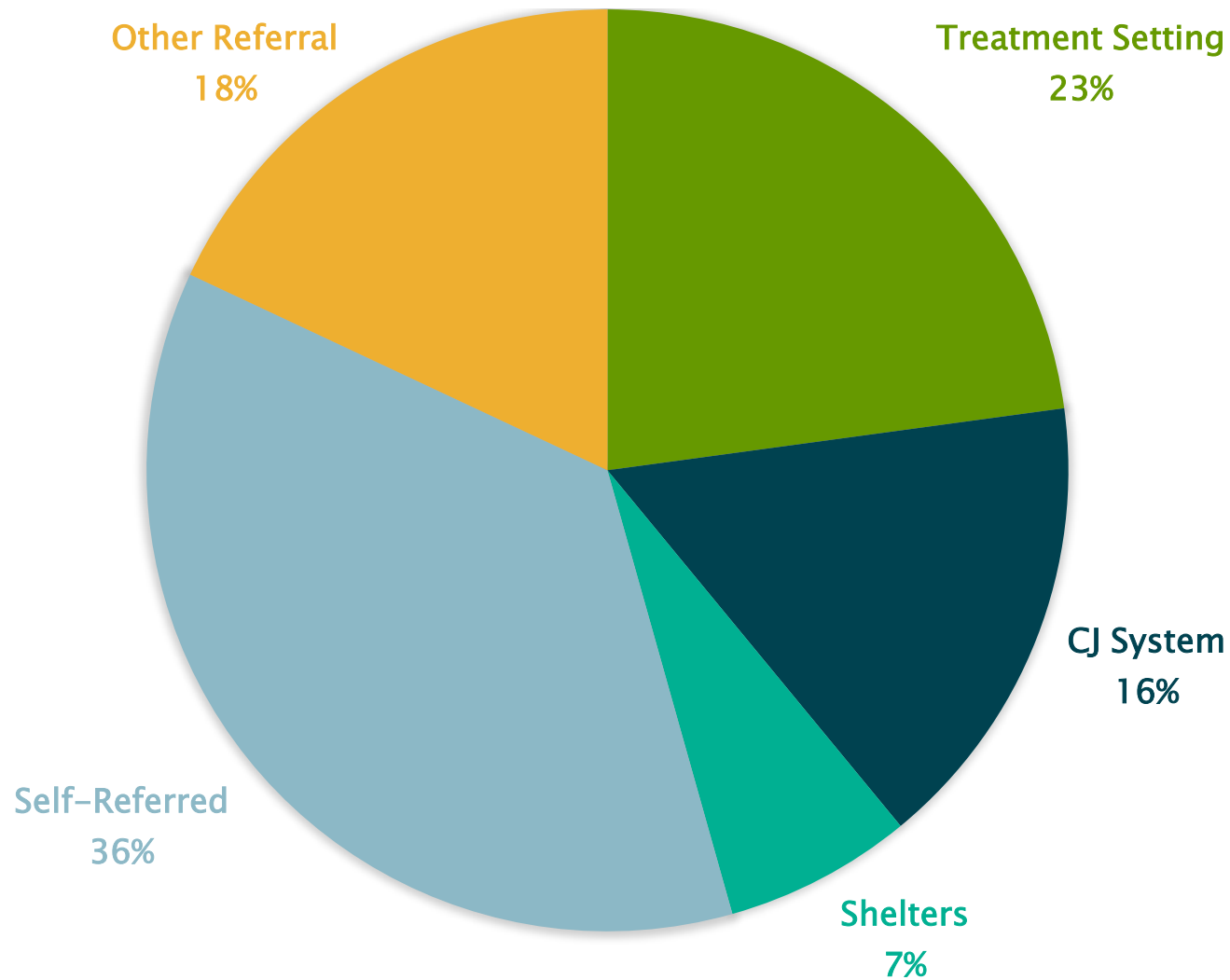
Telephone
Recovery
Support

Recovery
Coaching

Family Support
Groups

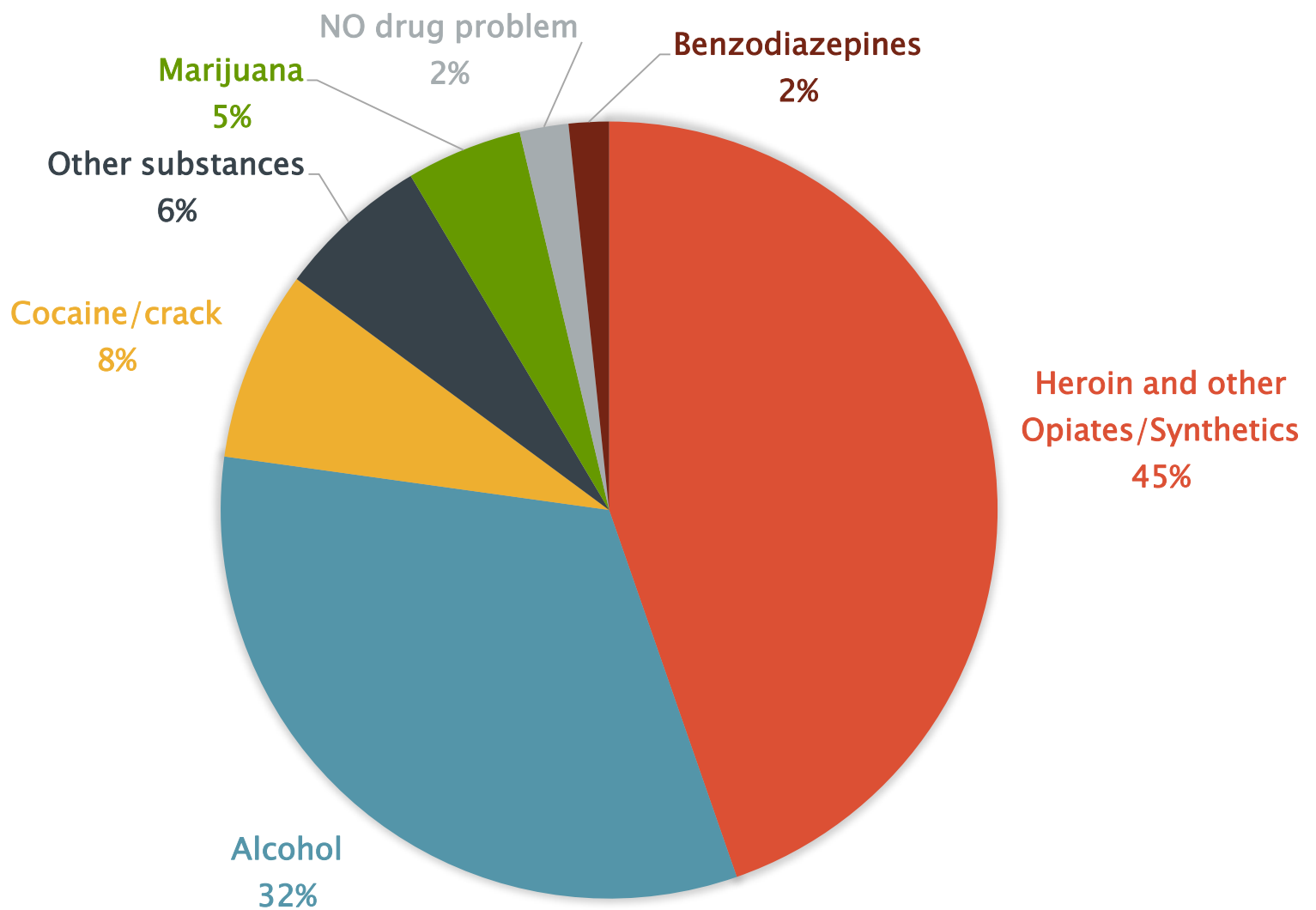
Recovery
Trainings

Access to
resources



Center Referral Sources

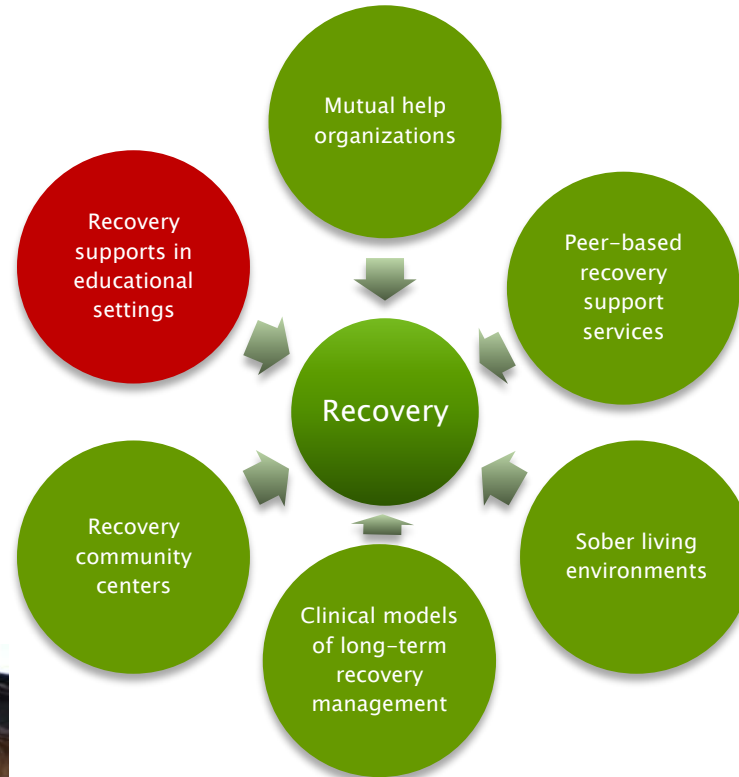
RCC members are referred to the centers from a variety of sources. Other referral sources include word of mouth (e.g., friends and family).



Members' Primary Substance Problems

Director estimates cite heroin and other opioids (45%) and alcohol (32%) as the most prevalent primary substances used by center members.

Recovery Supports In Educational Settings



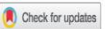
Recovery High Schools....

- ▶ are secondary schools designed specifically for students in recovery from SUD.
- ▶ Each school operates differently depending on available community resources and state standards, but each recovery high school shares the following goals:
 - To educate all students in recovery from SUD and/or co-occurring disorders
 - To meet state requirements for awarding a secondary school diploma
 - To support students in working a strong program of recovery

Recovery High School Participation Effects compared to Non-recovery High school

- ▶ **Methods:** Quasi-experiment comparing outcomes for treated adolescents who attended RHSs for at least 28 days
- ▶ **N=194** (134 in RHSs, 60 in non-RHSs) enrolled in Minnesota, Wisconsin, or Texas schools (M age = 16; 86% White; 49% female).
- ▶ **Results: Adolescents attending RHSs 4x more likely than non-RHS students to report complete abstinence from alcohol, marijuana, and other drugs at the 6-month follow-up (OR = 4.36, $p = .026$), significantly lower levels of marijuana use ($d = -0.51$, $p = .034$) and less absenteeism from school ($d = -0.56$, $p = .028$).**

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Recovery high schools: effect of schools supporting recovery from substance use disorders

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^aDepartment of Human & Organizational Development, Vanderbilt University, Nashville, TN, USA; ^bSchool of Medicine and Public Health, Department of Population Health Sciences, University of Wisconsin-Madison, Madison, WI, USA

