Utility of Operant Conditioning to Address Poverty-Related Health Disparities

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  - Brantley P. Jarvis
  - Shrinidhi Subramaniam
  - Forrest Toegel
  - Matthew D. Novak

Poverty is Associated with Poor Health

- Obesity: *Drewnowski et al. (2004). Am J Clin Nutr. 79, 6-16*
- Smoking: *Hiscock et al. (2012). Ann. N. Y. Acad Sci, 1248, 107-123*
- Heart Failure: *Hawkins et al. (2012). Eur J Heart Fail, 14, 138-146*
- Stroke: *Addo et al. (2012). Stroke, 43, 1186-1191*
- Cancer: *Ward et al. (2004). CA Cancer J Clin, 54, 78-93*
- Death: *Muennig, et al. (2010). Am J Public Health, 100, 1758-1764*
- HIV: *Oldenburg et al. (2014). AIDS, 28, 2763-2769*
- Drug Addiction: *Armstrong (2007). Arch Int Med; Williams (2007) Am J. Prev Med*

Silverman, Holtyn and Jarvis (2016). Preventive Medicine, 92, 58–61;
Silverman, Holtyn and Toegel (2019). Perspectives on Behavior Science.

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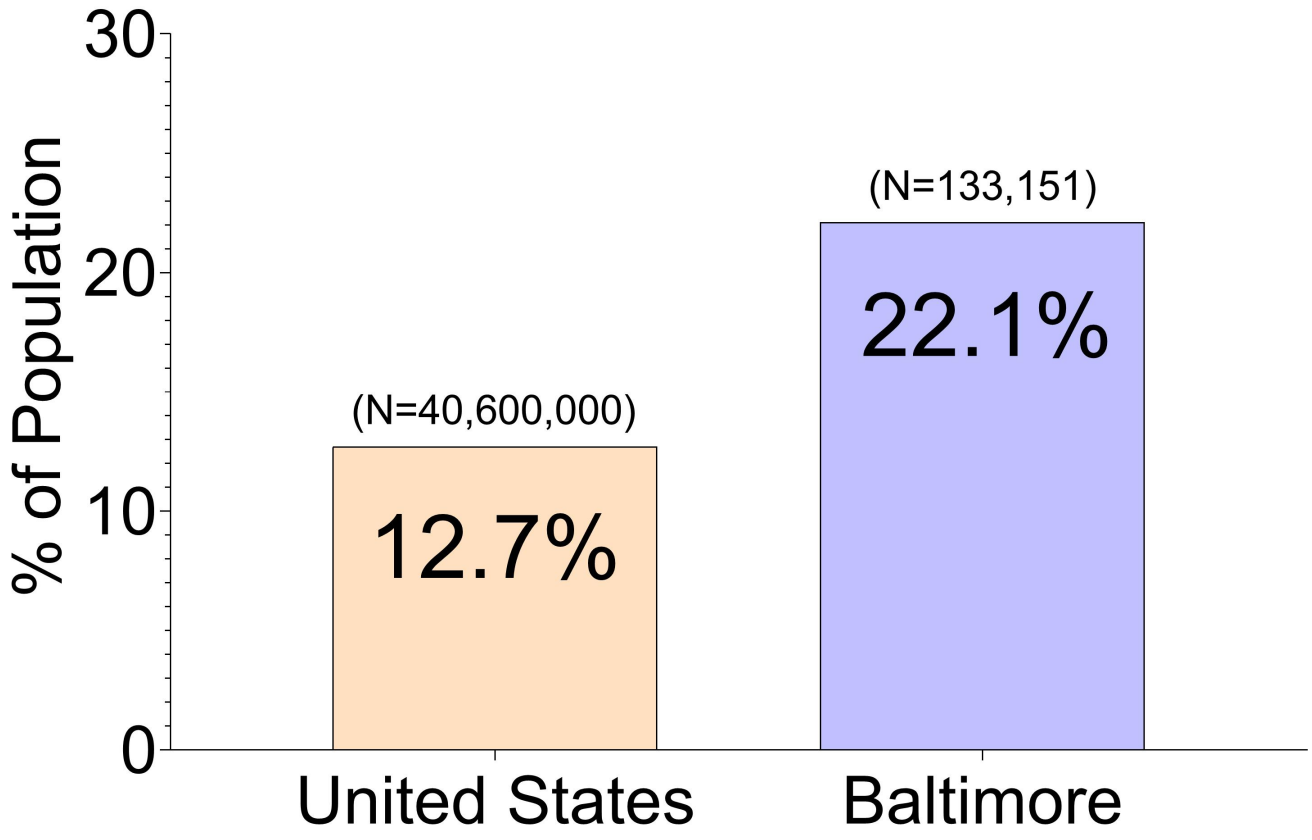
Poverty in the United States and Baltimore



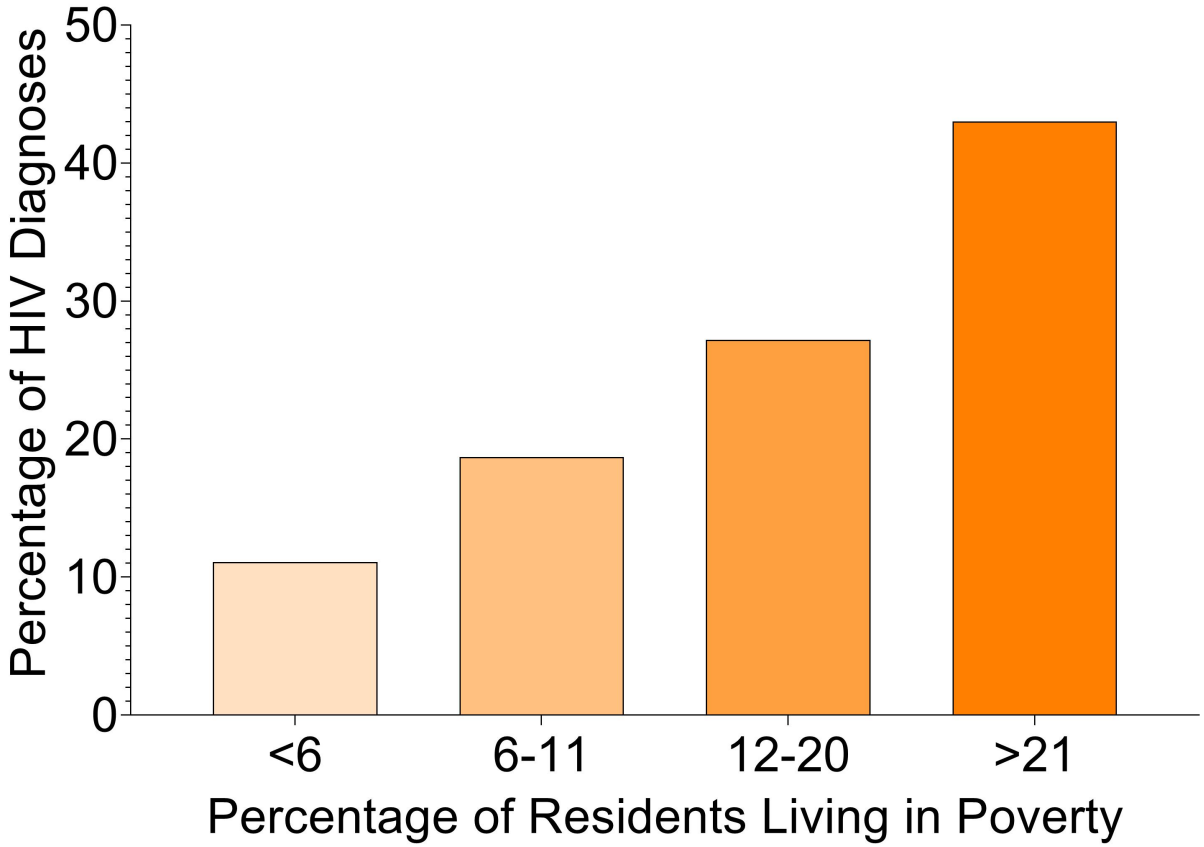
Promoting Health In People Who Live in Poverty

- Proximal interventions:
  - *promote health in people who live in poverty*
- Distal interventions:
  - *reduce poverty*

Silverman, Holtyn and Jarvis (2016). Preventive Medicine, 92, 58–61;
Silverman, Holtyn and Toegel (2019). Perspectives on Behavior Science.

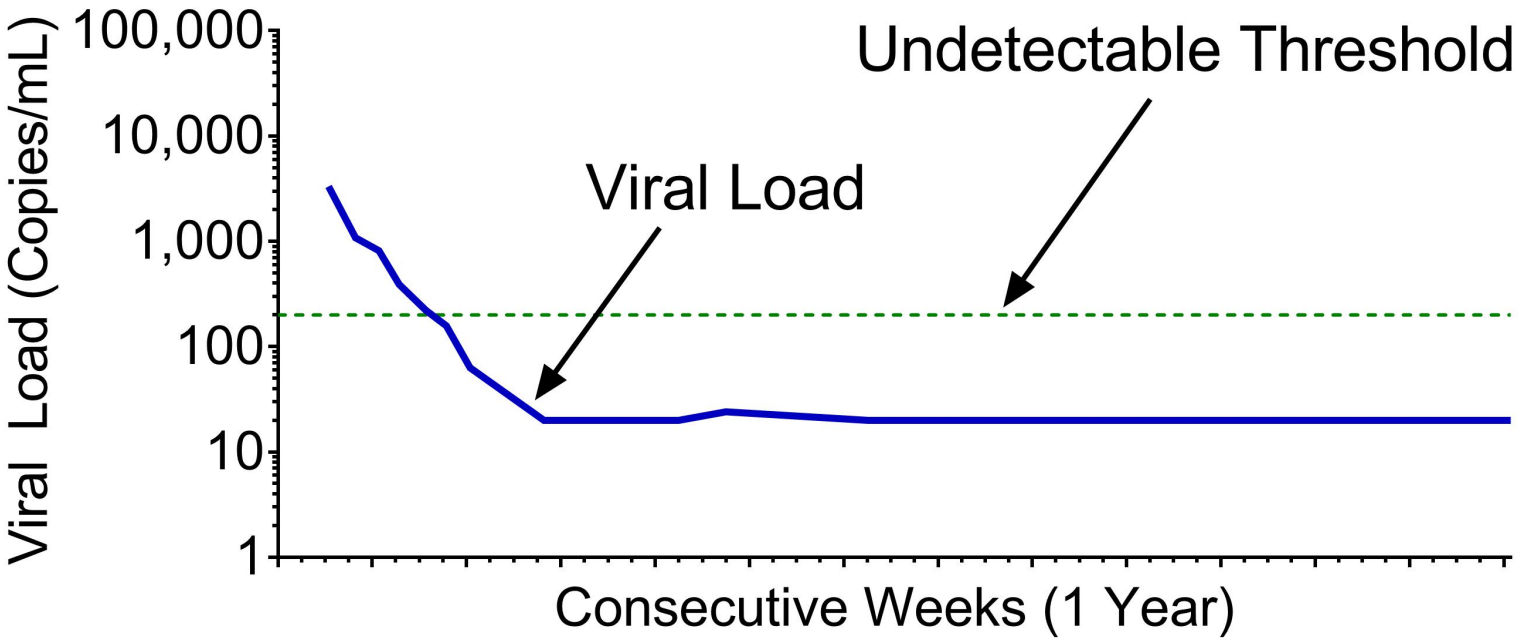
Proximal Intervention: Incentives for Viral Suppression in People Living with HIV

HIV Diagnoses by Poverty



CDC (2015). HIV Surveillance Supplemental Report , 20 (No. 5).

