



# ***The Psychological and Physiological Benefits of Physical Exercise on Addiction Recovery***



**Ryan Bain**  
**Tree House Recovery**



**Dr. John Ratey**  
**Harvard Medical School**



**Leslie Gold**  
**Strides in Recovery**

Opening Activity     $\begin{matrix} + \\ \circ \end{matrix} \bullet$



## Non-Profit National Organization

- Founded 2011
- Headquartered in Colorado Springs
- Publication of *Spark: The Revolutionary, New Science of Exercise and the Brain*

## Brain-Fitness Connection

- Physical exercise equally benefits your mind and your body
- Improves cognition, mental health, mood and executive function

## Members

- Organizations across the US that embrace exercise to support addiction recovery.







- **Areas of Application**

- Addiction Recovery
- Youth: ADD, ADHD, Autism
- First Responders: Trauma & Stress
- Healthy Aging

**For More Information:**  
[sparkinglife.org](http://sparkinglife.org)

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# Presentation Overview

**Part One:** The Brain Science of Exercise, Dr. John Ratey

**Part Two:** Local Programs Using Exercise to Support Addiction Recovery

- Tree House Recovery
  - Strides in Recovery
- 
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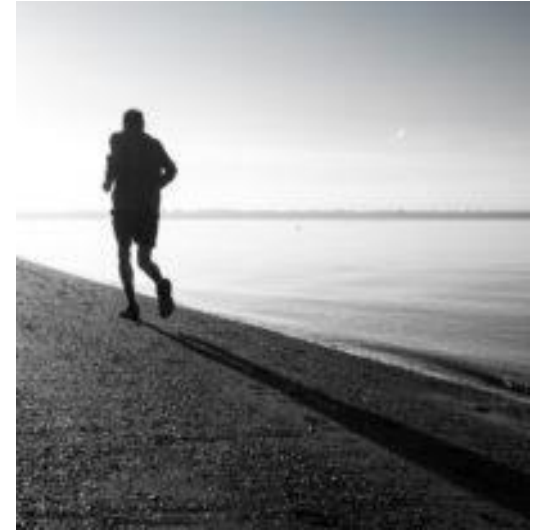
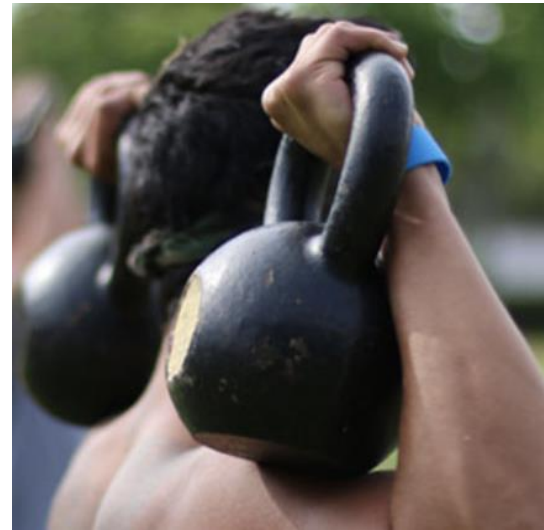
[Link](#) to  
Video by Dr. John Ratey

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# PHYSICAL ACTIVITY

A Research-Based Method  
To Treating  
Substance Use Disorder

Ryan Bain  
[ryan@treehouserecovery.com](mailto:ryan@treehouserecovery.com)



**TREE HOUSE RECOVERY®**  
Sustainable Addiction Recovery for Men



# Ryan Bain, MFT

## TREE HOUSE RECOVERY

National Program Director

Creator of Fitness Therapy Program

Individual & Group Therapy

## SPARKING LIFE

Board of Directors

Addiction Recovery Advisory Board

## SPORTS COACH

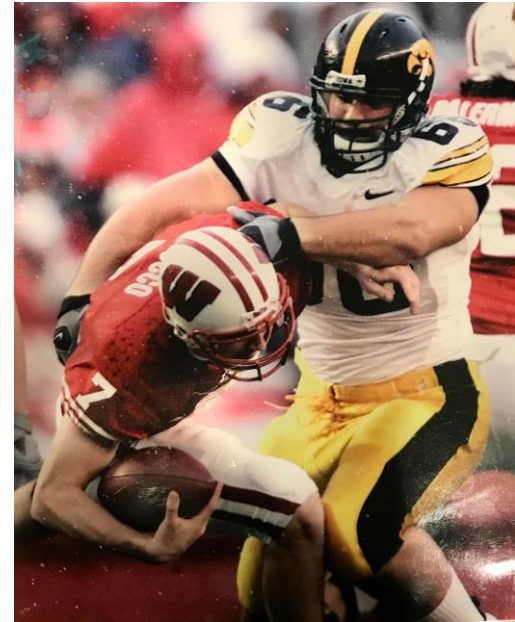
High School, Collegiate, Professional

Wrestling, Football, Strength & Conditioning

## BA: SOCIOLOGY

## MA: COUNSELING PSYCHOLOGY

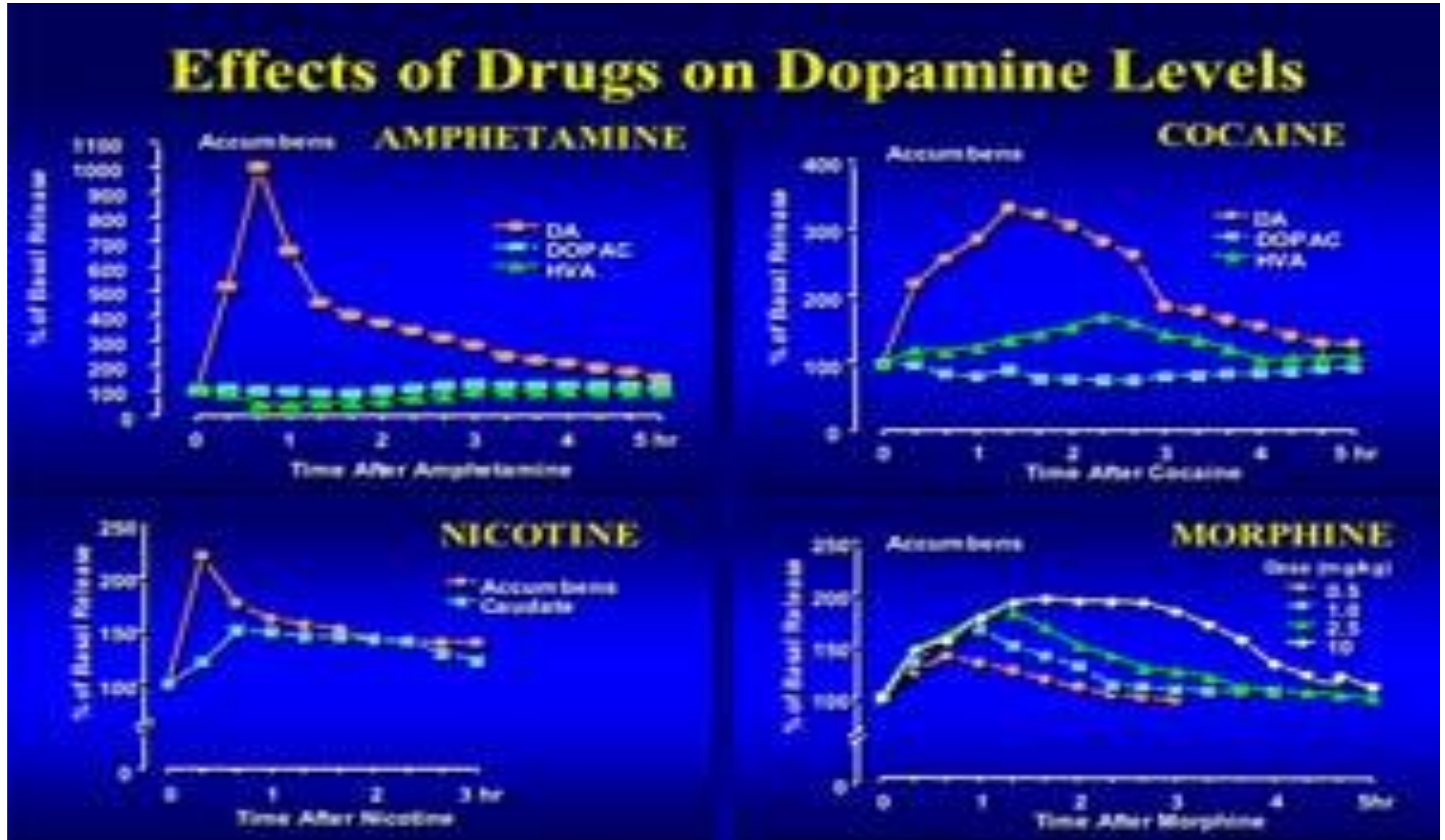
Specialization: Marriage & Family Therapy