ABSTRACT

Background: Recovery high schools (RHSs) provide post-treatment education and recovery support for young people with substance use disorders (SUDs). This is the first quasi-experimental outcome study to determine RHS effectiveness relative to students in non-RHSs. **Objectives:** To examine effects of RHS attendance on academic and substance use outcomes among adolescents treated for SUDs 6 months after recruitment to the study. **Methods:** A quasi-experimental design comparing outcomes for adolescents with treated SUDs who attended RHSs for at least 28 days versus a propensity-score balanced sample of students with treated SUDs who did not attend RHSs. The sample included 194 adolescents (134 in RHSs, 60 in non-RHSs) enrolled in Minnesota, Wisconsin, or Texas schools (M age = 16; 86% White; 49% female). Multilevel linear regression models were used to examine the effect of RHS attendance on students' outcomes, after adjusting for a range of potential confounders. **Results:** Adolescents attending RHSs were significantly more likely than non-RHS students to report complete abstinence from alcohol, marijuana, and other drugs at the 6-month follow-up (OR = 4.36, $p = .026$), significantly lower levels of marijuana use ($d = -0.51$, $p = .034$) and less absenteeism from school ($d = -0.56$, $p = .028$). **Conclusion:** These results indicate that RHSs have significantly beneficial effects on substance use and school absenteeism after 6 months for adolescents treated for SUDs.

ARTICLE HISTORY

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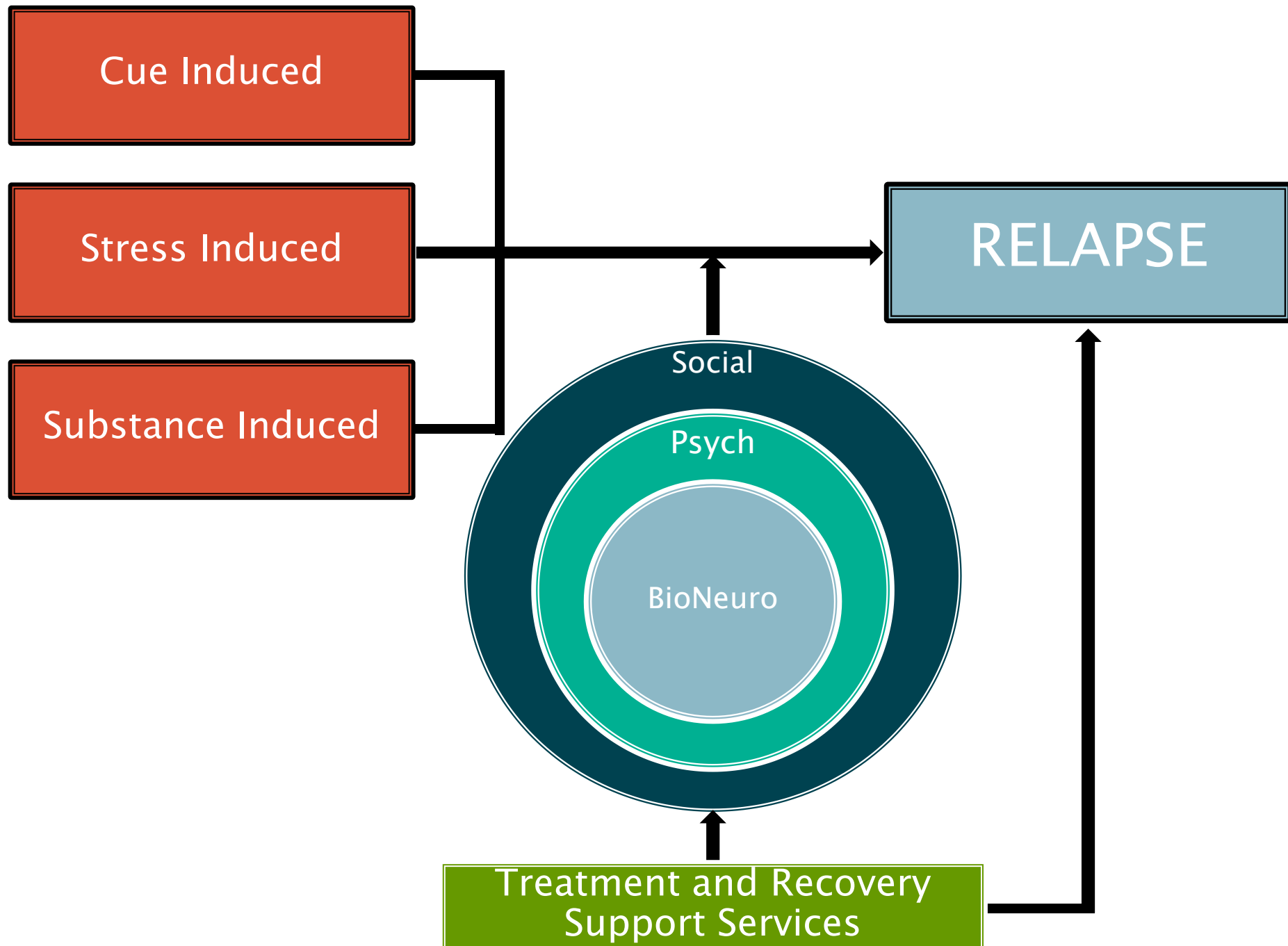
KEYWORDS

Adolescents; recovery schools; school success; substance use

Collegiate Recovery Programs

- ▶ There are almost 50 CRPs recognized by Association of Recovery in Higher Education (ARHE)
- ▶ Data in two model programs suggests relapse rates are very low at approximately 4% to 13% in any given semester





Three types of social support

- ▶ **Emotional** – warmth/nurturance provided by sources of support; offering of empathy, concern, affection, trust etc.
- ▶ **Instrumental**–provision of material goods, or services, money
- ▶ **Informational** –advice, guidance, suggestions

Post-acute withdrawal effects:

- ▶ More stress and lowered ability to experience normal pleasures

Increased sensitivity to stress via...