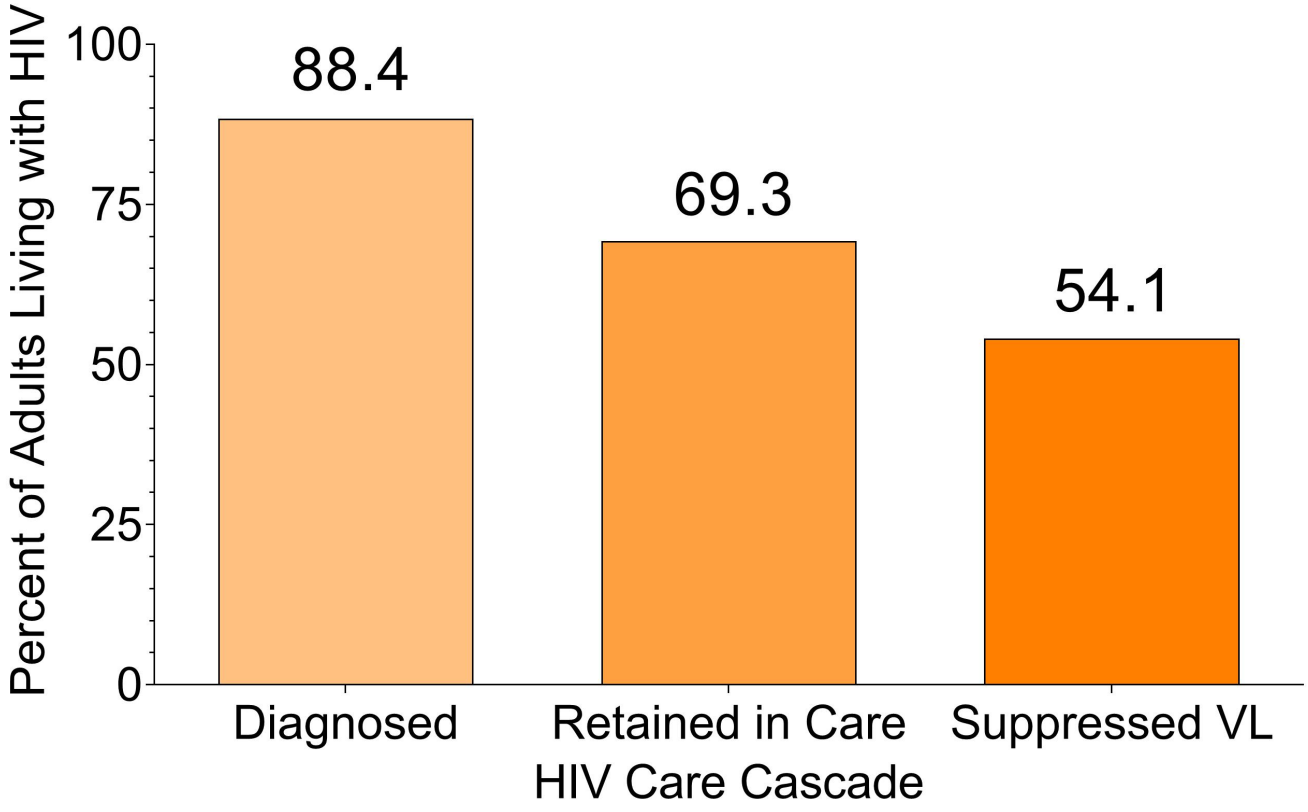
Daily Use of Antiretroviral Medication for HIV



Antiretroviral Therapy for HIV

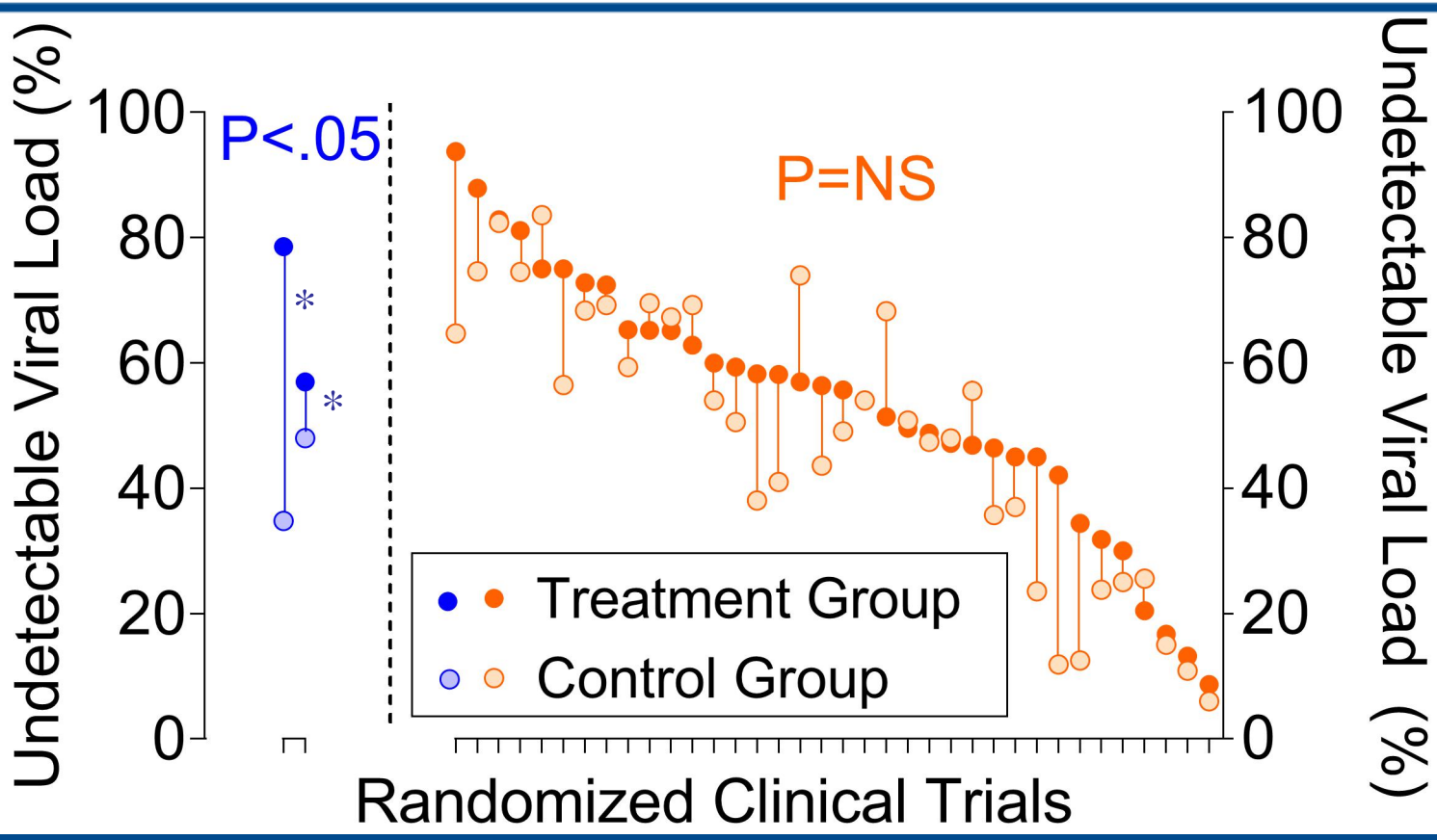
- Improves health and increases lifespan
  - *Leone et al., 2011, Infection, 39, 13-20*
  - *Montaner, Wood et al., 2010 J of AIDS,55, S5-9*
- "Undetectable = Untransmittable"
  - *Eisinger et al., 2019, JAMA, 321, 451-452*.
- Ending the HIV/AIDS epidemic
  - *Fauci et al., 2019, JAMA, 321, 844-845.*
  - *UNAIDS, 2014. 90-90-90*
    http://www.unaids.org/sites/default/files/media_asset/90-90-90_en.pdf