# BRAIN ADAPTATION DURING ACTIVE ADDICTION

- The brain is flooded with tremendous amounts of dopamine
- Stops producing natural neuro-chemical processes



# BRAIN ADAPTATION DURING ACTIVE ADDICTION

- Adapts to long-term drug use
- Tolerance develops

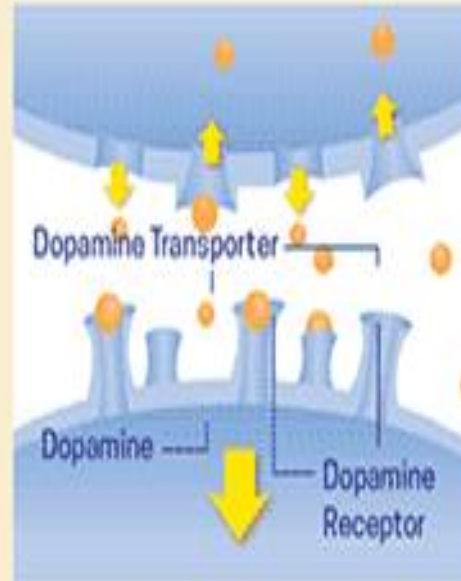
## Some drugs target the brain's pleasure center

Brain reward (dopamine pathways)



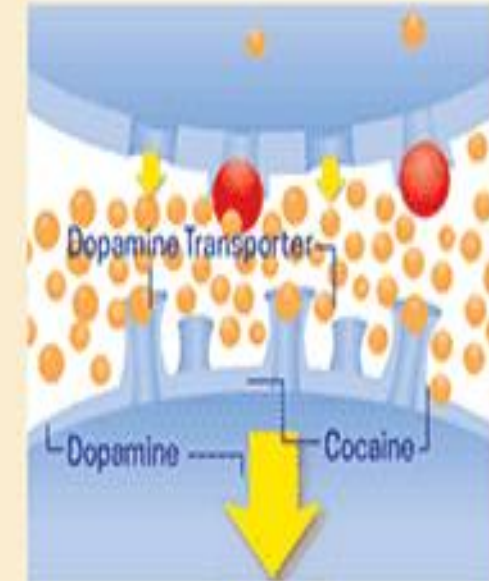
*These brain circuits are important for natural rewards such as food, music, and sex.*

How drugs can increase dopamine



While eating food

*Typically, dopamine increases in response to natural rewards such as food. When cocaine is taken, dopamine increases are exaggerated, and communication is denied.*