- Increased activity in hypothalamic-pituitary-adrenal axis (HPA-axis) and CRF/Cortisol release

Lowered ability to experience normal levels of reward via...

- Down-regulated dopamine D2/D3 receptor availability -- increasing risk of protracted dysphoria/anhedonia and relapse risk

Social Buffering

- ▶ Stress–buffering effects of social relationships – one of the major findings of past century
- ▶ Mechanisms of this poorly understood

Psychobiological Mechanisms Underlying the Social Buffering of the Hypothalamic–Pituitary–Adrenocortical Axis: A Review of Animal Models and Human Studies Across Development

Camelia E. Hostinar
University of Minnesota

Regina M. Sullivan
New York University Langone Medical Center

Megan R. Gunnar
University of Minnesota

Discovering the stress-buffering effects of social relationships has been one of the major findings in psychobiology in the last century. However, an understanding of the underlying neurobiological and psychological mechanisms of this buffering is only beginning to emerge. An important avenue of this research concerns the neurocircuitry that can regulate the activity of the hypothalamic–pituitary–adrenocortical (HPA) axis. The present review is a translational effort aimed at integrating animal models and human studies of the social regulation of the HPA axis from infancy to adulthood, specifically focusing on the process that has been named *social buffering*. This process has been noted across species and consists of a dampened HPA axis stress response to threat or challenge that occurs with the presence or assistance of a conspecific. We describe aspects of the relevant underlying neurobiology when enough information exists and expose major gaps in our understanding across all domains of the literatures we aimed to integrate. We provide a working conceptual model focused on the role of oxytocinergic systems and prefrontal neural networks as 2 of the putative biological mediators of this process, and propose that the role of early experiences is critical in shaping later social buffering effects. This synthesis points to both general future directions and specific experiments that need to be conducted to build a more comprehensive model of the HPA social buffering effect across the life span that incorporates multiple levels of analysis: neuroendocrine, behavioral, and social.

Keywords: stress, social support, early caregiving, oxytocin, prefrontal cortex

It is an empirical reality that some individuals succumb, whereas others thrive, when confronted with similar stressors. Having access to social support may be an important modulator of these widespread individual differences in responses to potentially stressful events. Indeed, some exciting experiments in humans (e.g., Heinrichs, Baumgartner, Kirschbaum, & Ehler, 2003; Kirschbaum, Klauer, Filipp, & Hellhammer, 1995; Taylor et al., 2008) and animals (e.g., Hennessy, 1984, 1986; Vogt, Coe, & Levine, 1981) have identified a dampening of the hypothalamic–pituitary–adrenocortical (HPA) axis response to stressors by social

factors as one of the possible mechanisms underlying the benefits of social support. Longitudinal studies also reveal relations between social support and basal levels of stress hormones such as salivary cortisol (Rosal, King, Ma, & Reed, 2004). Understanding the social buffering processes affecting this neuroendocrine axis would allow the possibility of interventions that might have cascading positive effects across multiple biological and psychological systems. Despite the important implications of this knowledge, our understanding of the underlying neurobiology and relevant components of social interaction that permit these HPA activity-regulating effects remains vastly incomplete.

RESPONDING TO STRESS: SOCIAL SUPPORT

How do social relationships influence health?

The Stress Buffering Model

- Social support buffers (i.e., moderates) the negative effects of stressors on health by providing resources (i.e., emotional, tangible, informational) that promote adaptive behavioral or neuroendocrine responses to acute or chronic stressors

RESPONDING TO STRESS: SOCIAL SUPPORT

- Widespread differences in the ways in which people respond to similar stressors
- **Social support** may help explain some of the difference in individual stress responses, for example, it's believed that:
 - There is a relationship between social support and **basal levels of stress hormones** (e.g., salivary cortisol)
 - Social support may help dampen the **hypothalamic-pituitary-adrenocortical (HPA) axis** response to stressors

SOCIAL SUPPORT:

“...information leading the subject to believe that he [she] is cared for and loved, esteemed, and a member of a network of mutual obligations”
(Cobb, 1976, p. 300)

Cobb, S. (1976). Social support as a Moderator of Life Stress. *Psychosomatic Medicine*, 38(5), 300-314.

Social relationships have “stress-buffering” effects...