HIV Care Cascade in Baltimore in 2017



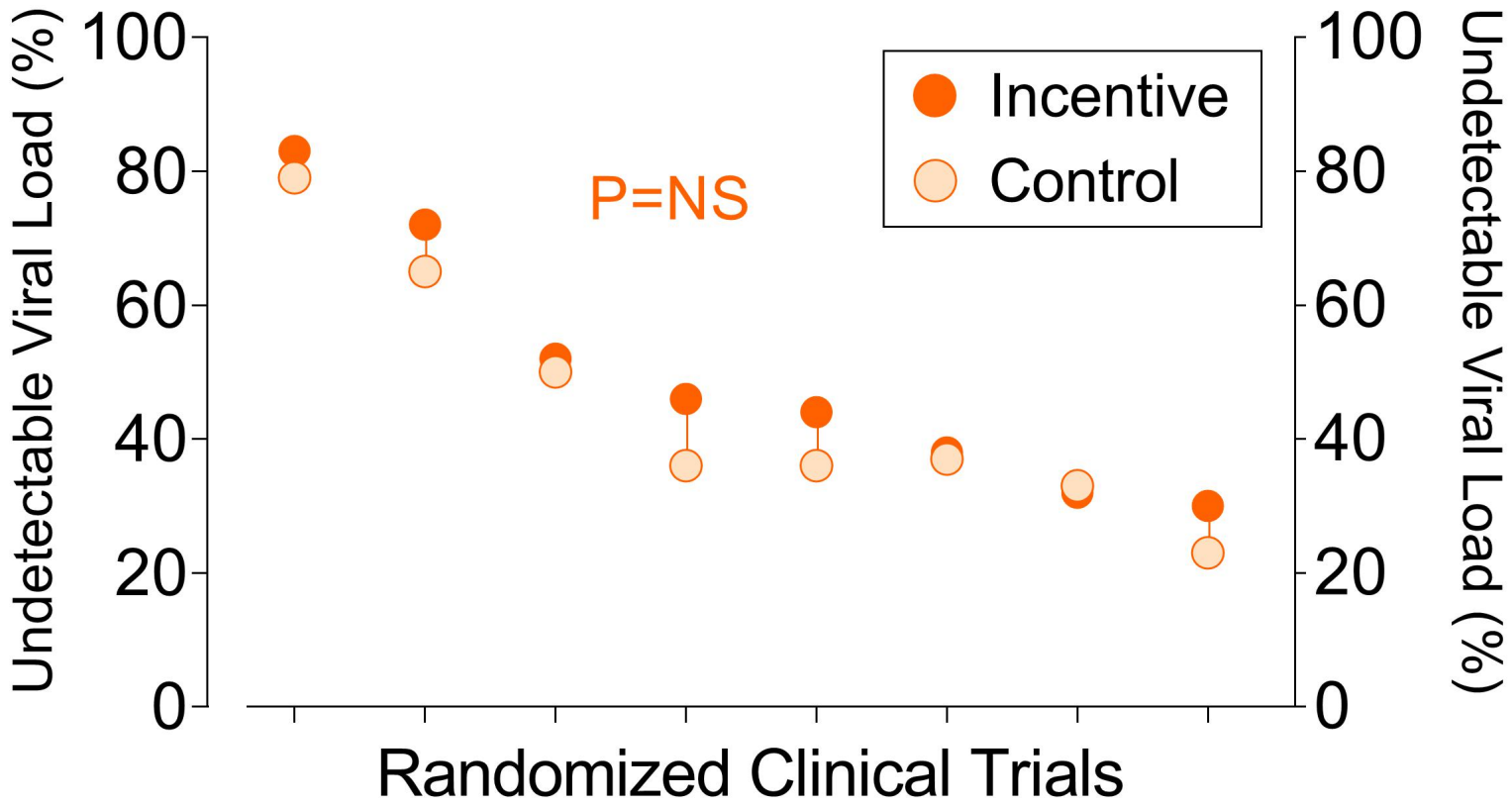
Arey et al. (2018). Baltimore Metro Annual HIV Epidemiological Profile 2017

Undetectable Viral Load in Studies Reviewed by Kanters et al.



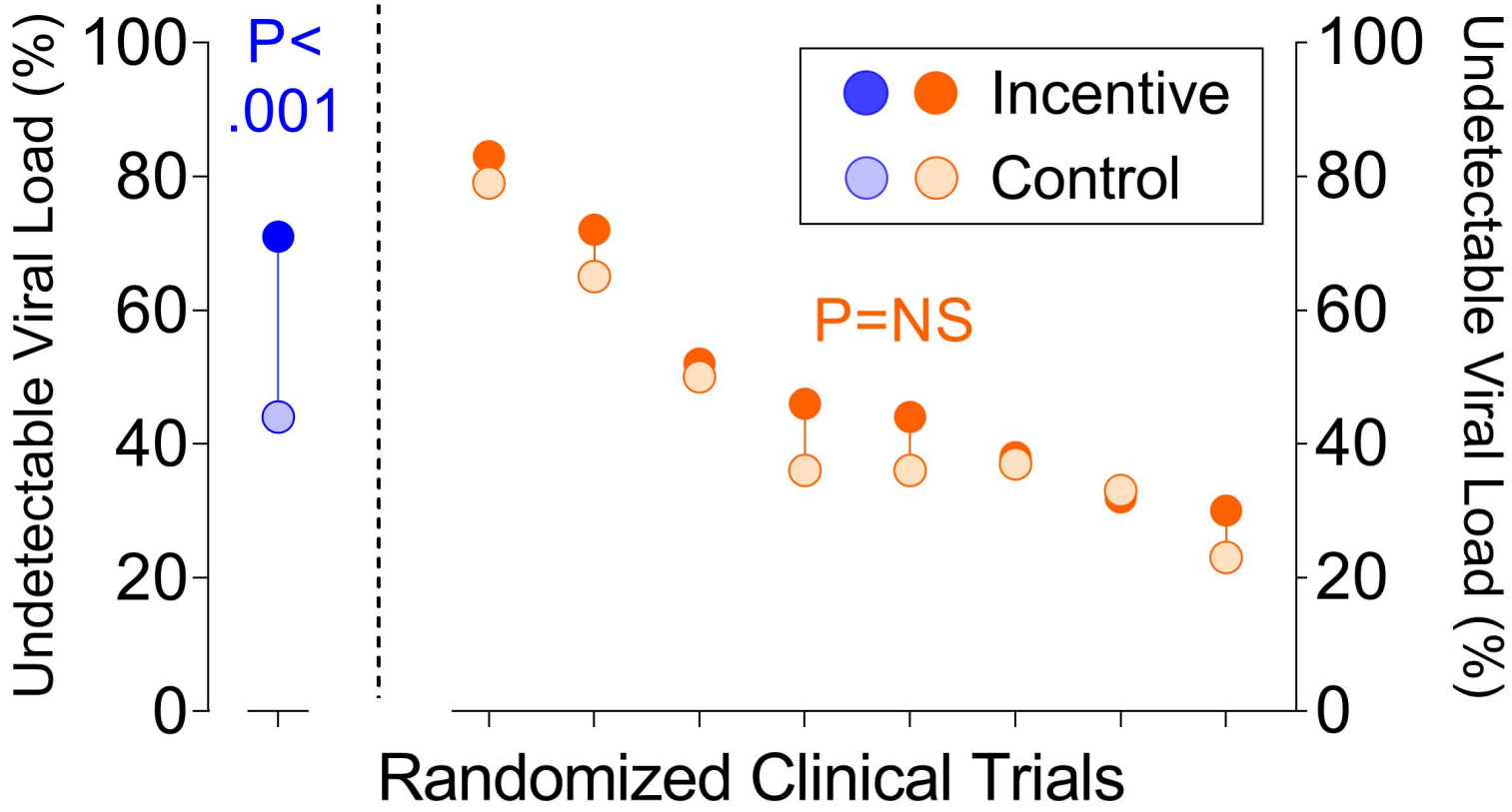
Kanters et al. (2017). Lancet HIV, 4, e31-e40d

Undetectable Viral Load in Incentive Studies



Toegel et al. (in preparation)

Undetectable Viral Load in Incentive Studies



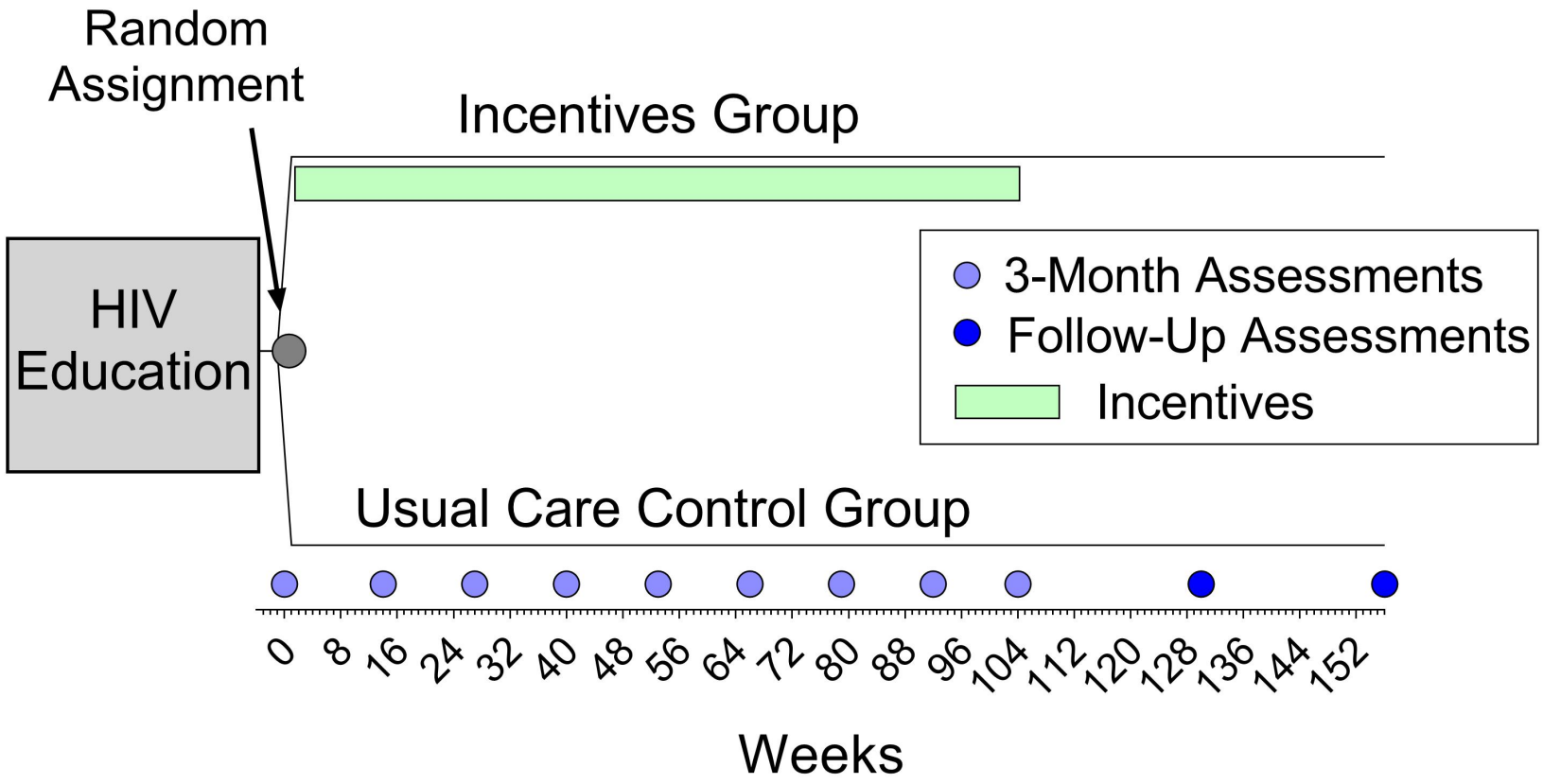
Toegel et al. (in preparation)