While using cocaine

# **Symptoms of Post-Acute Withdrawal Syndrome (PAWS)**

Cognitive Impairments

Feelings of Anxiety or Panic

Depressed Mood

Relational Challenges

Irritability

Obsessiveness

Compulsive Behaviors

Pessimism

Apathy

Sleep Disturbances

Stress Sensitivity

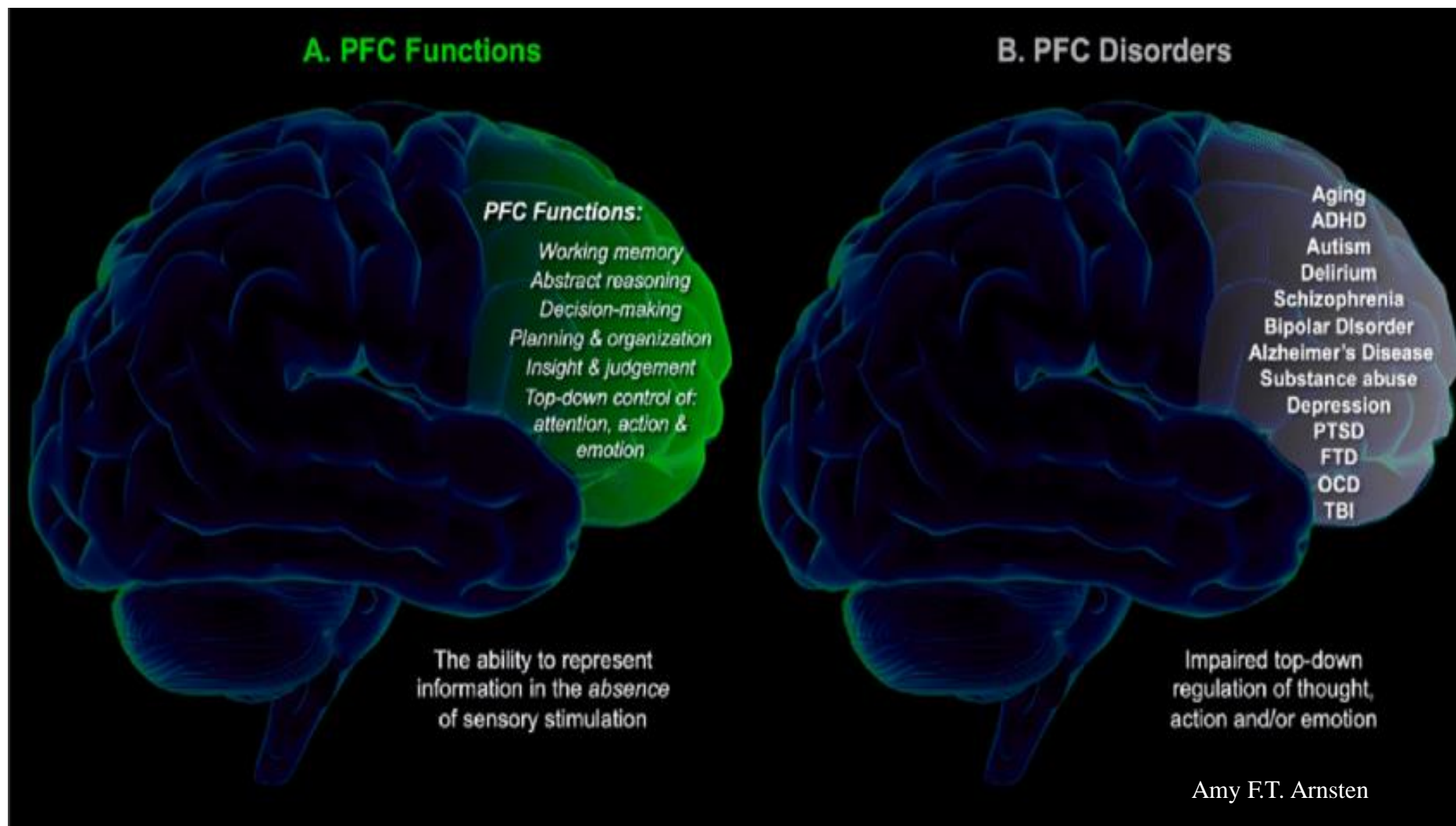
Cravings

Stage	Description	Activities needed to move to next stage
Pre-contemplative	Unaware of need for change; or aware but not considering change	<ul style="list-style-type: none"> <li>• Consciousness raising</li> <li>• Re-evaluation of the environment</li> <li>• Exploration of feelings about changing</li> </ul>
Contemplative	Considers behavioural change, seeks out information about personal advantages; may be ambivalent about changing	<ul style="list-style-type: none"> <li>• Self-evaluation</li> </ul>
Preparation/decision	Actively makes plans to change, takes steps towards action	<ul style="list-style-type: none"> <li>• Perception of environmental and social supports for change</li> </ul>
Action	Actively modulates behaviour; learns new skills; effects changes in environment to support change	<ul style="list-style-type: none"> <li>• Belief in ability to change and commitment to act</li> <li>• Rehearsal of new learning; substitution of new behaviour for old ones</li> <li>• Management of reinforcers to maintain gain</li> <li>• Restructuring of environment and experiences to avoid cues to old behaviour</li> <li>• Creation of environmental supports</li> </ul>
Maintenance	Maintains gains made; requires environmental support for change to assist in maintenance	<ul style="list-style-type: none"> <li>• Maintenance of environmental supports for change</li> </ul>

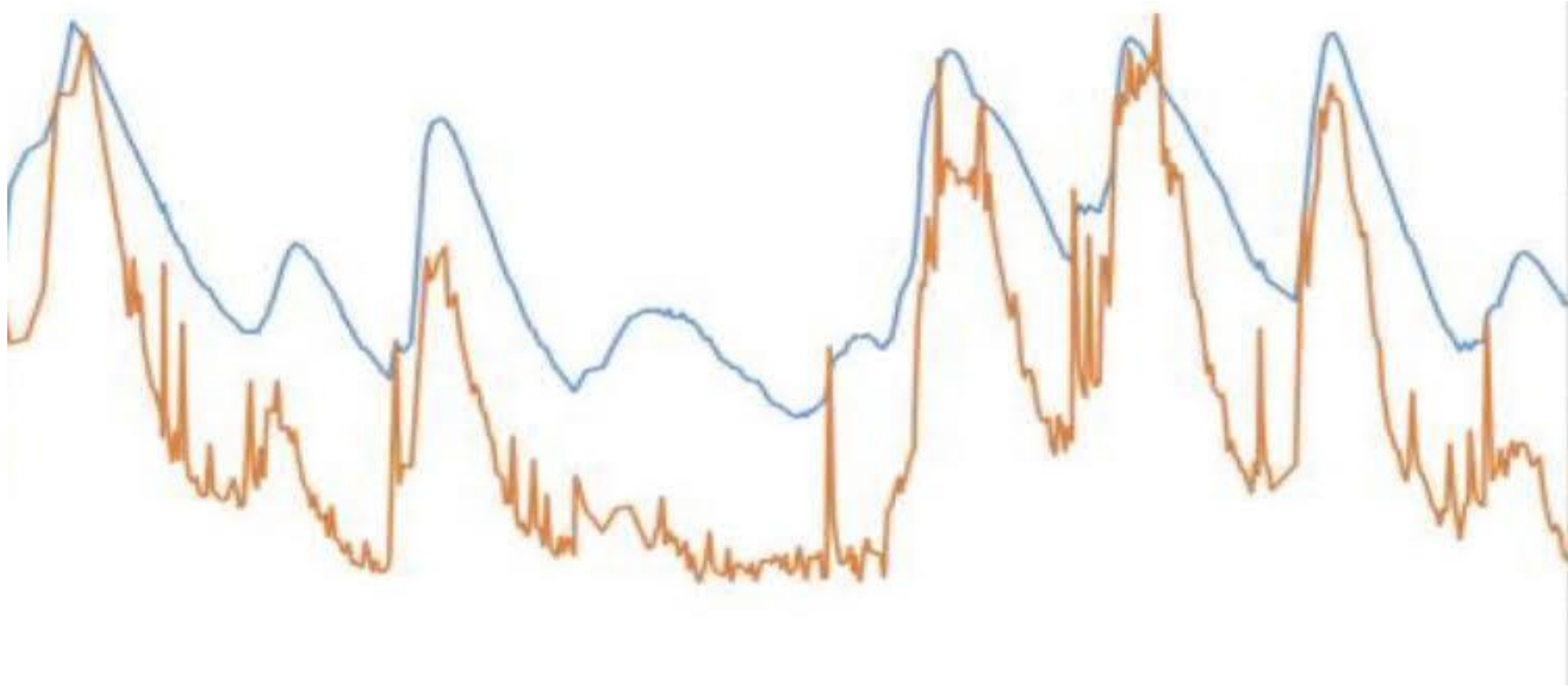
Source: (Woodward, 2000, p 18).



# Post-Acute Withdrawal Syndrome (PAWS) affects the Prefrontal Cortex



# Dysregulated Brain Waves in the Prefrontal Cortex during PAWS



# WITHDRAWAL TIMELINE

**01** DETOX-Acute Withdrawal  
1 to 2+ weeks

Mostly Physical Symptoms

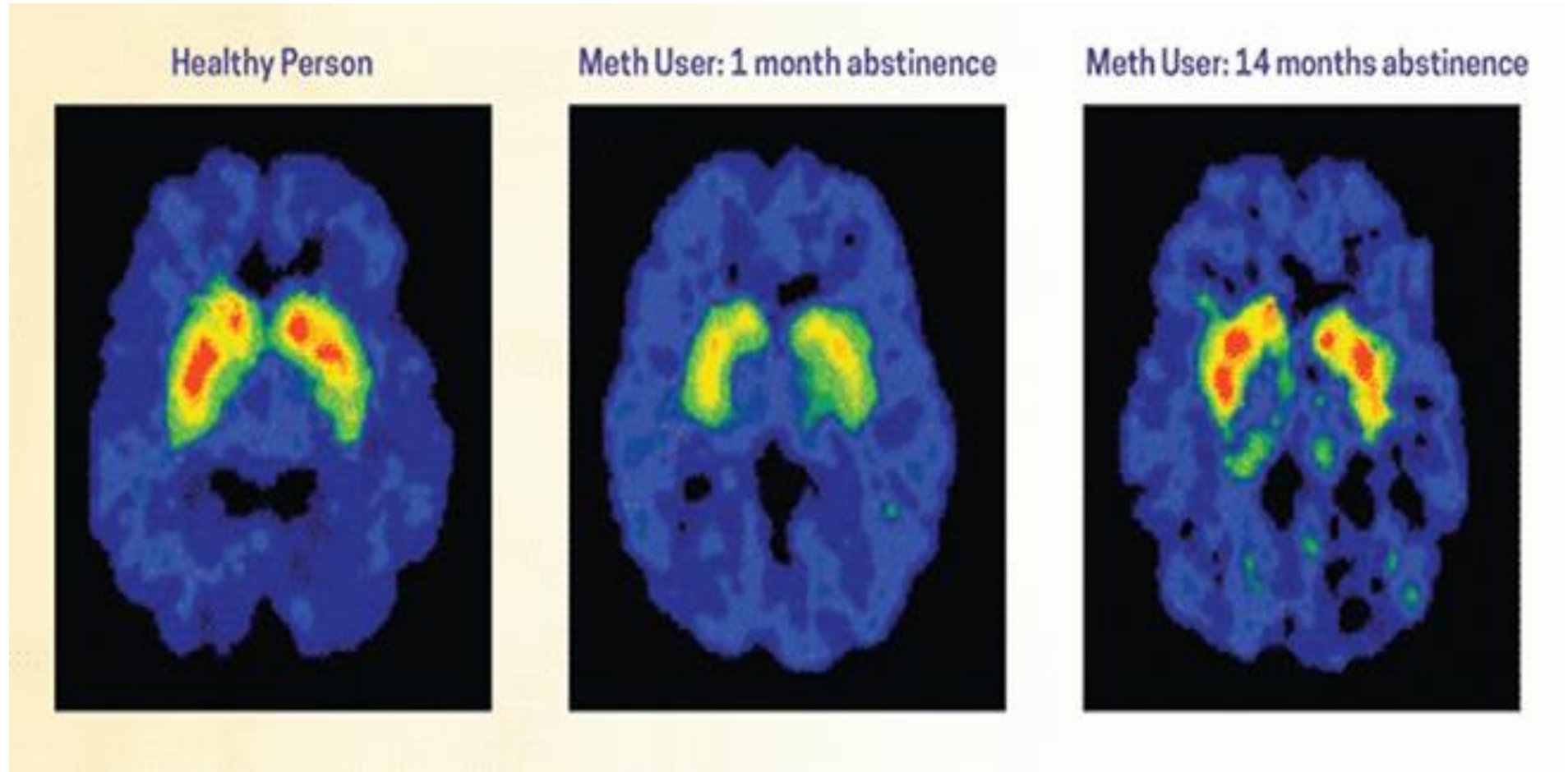
**02** PAWS-Post-Acute Withdrawal Syndrome  
weeks to months