RESPONDING TO STRESS: SOCIAL BUFFERING

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

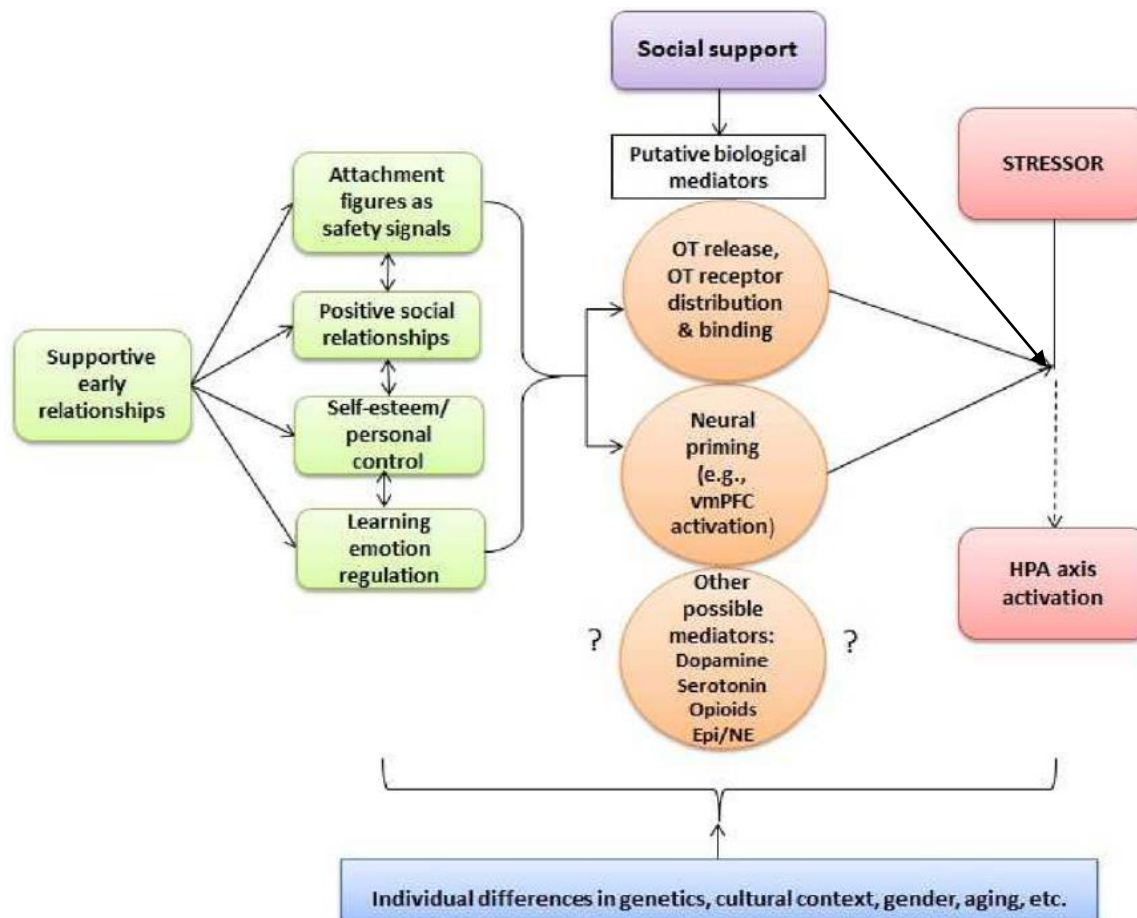


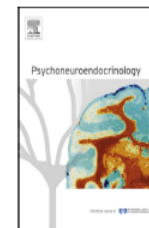
Figure 1. A Developmental Working Model of Social Buffering of the HPA Axis in Humans

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

- Prairie voles are very social, monogamous, creatures; and like alcohol
- Isolated prairie voles given 10% alcohol for 4 wks, followed by deprivation; then either kept isolated or housed with familiar same-sex social partner
- Isolated voles increased alcohol use but socially housed voles did not show increase.
- Voles display an alcohol deprivation/"relapse" effect that may be moderated by social re-integration, **and mediated neurobiologically by decreased CRF**

Available online at www.sciencedirect.com

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journal homepage: www.elsevier.com/locate/psyneuen

SHORT COMMUNICATION

Social partners prevent alcohol relapse behavior in prairie voles



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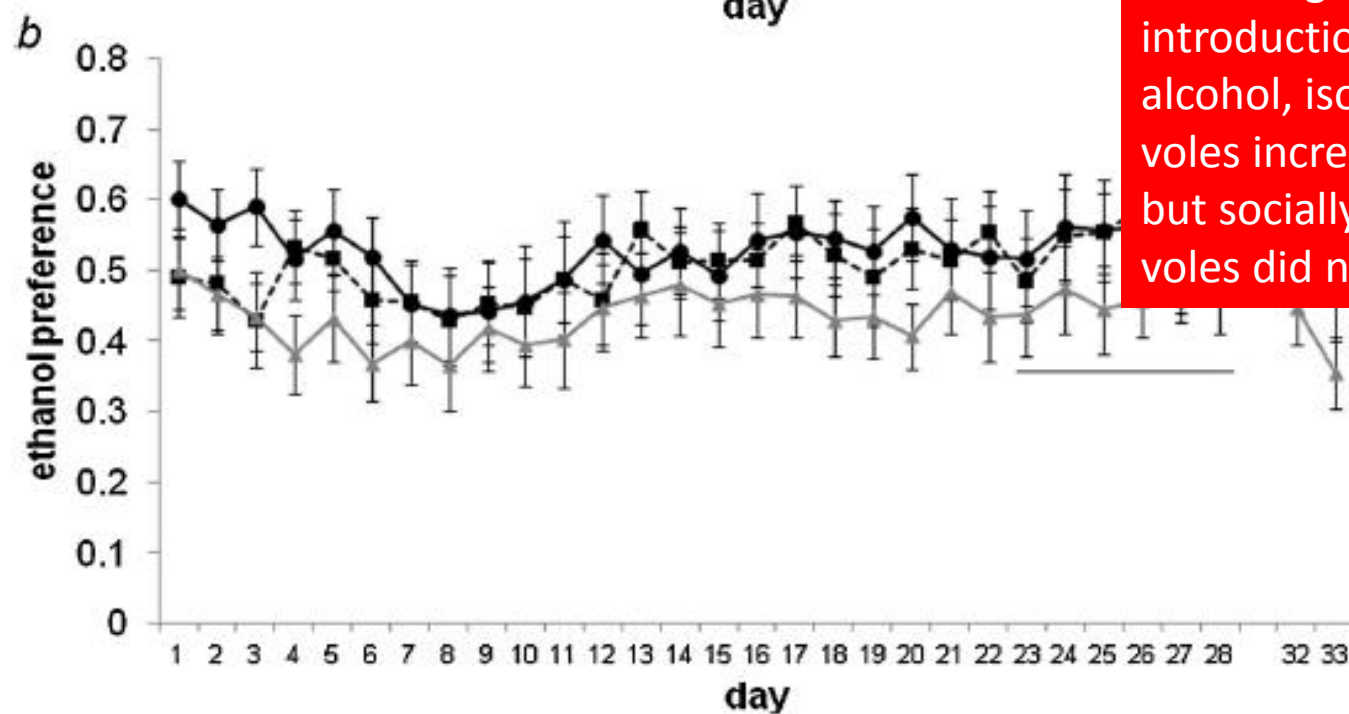
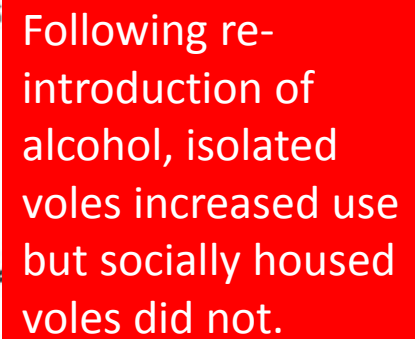
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KEYWORDS