Main Inclusion Criteria

- ≥ 18 years old
- Living with HIV
- Detectable viral load (>200 copies/mL)

Silverman et al. (2019). *AIDS and Behavior*, 23, 2337–2346

Experimental Design



Silverman et al. (2019). *AIDS and Behavior*, 23, 2337–2346

Incentive Intervention

- High magnitude incentives ($10 / day)
- Reinforce decreases in viral load (≈30% / wk)
- Random and decreasing viral load testing
- Long-term incentives: 2 Years ($7,300)
- Earnings applied to reloadable credit card

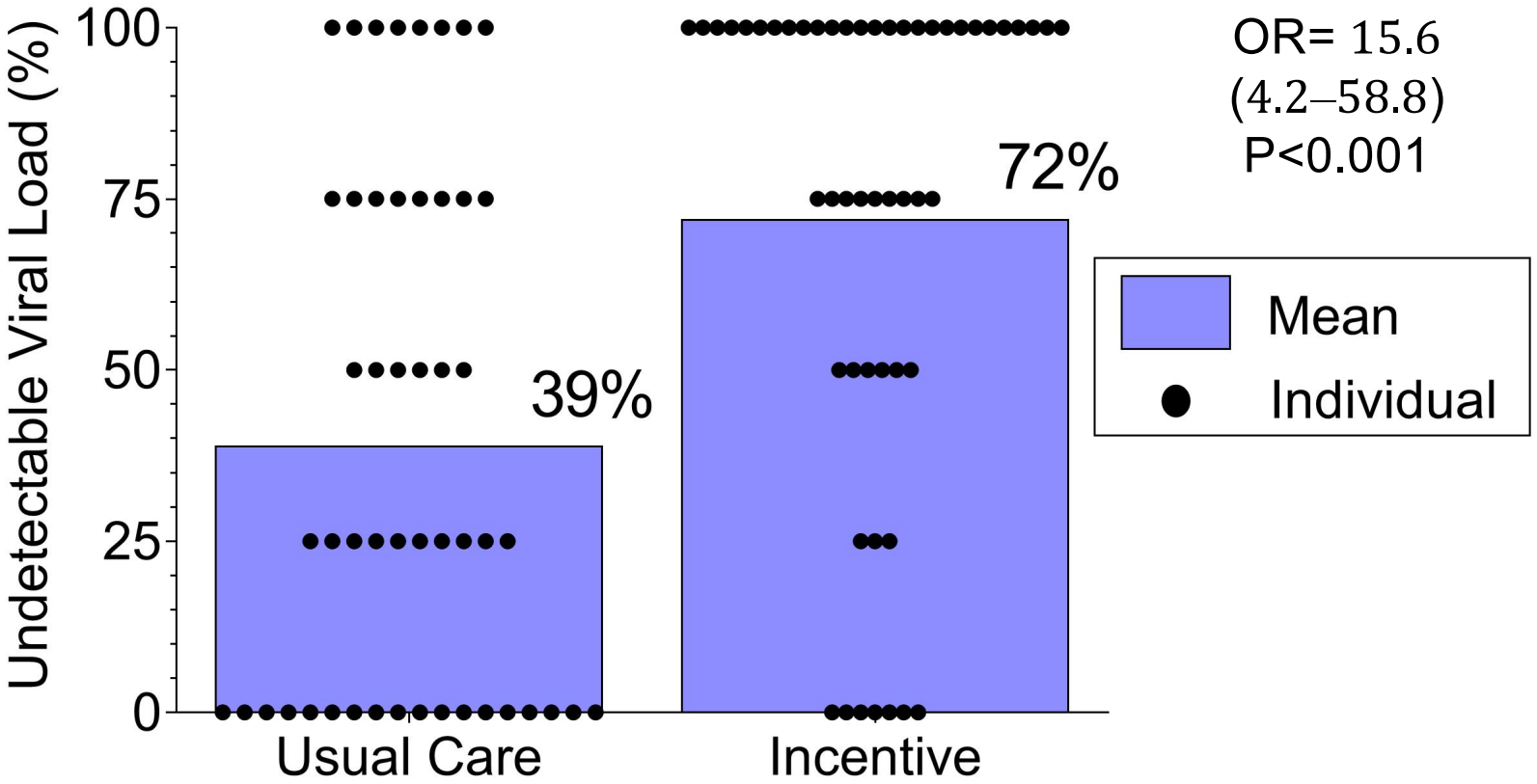
Silverman et al. (2019). *AIDS and Behavior*, 23, 2337–2346

Demographic Characteristics

	Usual Care (n=50)	Incentive (n=52)
Men	54%	54%
Black or African American	90%	88%
Unemployed	76%	86%
Living in Poverty	82%	83%
HIV Exposure Category		
Injection drug use	16%	19%
Men who have sex with men	14%	15%
Heterosexual sex	64%	48%

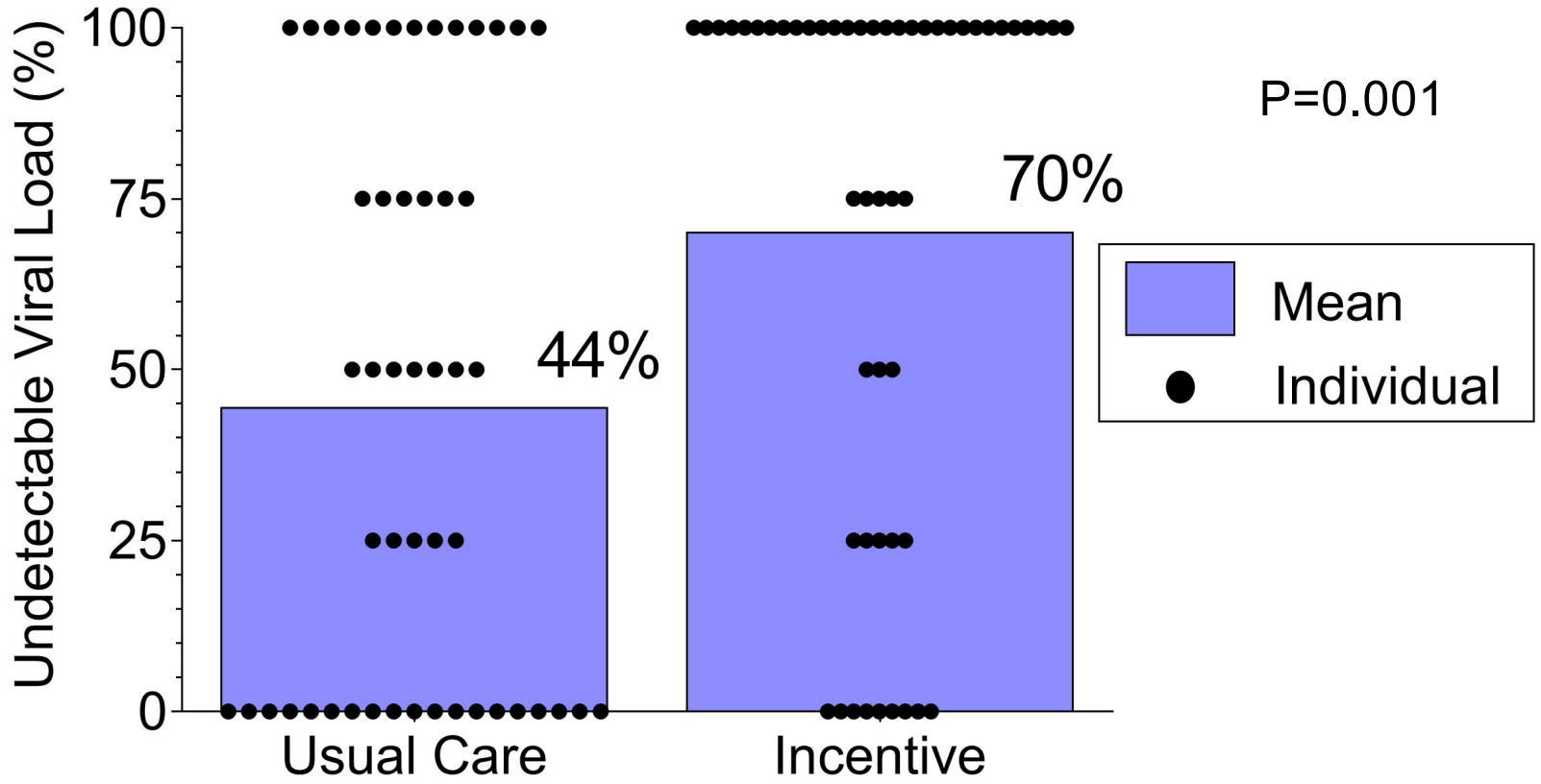
Silverman et al. (2019). *AIDS and Behavior*, 23, 2337–2346