Mostly Mental & Emotional Symptoms

# Changes in Dopamine Receptor Availability over Time

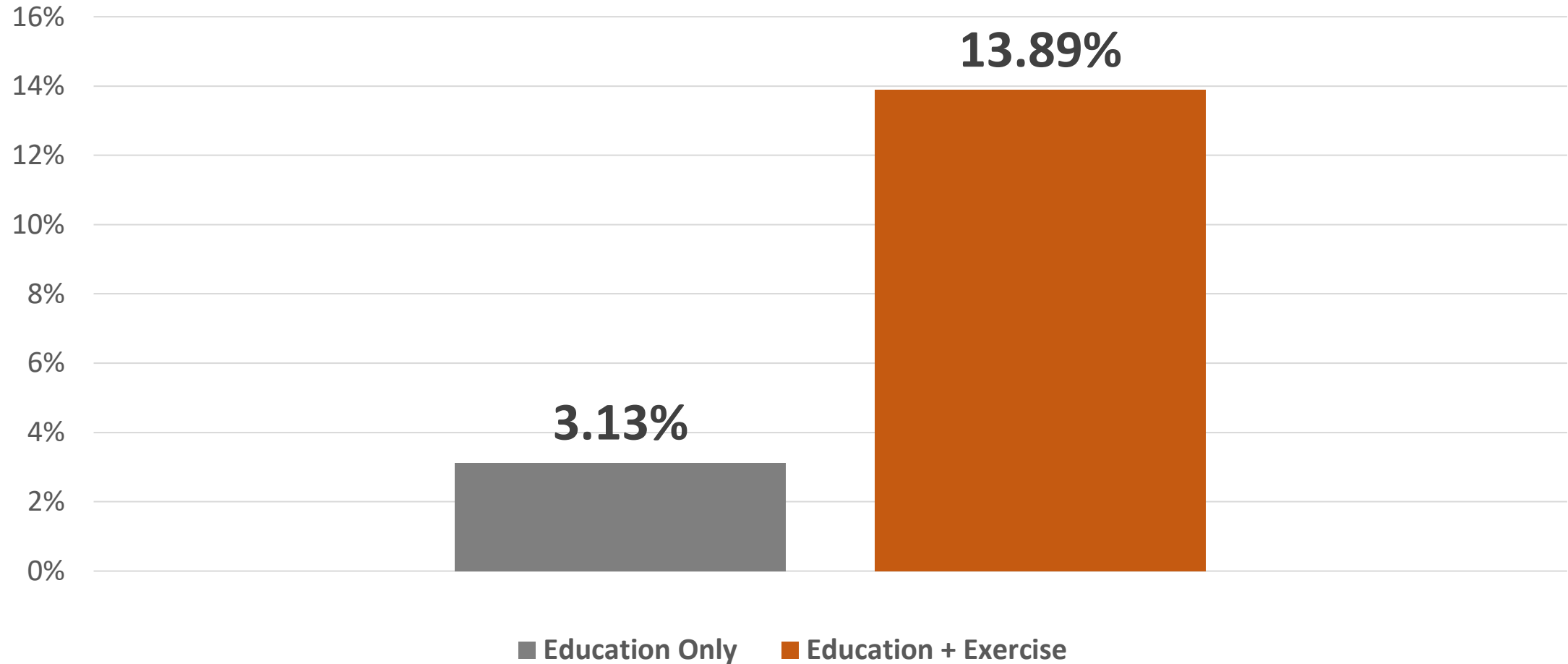
**During  
Active  
Addiction**

- Dopamine Deficit
- Anhedonia
- Amygdala Hijack





## Change in Striatal Dopamine Receptor Availability after 8 Weeks



<http://newsroom.ucla.edu/releases/adding-exercise-to-health-education-helps-treat-addiction-say-ucla-researchers>

<https://www.nature.com/articles/npp2015331> Effect of Exercise Training on Striatal Dopamine D2/D3 Receptors in Methamphetamine Users during Behavioral Treatment

# Exercise and Pharmacotherapy in the Treatment of Major Depressive Disorder

Blumenthal, James A.; Babyak, Michael A.; Doraiswamy, P Murali; [More](#)

**Psychosomatic Medicine.** 69(7):587-596, September 2007.

 [Abstract](#)  [Favorites](#)  [PDF](#)  [Get Content & Permissions](#)

## Objective:

To assess whether patients receiving aerobic exercise training performed either at home or in a supervised group setting achieve reductions in depression comparable to standard antidepressant medication (sertraline) and greater reductions in depression compared to placebo controls.

## Methods:

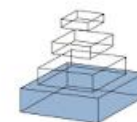
Between October 2000 and November 2005, we performed a prospective, randomized controlled trial (SMILE study) with allocation concealment and blinded outcome assessment in a tertiary care teaching hospital. A total of 202 adults (153 women; 49 men) diagnosed with major depression were assigned randomly to one of four conditions: supervised exercise in a group setting; home-based exercise; antidepressant medication (sertraline, 50–200 mg daily); or placebo pill for 16 weeks. Patients underwent the structured clinical interview for depression and completed the Hamilton Depression Rating Scale (HAM-D).

## Results:

After 4 months of treatment, 41% of the participants achieved remission, defined as no longer meeting the criteria for major depressive disorder (MDD) and a HAM-D score of <8. Patients receiving active treatments tended to have higher remission rates than the placebo controls: supervised exercise = 45%; home-based exercise = 40%; medication = 47%; placebo = 31% ( $p = .057$ ). All treatment groups had lower HAM-D scores after treatment; scores for the active treatment groups were not significantly different from the placebo group ( $p = .23$ ).