Prairie vole;
Alcohol;
Relapse;
Alcohol deprivation
effect;
Ethanol;
Social support

Summary There is robust evidence for a protective role of interpersonal factors such as social support on alcohol relapse, but research on the mechanisms that social factors may be acting on to effectively protect individuals against relapse is lacking. Prairie voles are highly social, monogamous rodents that freely self-administer ethanol in high amounts, and are a useful model for understanding social influences on alcohol drinking. Here we investigated whether prairie voles can be used to model social influences on relapse using the alcohol deprivation effect, in which animals show a transient increase in ethanol drinking following deprivation. In Experiment I, subjects were housed alone during four weeks of 24-h access to 10% ethanol in a two-bottle choice test. Ethanol was then removed from the cage for 72 h. Animals remained in isolation or were then housed with a familiar same-sex social partner, and ethanol access was resumed. Animals that remained isolated showed an increase in ethanol intake relative to pre-deprivation baseline, indicative of relapse-like behavior. However, animals that were socially housed did not show an increase in ethanol intake, and this was independent of whether the social partner also had access to ethanol. Experiment II replicated the alcohol deprivation effect in a separate cohort of isolated animals. These findings demonstrate that prairie voles display an alcohol deprivation effect and suggest a 'social buffering' effect of relapse-like behavior in the prairie vole. This behavioral paradigm provides a novel approach for investigating the behavioral and neurobiological underpinnings of social influences on alcohol relapse.

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Post-acute withdrawal effects:

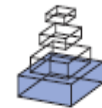
- ▶ More stress and lowered ability to experience normal pleasures

Increased sensitivity to stress via...

- Increased activity in hypothalamic-pituitary-adrenal axis (HPA-axis) and CRF/Cortisol release

Lowered ability to experience normal levels of reward via...

- Down-regulated dopamine D2/D3 receptor availability -- increasing risk of protracted dysphoria/anhedonia and relapse risk



The rewarding nature of social interactions

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The objective of this short review is to highlight rewarding as humans and discuss their neural basis. Thereby we report recent findings on how social stimuli in general are processed in the reward system of the Mind as one mediating process for experiencing social reward. In conclusion we discuss clinical implications for psychiatry and psychology.

Keywords: reward, theory of mind, social interaction

INTRODUCTION

Human societies form a dynamic and complex system, which requires frequent interaction between individuals. According to the “social brain hypothesis” (Dunbar, 1998; Adolphs, 2003) parts of the human neo-cortex have evolved to improve survival in dynamic

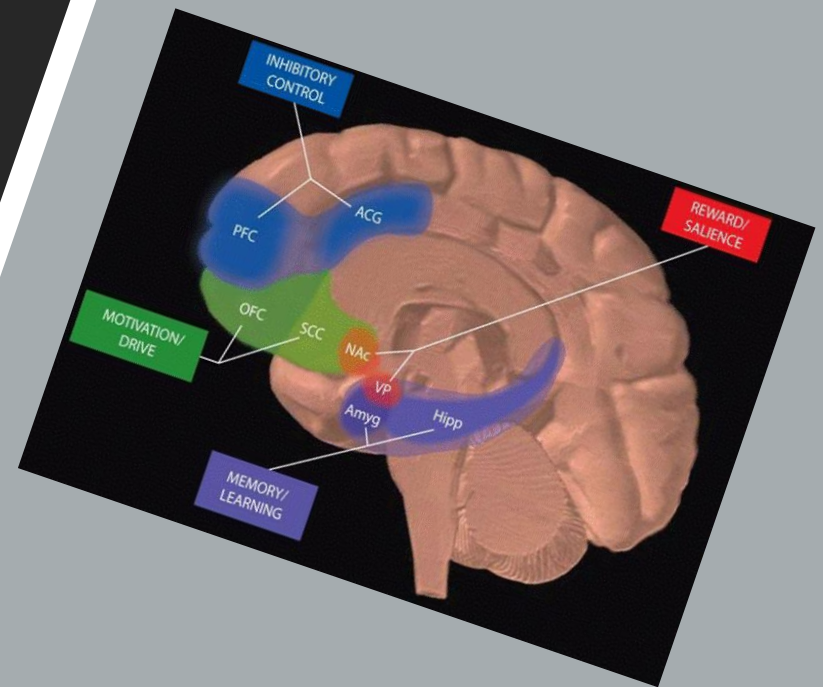
dopamine for highly socially motivated behaviors such as parental care, mating behavior and social interaction. Access to pups is more reinforcing (Dunbar, 2003) and dopamine in the nucleus accumbens is involved in typical mating behavior and social interaction.

Several empirical studies support the notion that social reward is processed in the same subcortical network as non-social reward and drug addiction.