Undetectable Viral Loads During First Year



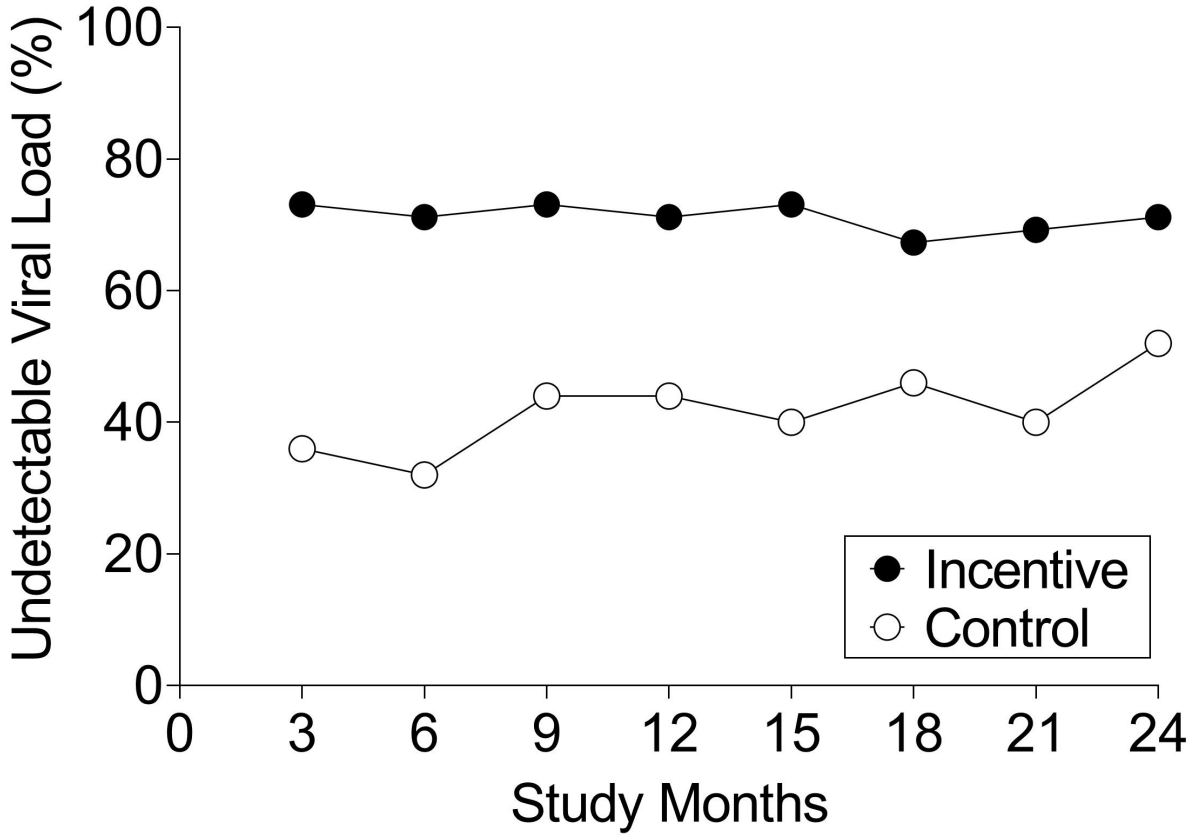
Silverman et al. (2019). *AIDS and Behavior*, 23, 2337–2346

Undetectable Viral Loads During Second Year



Novak et al. (in preparation)

Undetectable Viral Loads Over 2 Years

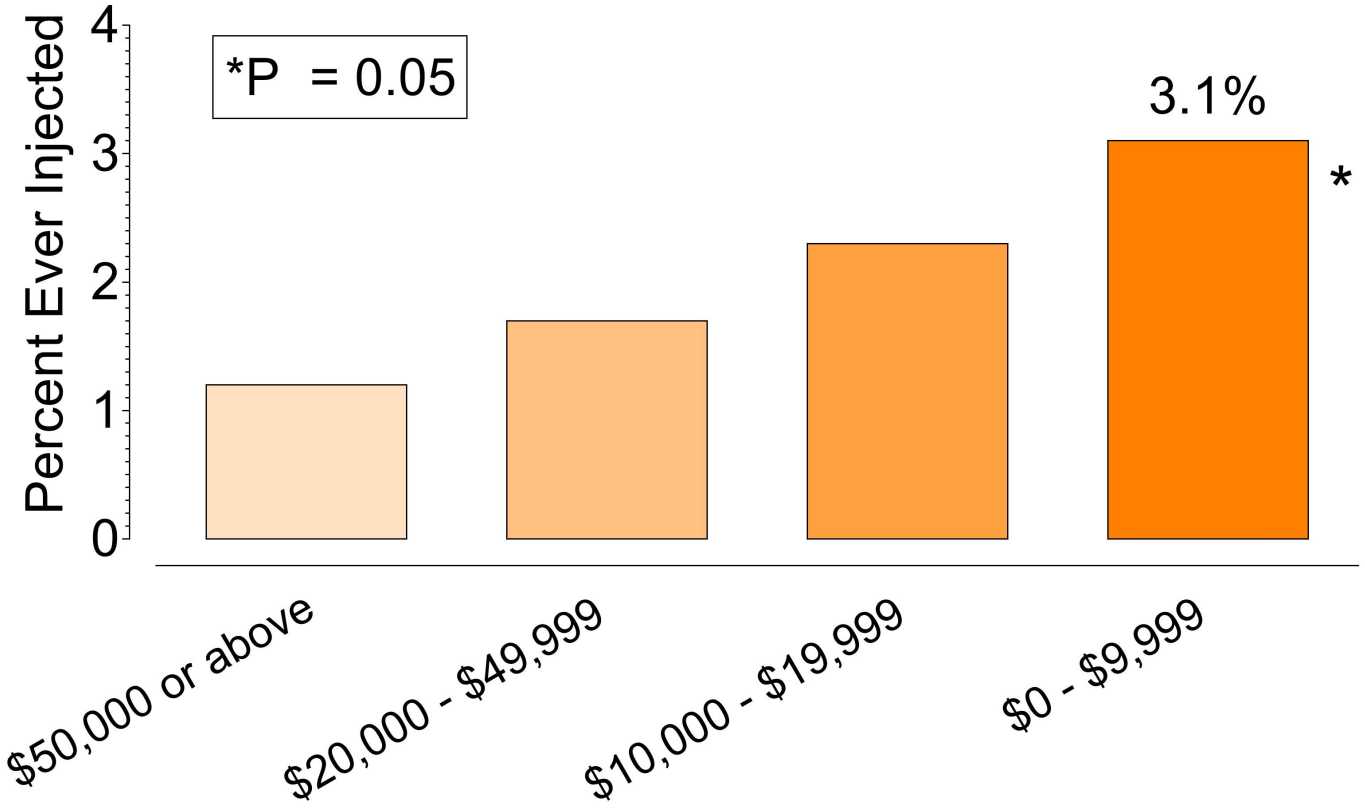


Novak et al. (in preparation)

Operant Conditioning to Promote Drug Abstinence in People Who Live in Poverty

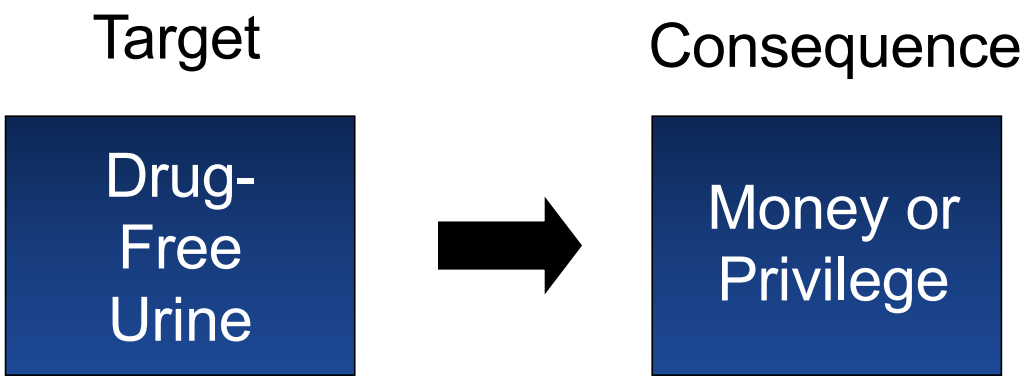
Silverman, Holtyn and Toegel (2019). Perspectives on Behavior Science.

Injection Drug Use by Income



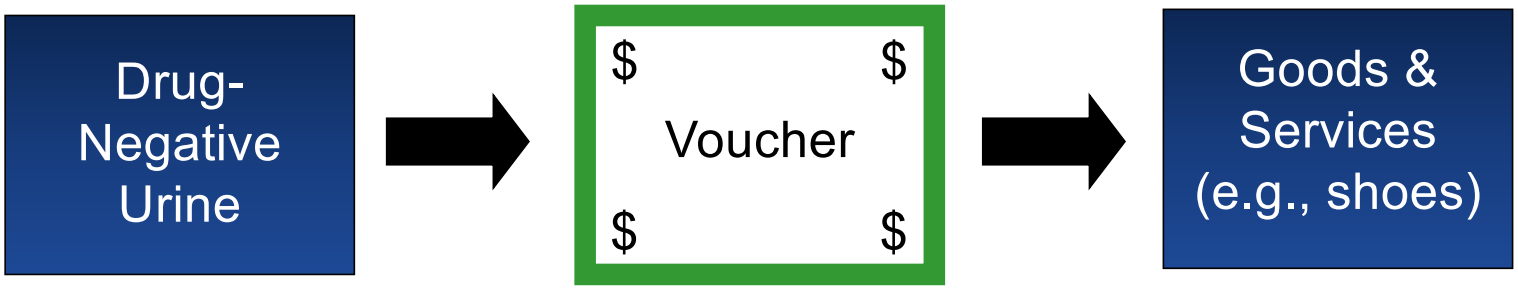
Armstrong (2007). Archives of Internal Medicine, 167, 166-173.