## Conclusions:

The efficacy of exercise in patients seems generally comparable with patients receiving antidepressant medication and both tend to be better than the placebo in patients with MDD. Placebo response rates were high, suggesting that a considerable portion of the therapeutic response is determined by patient expectations, ongoing symptom monitoring, attention, and other nonspecific factors.



# Effects of exercise and physical activity on anxiety

**Elizabeth Anderson<sup>1</sup> and Geetha Shivakumar<sup>1,2\*</sup>**

<sup>1</sup> VA North Texas Health Care System, Dallas, TX, USA

<sup>2</sup> Department of Psychiatry, University of Texas Southwestern Medical Center, Dallas, TX, USA

\*Correspondence: geetha.shivakumar@va.gov

**Edited by:**

Eduardo Lusa Cadore, Federal University of Rio Grande do Sul, Brazil

**Reviewed by:**

Eduardo Lusa Cadore, Federal University of Rio Grande do Sul, Brazil

There is strong evidence from animal studies that exercise and regular activity positively impacts the pathophysiological processes of anxiety. Numerous studies and meta-analyses show that exercise is also associated with reduced anxiety in clinical settings. Similar to the heterogenic nature of the anxiety, no single mechanism sufficiently accounts for the anxiolytic nature of exercise. Physical activity positively impacts a number of biological, as well as psychological, mechanisms. The role of exercise in the enhancement of neurogenesis in humans has drawn significant attention in recent years and its implications for anxiety disorders are an exciting area of investigation. Future studies are needed to further this type of work, as well as studies specifically exploring clinical applications of exercise in anxiety disorders.



# Effects of Physical Exercise on Cognitive Functioning and Wellbeing: Biological and Psychological Benefits

*Laura Mandolesi<sup>1,2\*</sup>, Arianna Polverino<sup>1,3</sup>, Simone Montuori<sup>1</sup>, Francesca Foti<sup>2,4</sup>, Giampaolo Ferraioli<sup>5</sup>, Pierpaolo Sorrentino<sup>6</sup> and Giuseppe Sorrentino<sup>1,3,7</sup>*

Much evidence shows that physical exercise (PE) is a strong gene modulator that induces structural and functional changes in the brain, determining enormous benefit on both cognitive functioning and wellbeing. PE is also a protective factor for neurodegeneration.

However, it is unclear if such protection is granted through modifications to the biological mechanisms underlying neurodegeneration or through better compensation against attacks. This concise review addresses the biological and psychological positive effects of PE describing the results obtained on brain plasticity and epigenetic mechanisms in animal and human studies, in order to clarify how to maximize the positive effects of PE while avoiding negative consequences, as in the case of exercise addiction.



## PAWS SYMPTOMS

Cognitive Impairments

Feelings of Anxiety or Panic

Depressed Mood

Relational Challenges

Irritability

Obsessiveness

Compulsive Behaviors

Pessimism

Apathy

Sleep Disturbances

Stress Sensitivity

Craving

**VS**

## BENEFITS OF EXERCISE

Enhances Executive Function

Mood Regulation

Acts as an Antidepressant

Lessens Anxiety

More Love & Bonding

Better Consequence Evaluation

Enhances Impulse Control

Increases Self-Confidence

Increases Motivation & Drive

Decreases Stress

Improves Sleep Hygiene

Reduced Cravings



**TREE HOUSE RECOVERY®**  
Sustainable Addiction Recovery for Men

Video not available to be shared



MEDICINE & SCIENCE  
IN SPORTS & EXERCISE

DOI: 10.1249/01.mss.0000561810.37616.86  
June, 2019  
51(6): 437



Board #6

May 30 1:30 PM - 3:30 PM

### Exercise Interventions Improve Drug Abstinence at an In-Patient Rehabilitation Center

Emily L. Roessel<sup>1</sup>, J. Mark VanNess<sup>1</sup>, Mercedes K. Steidley<sup>1</sup>,  
Ryan C. Bain<sup>2</sup>, Courtney D. Jensen<sup>1</sup>. <sup>1</sup>University of the Pacific,  
Stockton, CA. <sup>2</sup>Tree House Rehabilitation, Orange County, CA.

Exercise training likely enhances coping skills and sobriety among patients with substance use disorder. Better examination of the mechanisms producing these changes may help identify more effective interventions. **PURPOSE:** To test the effect of a vigorous exercise prescription on drug abstinence in voluntary rehabilitation patients. **METHODS:** 25 male subjects in a drug treatment program underwent a 12-week intervention, which included cardiovascular exercise, resistance training, and supportive psychotherapy. Five days a week, subjects were asked to participate in either yoga with mindfulness practices or action-based induction therapy lasting two hours; there was also a 90-minute exercise boot camp. Data collected were exercise adherence, exercise performance, sobriety and relapse rates, and an assessment of emotional coping skills. Chi-squared tests and t-tests compared exercisers to non-exercisers; logistic and linear regressions tested the effect of exercise behavior on measurements of coping and sobriety. **RESULTS:** Subjects had experienced frequent relapse (5±8 episodes) prior to the current admission. Across the sample, 84% were sober on completion of the program, 8% relapsed during treatment, and 36% relapsed after treatment. During the program, 84% exercised regularly, 68% practiced yoga, and 60% followed a disciplined diet. Bench press max improved over the program (39%;  $p<0.001$ ), as did squat max (55%;  $p<0.001$ ) and deadlift max (70%;  $p<0.001$ ). Among patients who exercised regularly, 91% were sober on completion compared to 50% of patients who did not engage in regular exercise ( $p=0.043$ ). Owing to a small sample of patients who relapsed during treatment ( $N=2$ ), the difference in exercisers who relapsed during treatment (5%) and non-exercisers who relapsed (25%) was not significant ( $p=0.171$ ). Following treatment, 29% of exercisers and 75% of non-exercisers relapsed ( $p=0.076$ ). The odds of successfully managing adverse emotional states when they arose increased 20-fold in subjects who exercised regularly ( $p=0.036$ ). Each additional session of yoga per week predicted a 20-day increase in the longest duration of sobriety ( $p=0.016$ ). **CONCLUSION:** Exercise appears to exert a positive effect on drug and alcohol sobriety and coping skills in a population that struggles with frequent relapse.

## DATA COLLECTED

- ★ Post-treatment sobriety and relapse rates
- ★ Post-treatment coping skill implementation
- ★ Post-treatment exercise adherence
- ★ Exercise performance during treatment

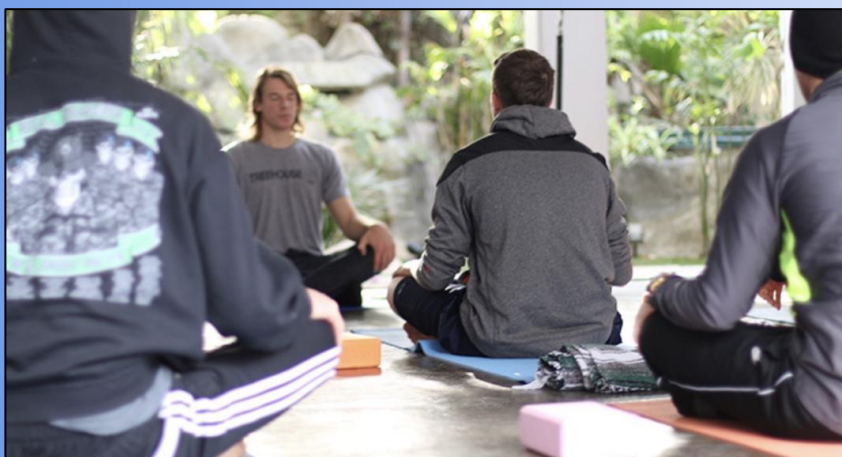
## RESULTS

- ★ 64% of program participants maintained sobriety post-treatment
- ★ 29% of subjects who engaged in regular exercise levels post-treatment relapsed
- ★ 75% of non-exercisers relapsed post-treatment