There is evidence from several studies that dopaminergic reward circuits in the basal ganglia form the primary neural system for processing reward of various social stimuli which could motivate social behavior.

Neuroscience of Recovery Capital

- ▶ If addiction is a disease of the brain, could jobs, recovery housing, and social networks/friends, change the brain, upregulate down-regulated receptor systems, and increase the chances of long-term remission?



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
- [^{11}C]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 [^{11}C]raclopride.

Methods: Fourteen healthy volunteers were scanned with [^{11}C]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 [^{11}C]raclopride BP. A similar correlation was seen with the perceived social support, where higher [^{11}C]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: [^{11}C]raclopride, dopamine 2/3 receptor, PET Imaging, social status

Methods and Materials

Previous studies in animals have shown a correlation between dopamine transmission in the brain and social hierarchy (1). In monkeys, dominant and subordinate social rank are determined by physical and social triumph and defeat. Dominant animals win more physical confrontations and receive more social attention, such as grooming or huddling. Two positron emission tomography (PET) imaging studies have investigated the relationship between social status and $D_{2/3}$ receptors in the striatum in monkeys. Both showed that social dominance was associated with higher $D_{2/3}$ receptor binding compared with subordinate animals (2,3).

In humans, social hierarchy is a more subtle phenomenon that can be approximated by measuring social status and social support (4). Thus, the goal of the present study was to examine the correlation between these factors and dopamine $D_{2/3}$ receptor binding in human subjects. Given the known effect of disease states on striatal $D_{2/3}$ receptors, including substance dependence, schizophrenia, and anxiety disorders (5–7), only healthy control volunteers were included in this study. Social status was measured using the Barratt Simplified Measure of Social Status (BMSSS) (8) and social support was measured using the Multidimensional Scale of Perceived Social Support (MSPSS) (9). Our hypothesis was that low social status and low levels of social support would correlate with low $D_{2/3}$ receptor binding in the striatum measured with [^{11}C]raclopride.

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.

[^{11}C]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 [preDPU]), the caudate caudal to the AC (postcommissural caudate [postCAU]), and the putamen caudal to the AC (postcommissural putamen [postPUT]).

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doi:10.1016/j.biopsych.2009.07.037

D2/D3 RECEPTOR BINDING & SOCIAL STATUS AND SUPPORT

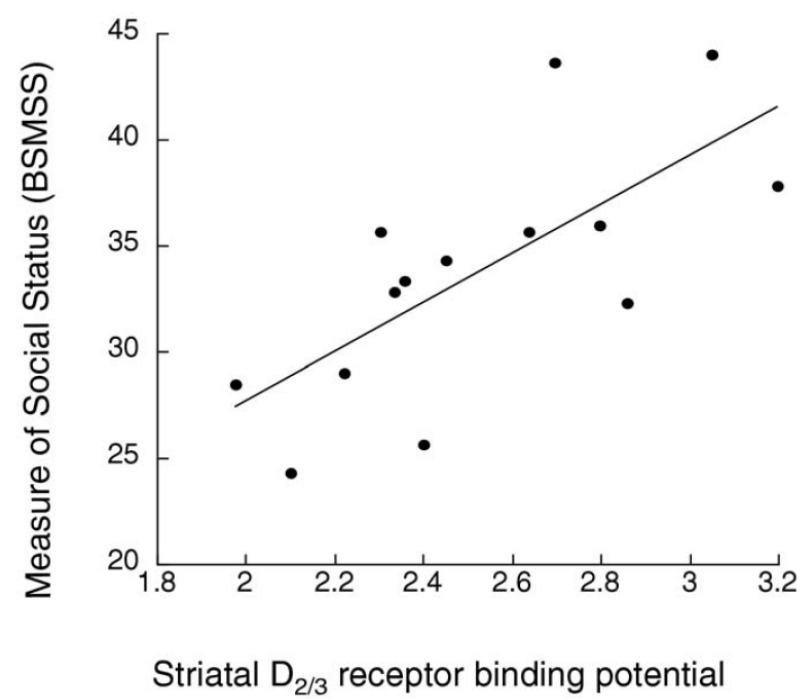


Figure 1. Correlation between [¹¹C]raclopride BP (x axis) and social status, measured with the Barratt Simplified Measure of Social Status (BSMSS). A positive correlation was seen, where higher BP correlated with higher BSMSS ($r = .71, p = .004$, age-corrected $p = .007$). BP, binding potential.