Proximal Intervention: Abstinence Reinforcement



Bigelow et al. (1981). Addictive Behaviors, 6, 241-252

Proximal Intervention: Abstinence Reinforcement



Higgins et al. (1991). The American Journal of Psychiatry, 148, 1218-1224

Abstinence Reinforcement is an Effective Approach

- Meta-Analysis of Psychosocial Treatments
  - *Dutra et al. (2008). Am J Psychiatry, 165, 179-187*
- Review of Cocaine Addiction Treatments
  - *Knapp et al. (2007). Cochrane Rev Jul 18;(3): CD003023*
- National Institute on Health and Clinical Excellence (NICE) Review of Psychosocial Interventions
  - *Pilling et al. (2007). British Medical Journal, 335, 203-205.*
- Review of Interventions for Pregnant Smokers
  - *Lumley et al. (2009). Cochrane Rev. Jul 8;(3):CD001055*

Reinforcement Magnitude Matters

- Increasing magnitude increases effectiveness
  - *Nader and Woolverton (1991). Psychopharmacology, 105, 169-174*
  - *Stitzer and Bigelow (1983). Behavior Therapy, 14, 647-656*
  - *Stitzer and Bigelow (1984). J Applied Behavior Anal, 17, 477-483*
  - *Silverman et al. (1999). Psychopharmacology, 146, 128-138*
  - *Dallery et al. (2001), Exp Clin Psychopharmacology, 9, 317-325*
  - *Petry et al. (2004). Addiction, 99, 349-360*
  - *Higgins et al. (2007). Addiction,102, 271-81*

Relapse is Common After Reinforcement Ends

- Alcohol and Benzodiazpines
  - *Miller et al. (1974). Behaviour Research and Therapy, 12, 261-263*
  - *Stitzer et al. (1982). Journal of Applied Behavior Analysis, 15, 493-503*
- Cigarettes
  - *Shoptaw et al. (2002). Addiction, 97, 1317-28*
  - *Heil et al. (2008). Addiction, 103, 1009–1018*
- Cocaine
  - *Silverman et al. (1996). Archives of Gen Psychiatry, 53, 409-415*
  - *Silverman et al., (1998). Journal Consul &Clinical Psychology, 66,811-824*
  - *Silverman et al. (1999). Psychopharmacology, 146, 128-138*
- Heroin
  - *Stitzer et al. (1980). Addictive Behaviors, 5, 333-340*
  - *Silverman et al. (1996). Drug and Alcohol Dependence, 41, 157-165*
  - *Preston et al. (2002). Drug and Alcohol Dependence, 67, 125-137*

Maintenance of Abstinence Reinforcement

- Long-term maintenance of reinforcement
  - *Silverman et al., (2004). J Consult and Clin Psychology, 72: 839-854*
  - *Kirby et al. (2013). Drug and Alcohol Dependence,132, 639– 645*

The Therapeutic Workplace: Proximal and Distal Interventions

Silverman, Holtyn and Jarvis (2016). Preventive Medicine, 92, 58–61;
Silverman, Holtyn and Toegel (2019). Perspectives on Behavior Science.

A Laboratory Model of a Therapeutic Workplace

Employment-Based Abstinence Reinforcement

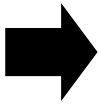
Phases of Therapeutic Workplace Treatment