**TREE HOUSE RECOVERY®**  
Sustainable Addiction Recovery for Men



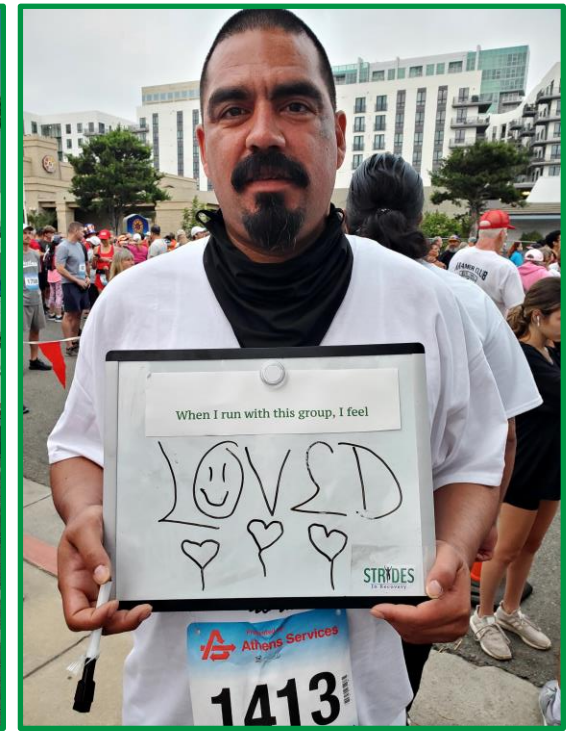


# STRIDES

In Recovery

We bring  
recovery-focused  
running/walking  
programs to  
addiction  
treatment  
communities.

Presented by Leslie Gold  
Founder and Executive Director



# The Birth of an Idea

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[Link](#) to the video of the team that inspired the creation of Strides in Recovery





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*“Being part of this team means  
That sometimes we carry others  
and other times we are carried.  
Sometimes we need to be loved  
when we can’t love ourselves, and  
love others when they feel  
vulnerable. We go through the  
season and need each other.”*

-Robin L., LA Marathon Finisher, first year of recovery

# Three Pillars of Our Program



**Exercise  
(Walking / Running)**



**Supportive  
Community**



**Training Toward a  
Challenging Goal**



# Our Values

## **Recovery-focused**

We are a goal-oriented group recovery program that uses running/walking to support sobriety.

## **Inclusive**

Everyone is welcome regardless of level of fitness or experience.

## **Non-Competitive**

We support moving forward in recovery and in life at the pace that's right for each person.

## **Collaborative**

We celebrate each other's successes and lift others when they are down. We inspire and encourage each other to do our best.

# Types of Benefits as told by our participants

- Increased rate of brain repair
- Additional benefits of physical activity
- Training as part of a community
- Training toward a goal
- Preparing for a healthy lifestyle after treatment

# Brain Healing and Other Benefits of Exercise





***“After I started running, I stopped taking my antidepressants. I feel so much better.”***





“This would be so much easier if I quit smoking.”

Used by some treatment providers as part of their smoking cessation program

**'Everything is so dark. If I'm going to be miserable, why be sober?'**

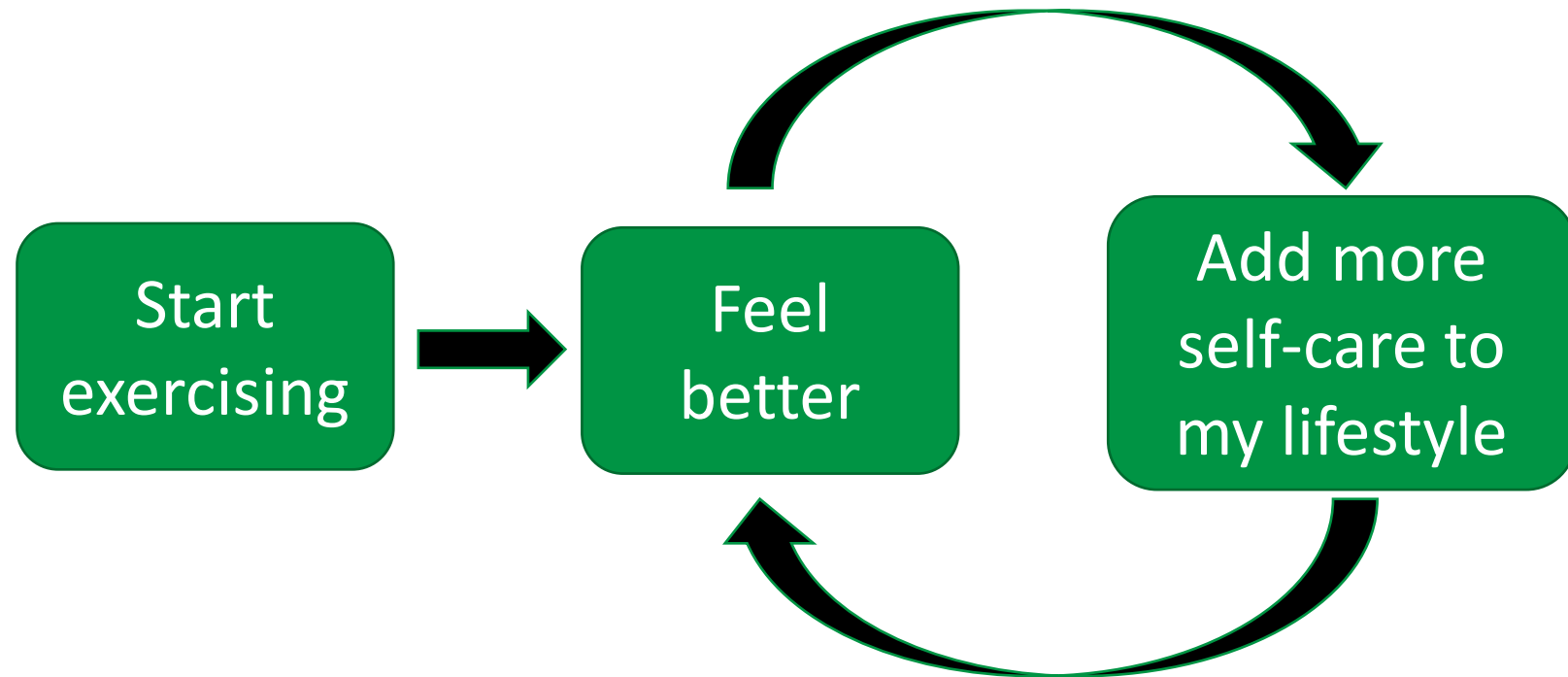
## How Toni Stopped Hating Herself



*"If I had known working out would make me feel this good, I would have always been active. I never believed all those people who talked about how much better they felt. Now I know it's true. I will never go back to being insecure or hating myself. Being in shape makes me want to do things that help me. It makes me want to do the program and be a sponsor."*

*-Toni C.*

Adding exercise to early recovery can inspire additional positive lifestyle changes






# The Benefits of Training with a Group

What researchers already know

What our participants say

# Managing Substance Use Disorder through a Walking/Running Training Program

Chia-Liang Dai<sup>1</sup> , Ching-Chen Chen<sup>2</sup>, George B Richardson<sup>3</sup> and Howard R. D. Gordon<sup>1</sup>

<sup>1</sup>Department of Teaching and Learning, University of Nevada, Las Vegas, USA. <sup>2</sup>Department of Counselor Education, School Psychology, and Human Services, University of Nevada, Las Vegas, USA. <sup>3</sup>School of Human Services, University of Cincinnati, USA.