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

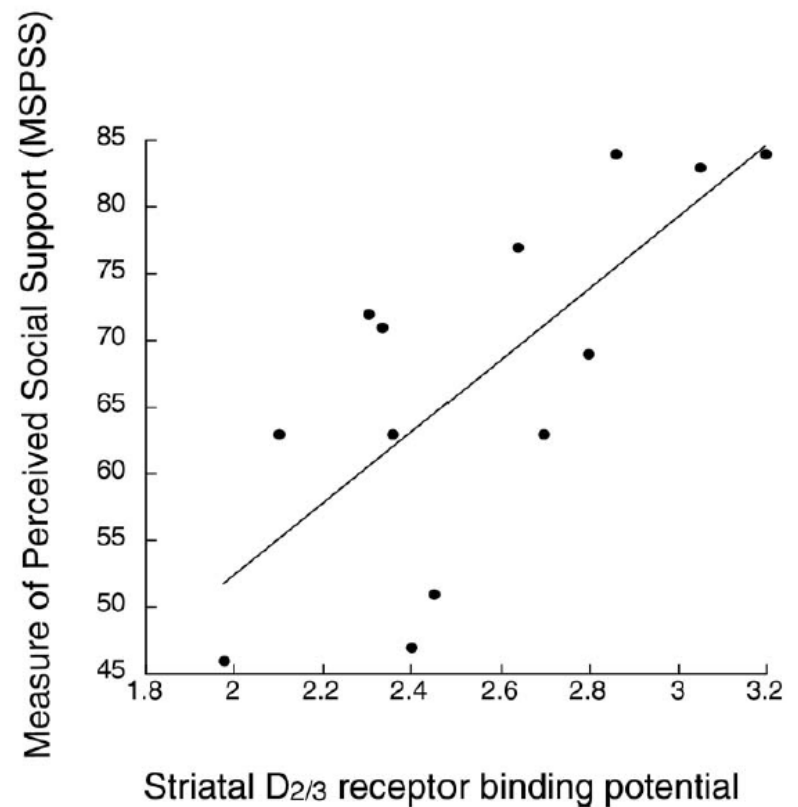


Figure 2. Correlation between [¹¹C]raclopride BP (x axis) and score on the Multidimensional Scale of Perceived Social Support (MSPSS). A positive correlation was seen, where higher BP correlated with higher score on the MSPSS ($r = .73, p = .005$, age-corrected $p = .02$). BP, binding potential.

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

Social dominance in monkeys: dopamine D₂ receptors and cocaine self-administration

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Monkeys, like humans, love to be with each other, and also like cocaine...

Disruption of the dopaminergic system has been implicated in the etiology of many pathological conditions, including drug addiction. Here we used positron emission tomography (PET) imaging to study brain dopaminergic function in individually housed and in socially housed cynomolgus macaques ($n = 20$). Whereas the monkeys did not differ during individual housing, social housing increased the amount or availability of dopamine D₂ receptors in dominant monkeys and produced no change in subordinate monkeys. These neurobiological changes had an important behavioral influence as demonstrated by the finding that cocaine functioned as a reinforcer in subordinate but not dominant monkeys. These data demonstrate that alterations in an organism's environment can produce profound biological changes that have important behavioral associations, including vulnerability to cocaine addiction.

The importance of social context, control over environment, and relapse risk

- ▶ When all monkeys were individually housed no difference in DA D2 receptor volume
- ▶ After 3 months of social housing, dominant monkeys showed 22% increase in DA D2 volume; subordinate monkeys – no change
- ▶ Increase in DA D2 associated with lower likelihood of cocaine use
- ▶ “Dominance” defined as: easy access to food and water, social mobility, and greater environmental control.
- ▶ Human Implications: facilitating greater access to and availability of recovery capital may instill hope, empower people, help them have more control over their environment, increase social contact and social mobility through the environment, and thereby induce neurochemical changes that reduces relapse risk

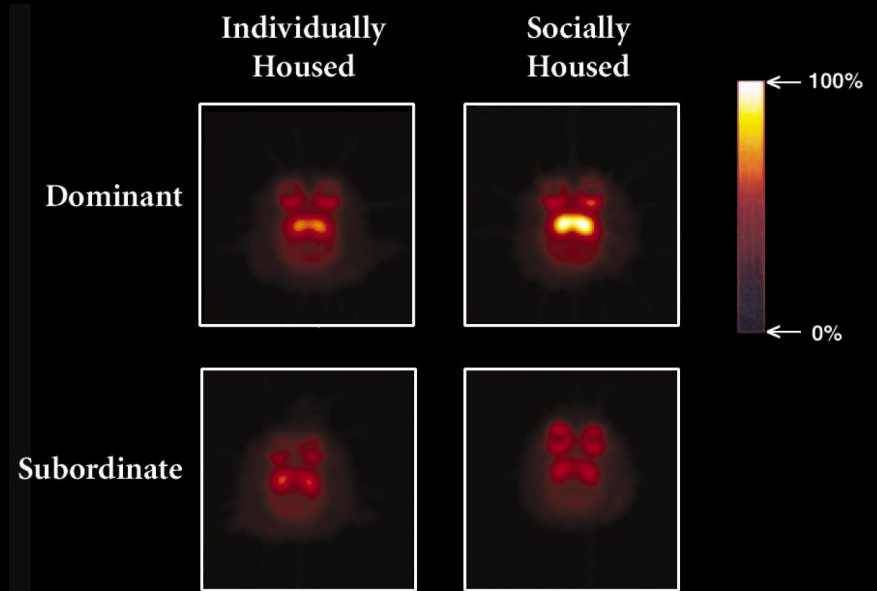


Table 1. Dopaminergic characteristics of monkeys.

Social rank ^a	[¹⁸ F]FCP distribution volume ratios		
	Individually housed	Socially housed	Percent change
1	2.49 ± 0.08	3.04 ± 0.23 ^{b,c}	+22.0 ± 8.8
2	2.58 ± 0.13	2.99 ± 0.13	+16.7 ± 6.0
3	2.58 ± 0.13	2.88 ± 0.30	+13.4 ± 15.3
4	2.40 ± 0.06	2.49 ± 0.10	+3.9 ± 5.3

Mean ± s.e.m. [¹⁸F]FCP DVR as determined with PET imaging in male cynomolgus monkeys as a function of social rank while individually and socially housed. ^aFor individually housed scans, these numbers represent eventual social rank. ^bSignificantly higher than individually housed 'dominants.' ^cSignificantly higher than socially housed subordinates.



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Summary

Treating Addiction as a Chronic Disease

- ▶ RSSs open up new pathways to recovery and can enhance and extend the effects of professionally-delivered care by....
 - Helping change social networks towards those that model and support recovery in the communities in which people live
 - Helping build resilience, buffer stress, and increase recovery coping, confidence and motivation over the long-term
 - Help individuals build further “recovery capital” by providing supports in high risk educational environments like colleges/high schools, providing linkages to employment opportunities, and health/social services
 - Providing ongoing recovery-specific support at little cost reducing burden on professional health services while enhancing remission rates, thereby reducing health care costs.