PHASE 1: Training and Abstinence Initiation

JOB: Training

PAY: Vouchers or Reloadable credit cards

DURATION: Limited



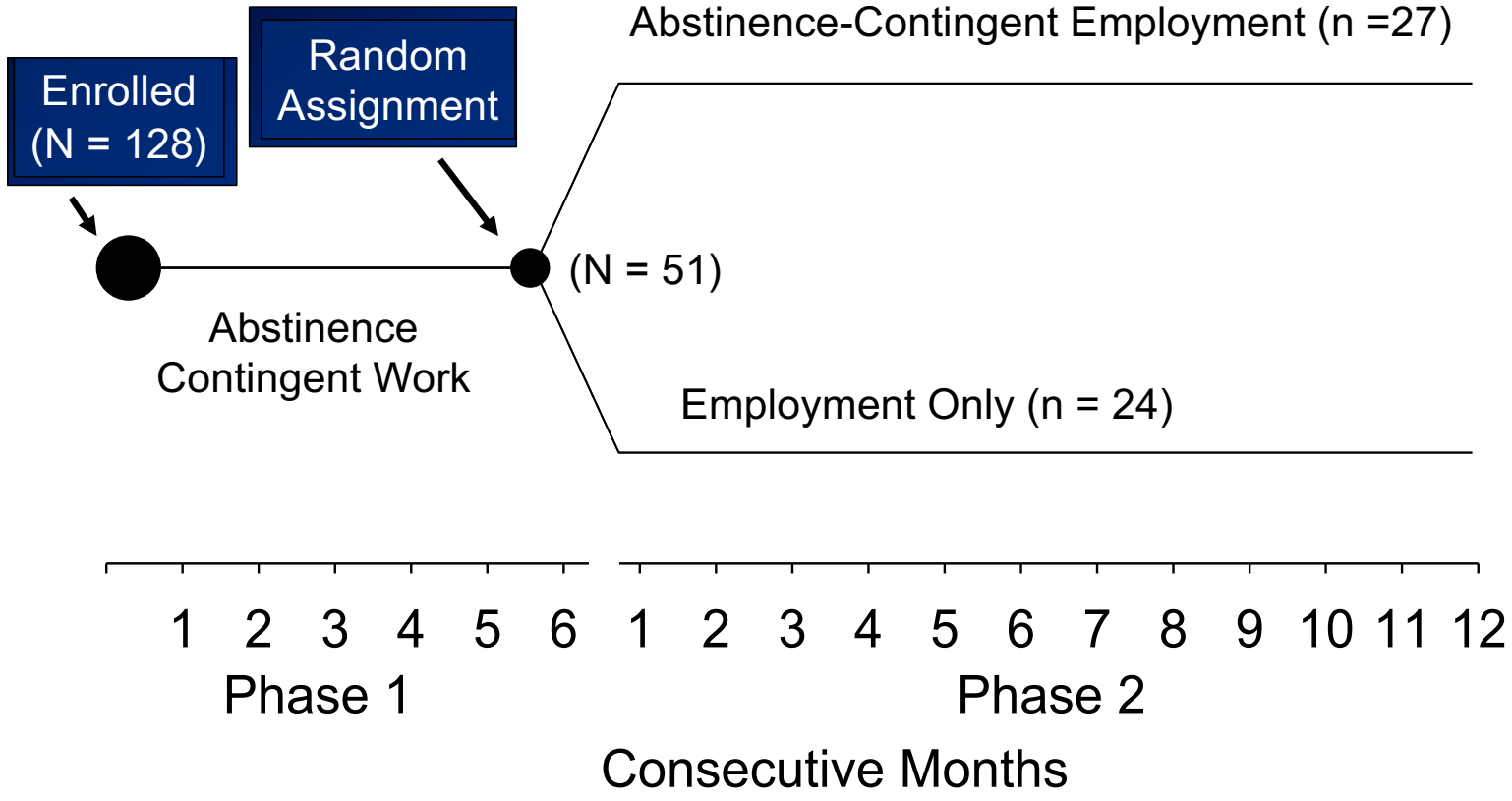
PHASE 2: Therapeutic Workplace Business

JOB: Work

PAY: Paycheck

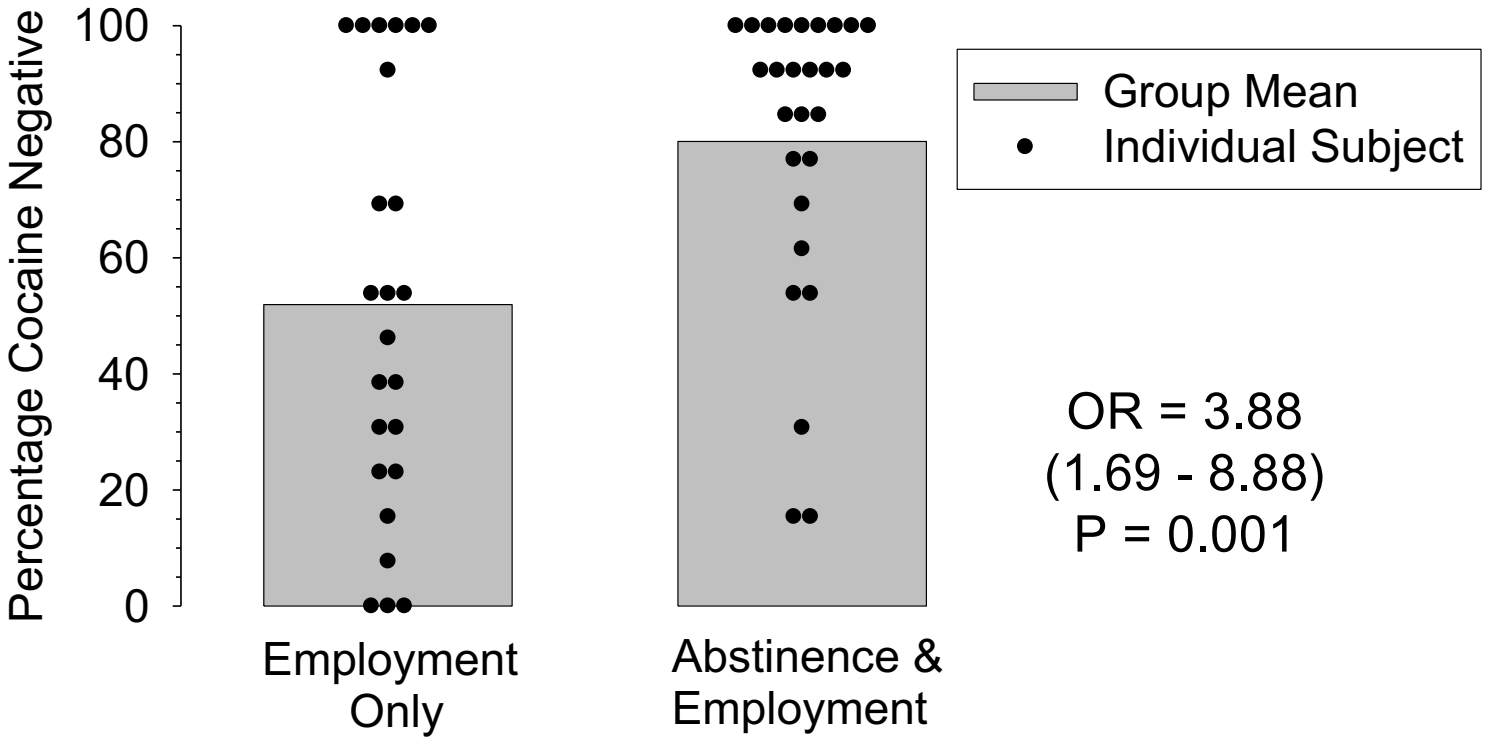
DURATION: Unlimited

Therapeutic Workplace Business to Maintain Abstinence



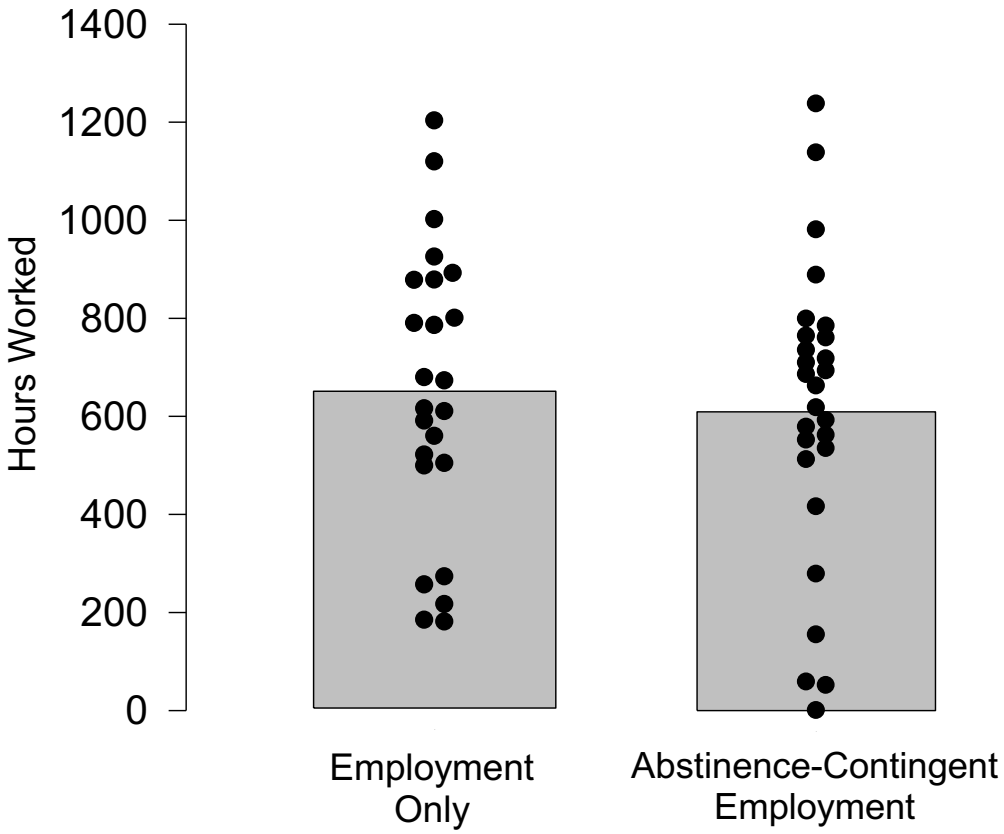
DeFulio et al. (2009). Addiction, 104, 1530-1538

Cocaine Abstinence in Year of Phase 2 Employment



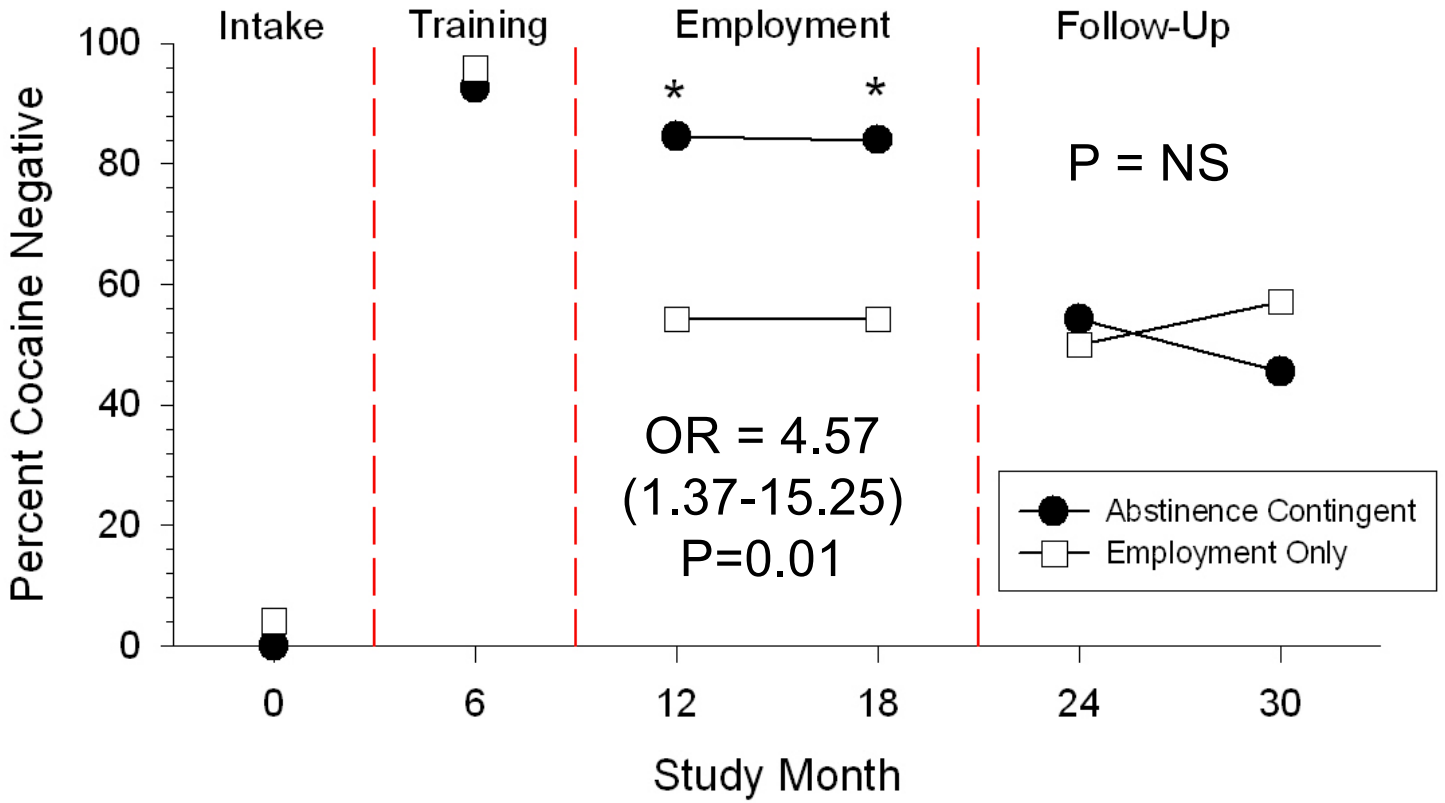
DeFulio et al. (2009). Addiction, 104, 1530-1538

Attendance in Year of Phase 2 Employment



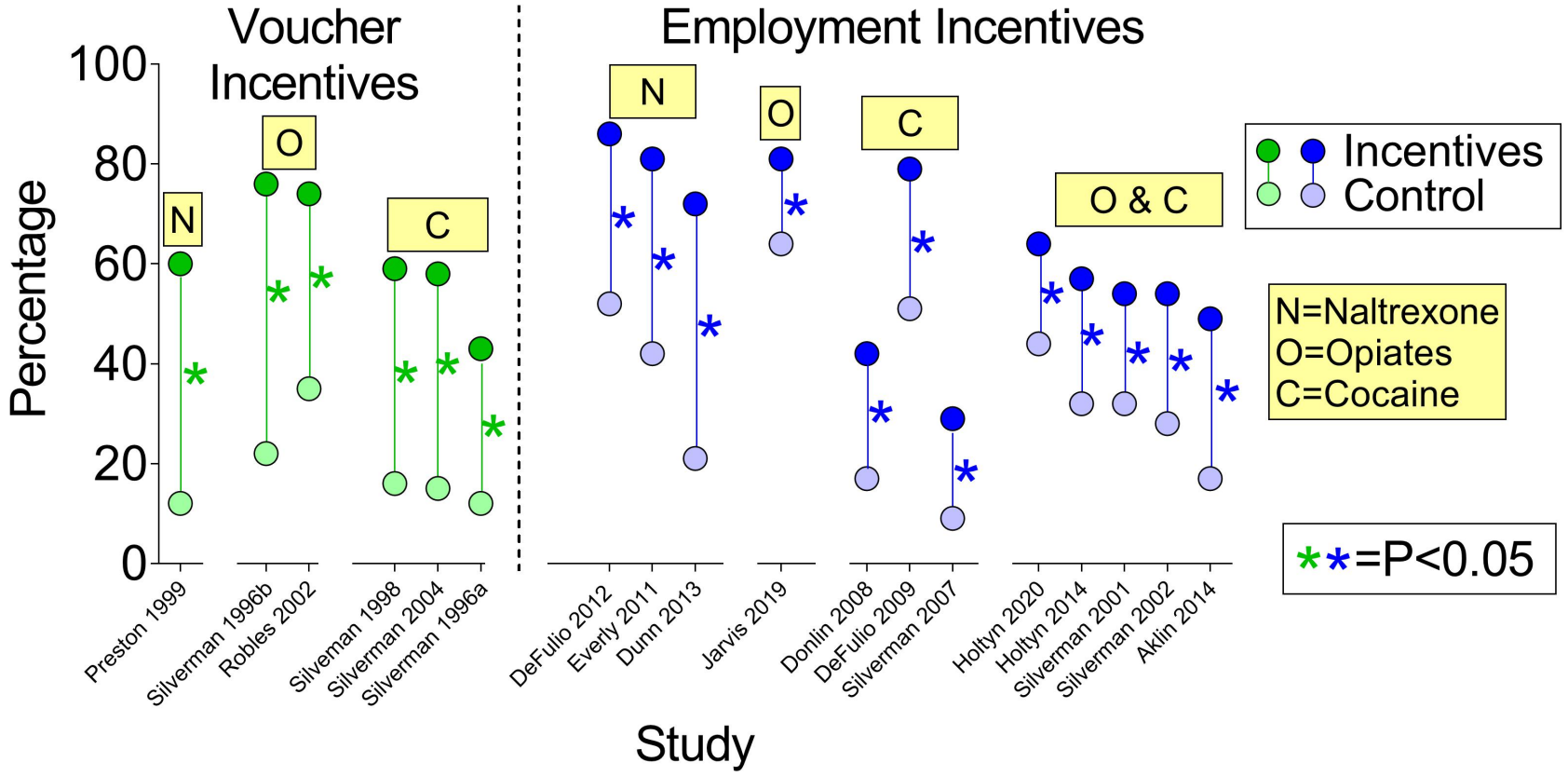
DeFulio et al. (2009). Addiction, 104, 1530-1538