Substance Abuse: Research and Treatment  
Volume 14: 1–8  
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DOI: 10.1177/1178221820936681



**ABSTRACT:** While emerging studies have demonstrated the benefit of exercise in Substance Use Disorder (SUD) recovery outcomes, lack of motivation to engage in exercise has been indicated as one of many perceived barriers that contribute to low recruitment and adherence rates in SUD treatment. The current study aimed to explore participants' perceptions of attending a supervised exercise program (boot camp workouts walking/running practice, and a race event) while in treatment for SUD. A total of 109 participants were recruited to a 14-week exercise training program and 61 chose to participate in, and completed, a race at the close of the program. Interviews were conducted during weeks 6 through 14 and data were examined using Thematic Analysis. Three main themes were identified: (1) pushing forward recovery through running, (2) gaining a sense of achievement by crossing the finish line, and (3) building a sense of belonging in the program. Implications for SUD recovery programs are discussed.

**KEYWORDS:** supervised exercise program, boot camp workouts, substance use disorder, relapse prevention

# Learning to Accept Help

*“For a long time, I saw help as a sign of weakness. To have the volunteers come beside me, cheer me on, and give me encouragement. . . embracing volunteer is a good thing. It doesn’t make me weak; it doesn’t make me seem I am afraid of any matter. Having these people come beside me is definitely a blessing in my life.”*

-UNLV study participant

# Building a Sense of Belonging in the Program

*Another participant shared that, “one year ago today, I was strung out on heroin, was homeless and felt worthless. This program has helped me because now I don’t need a drink or heroin. These volunteers make me **feel like I belong.**”*

-UNLV study participant

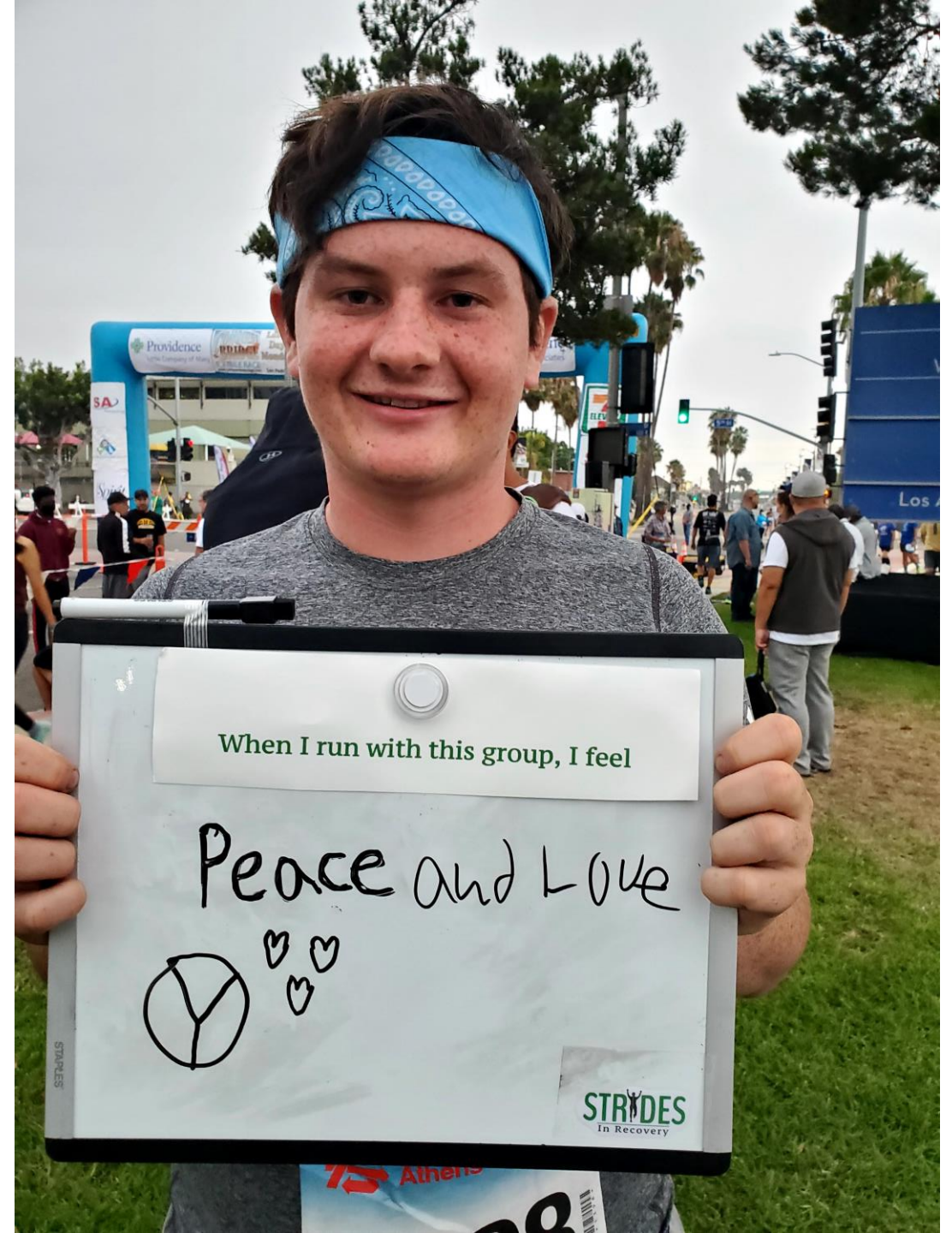
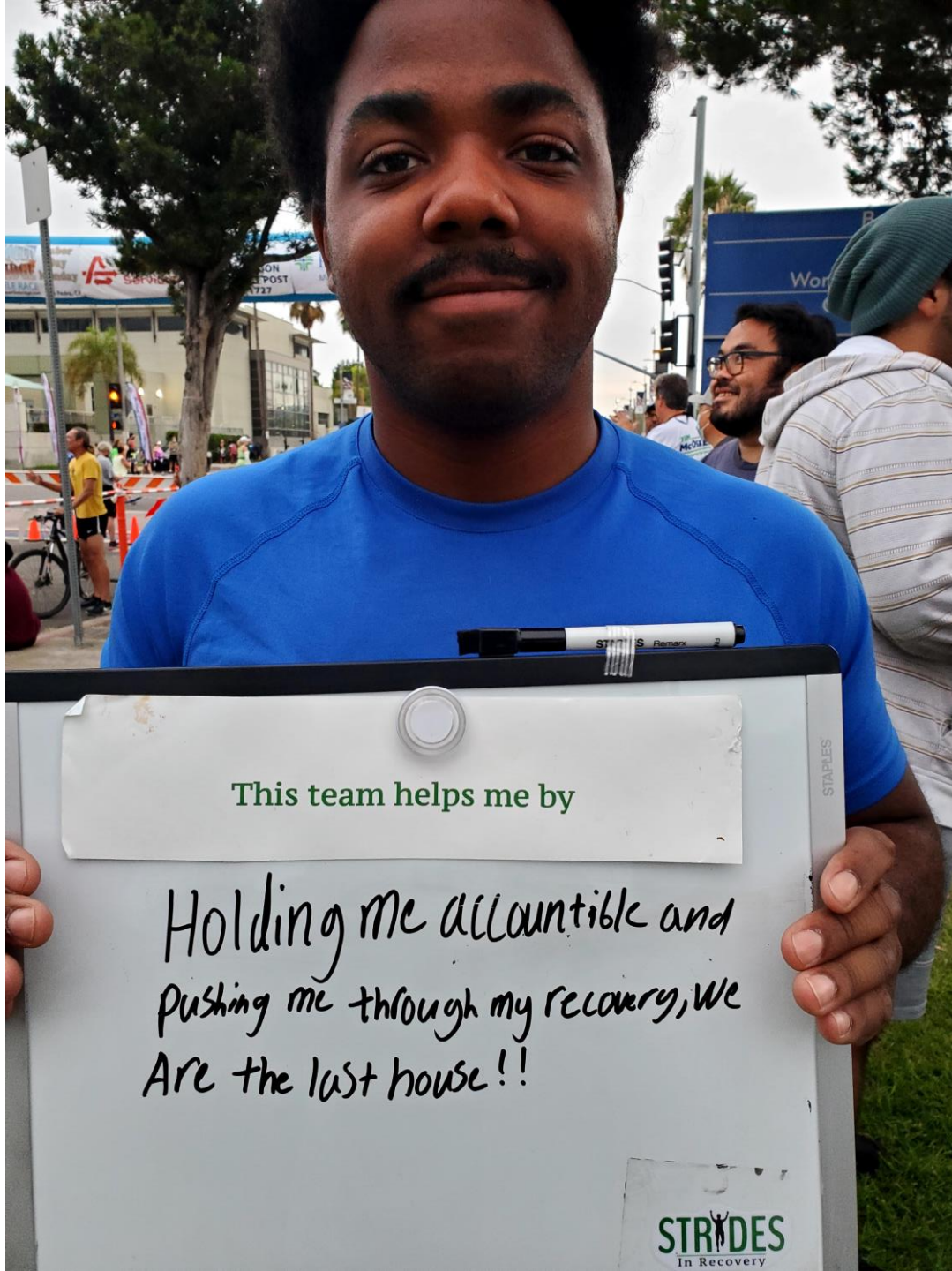


*“I felt connected to something more powerful than myself. It built up my self esteem as well as self-worth being part of such large group of people.”*

– T.L., 10K Finisher









## Becoming a Role Model

This team member, who continued working out after discharge, shared his “before” and “after” photos to inspire his newly sober brothers in the same treatment program.



# Paying it Forward

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# The Benefits of Training toward a Goal

# Able to Take on Challenges

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*"Training taught me that I can push past what I think I can. Even when I feel weak, there is always a little more in the tank, and that is the same with my life in sobriety."*

-John, 5K finisher



# Self Esteem Family Connection

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*"It makes me feel like a strong leader, a woman of purpose, not an addict, but a strong, active, healthy lady, working to achieve my personal goals."*

-Madison M, after finishing her first 10K, pictured with her mom





# Training as a Metaphor for Recovery

*"Instead of continuing to run away from my problems in life, being on the running team is showing me how to run through my hurdles with patience, endurance, consistency, and constant mental, physical, and spiritual growth."*

-Derek W.





# Preparing for a Healthy Sober Lifestyle



## Giving Back

After finishing a 5K in his first year of recovery, Shimon continued running and now leads hikes with his newly sober brothers.



# Embracing Physical Activity

March 20 · 🌐

Love my new sweatshirt. Started running again and it feels great. thanks [Leslie Gold](#)



Leslie Gold

Admin · February 7 · 🌐

Here are some great memories of Super Bowl Sunday 2020. These are the women of SHAWL House in the Redondo 5K/10K. We will be back in 2022!



Like · Reply · Share · 15w



Monique [redacted]

Oh my gosh! That was such an amazing accomplishment! Haven't stopped running since! ❤️👏 thank you!

Like · Reply · Share · 15w

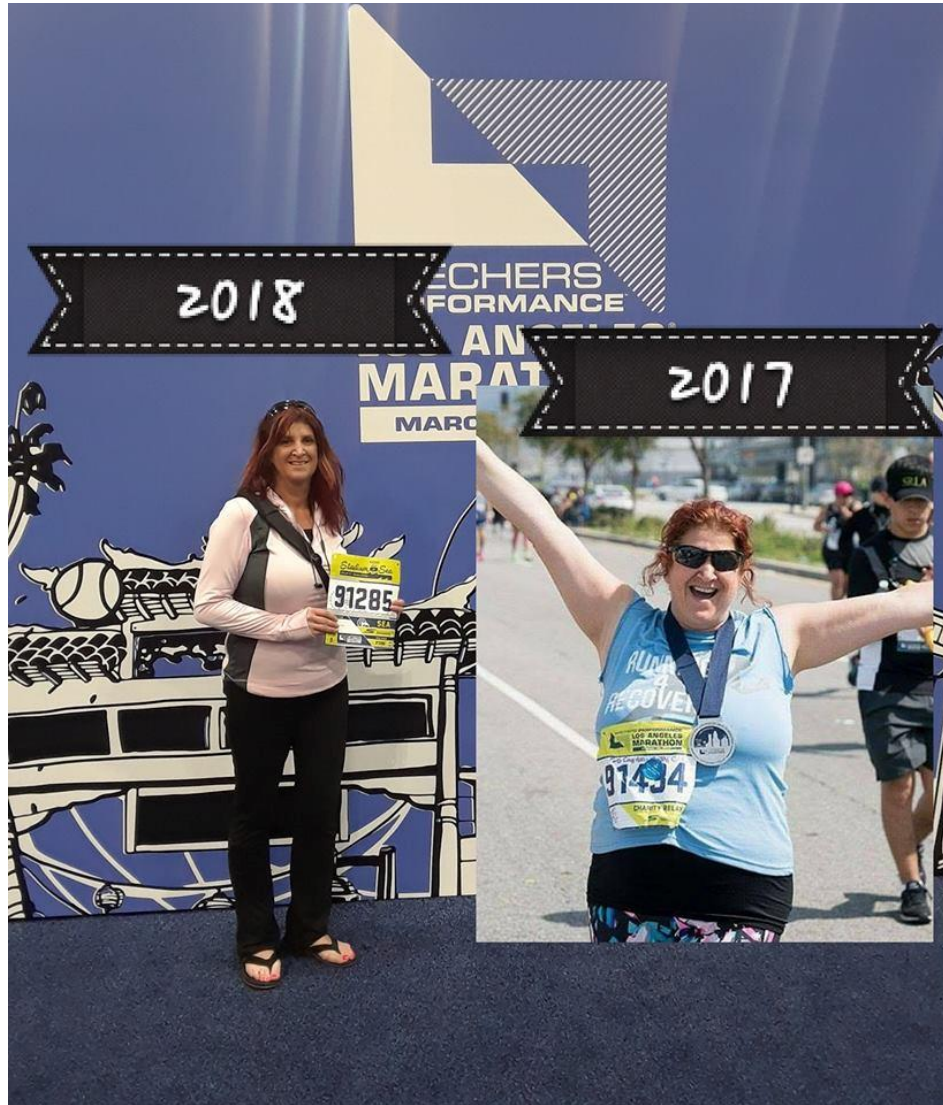


Diana Woolley





# Relapse Prevention Plan



*"Now I care about what I put in my body. I have to keep myself clean and sober to do the Marathon."*



Concluding  
Remarks





Many treatment programs are missing a core component.

**The key to improved  
outcomes isn't more sitting  
and more talking.**

**It's more physical activity.**



## BONUS:

When physical activity is done with a supportive community toward a challenging goal, the benefits are multiplied.



# **Questions &** **Answers**



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**TREE HOUSE RECOVERY®**  
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