Post-Treatment Cocaine Abstinence



DeFulio et al. (2011). Addiction, 106, 960–967

Effects of Voucher and Employment Incentives in Addiction

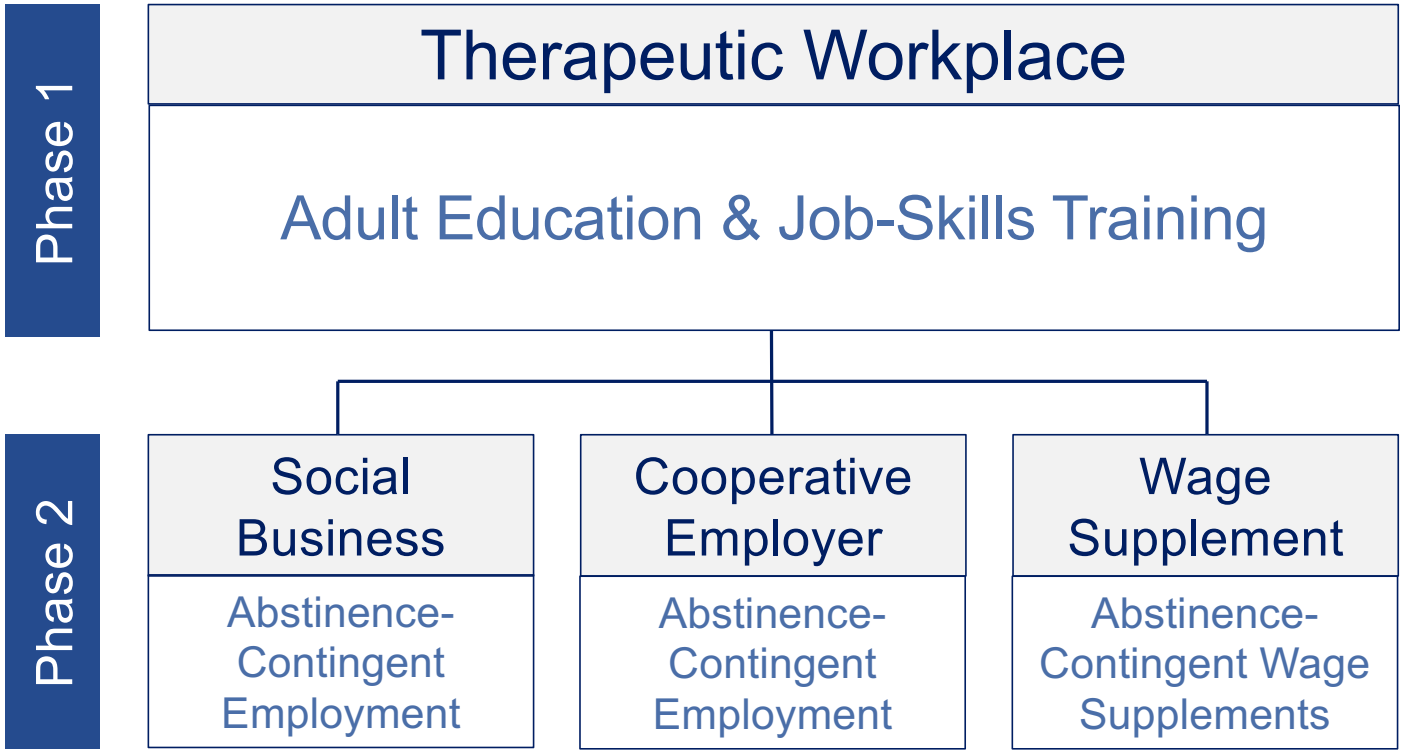


Silverman et al. (2019). Perspectives on Behavior Science, 42, 525–546

Models to Promote Long-Term Abstinence & Employment

Silverman et al., (2016). Trans Issues In Psychological Science, 2, 203–212

Models to Promote Abstinence and Employment



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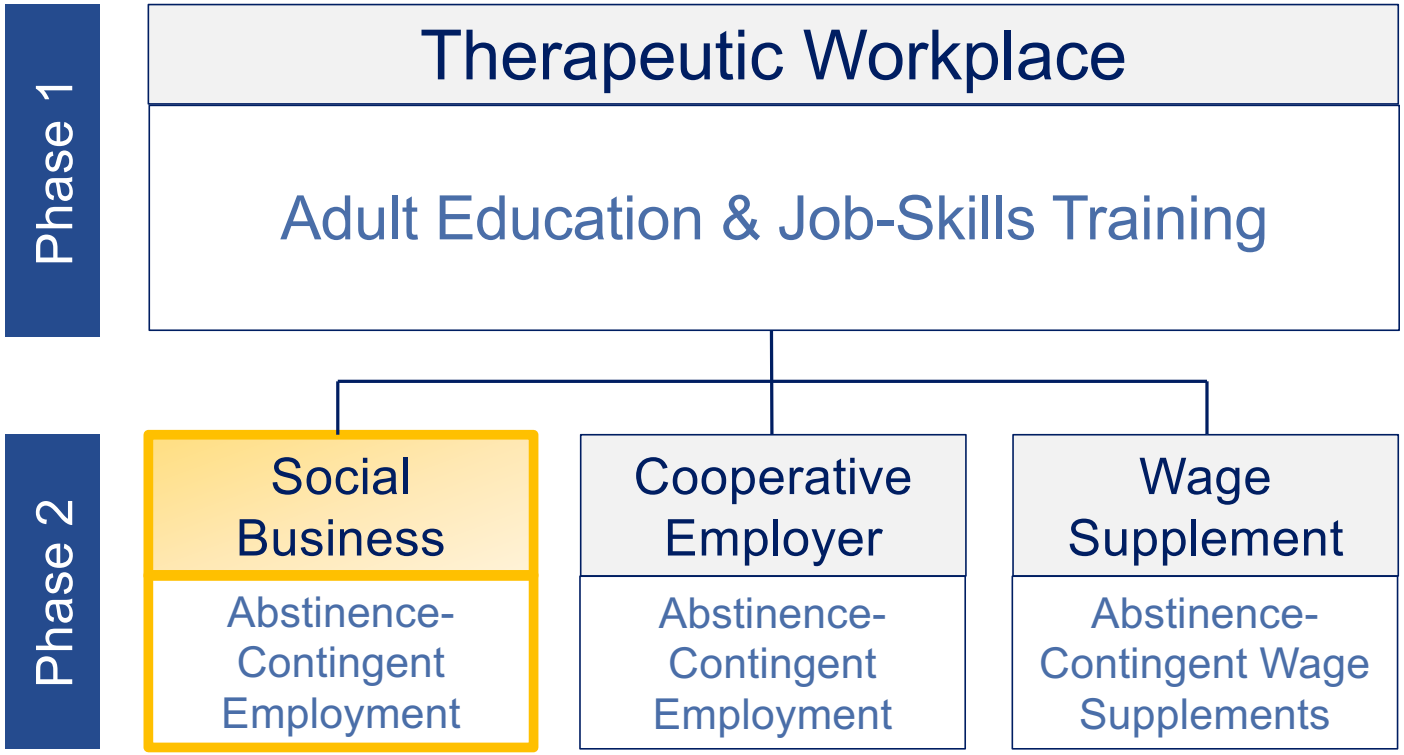

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A Therapeutic Workplace Social Business

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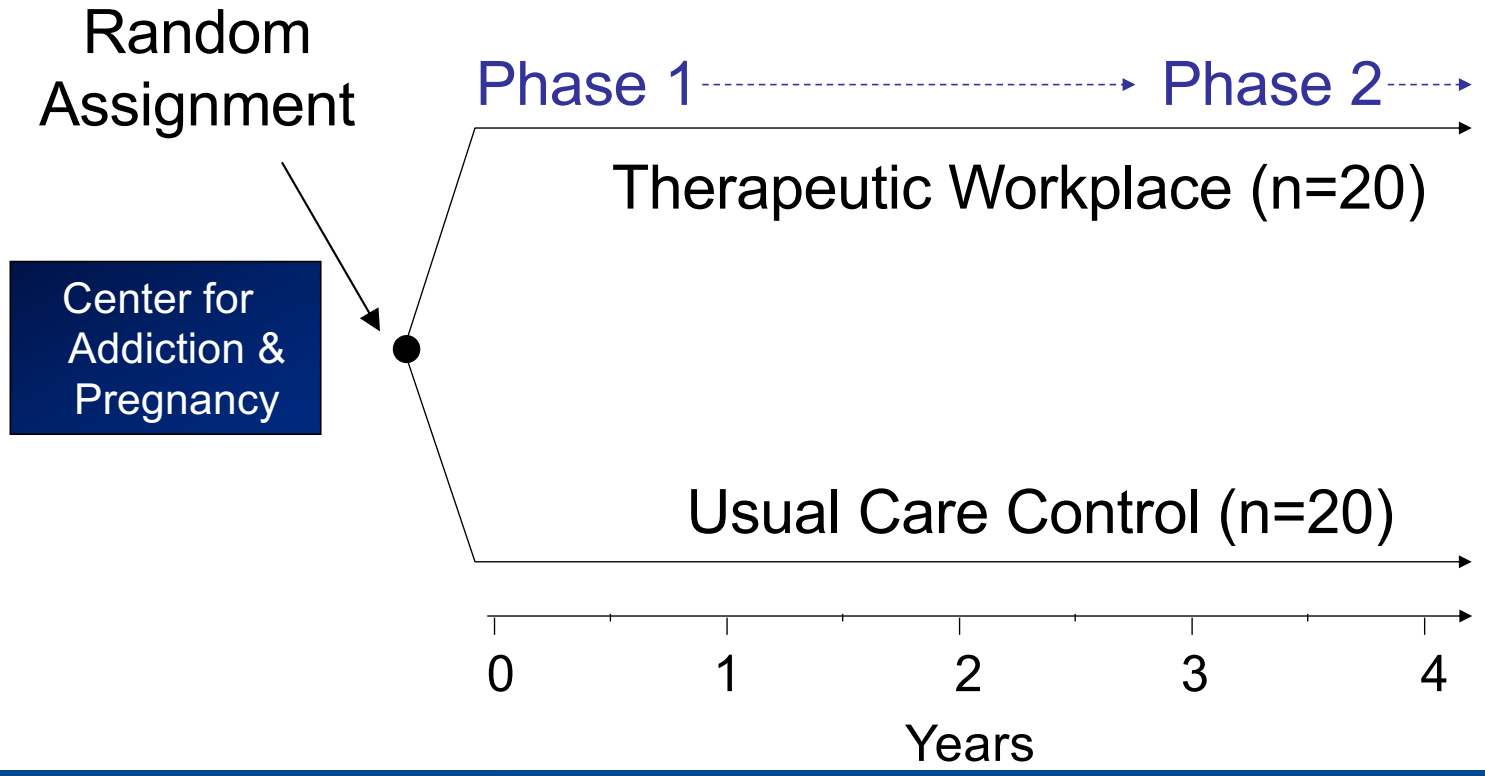
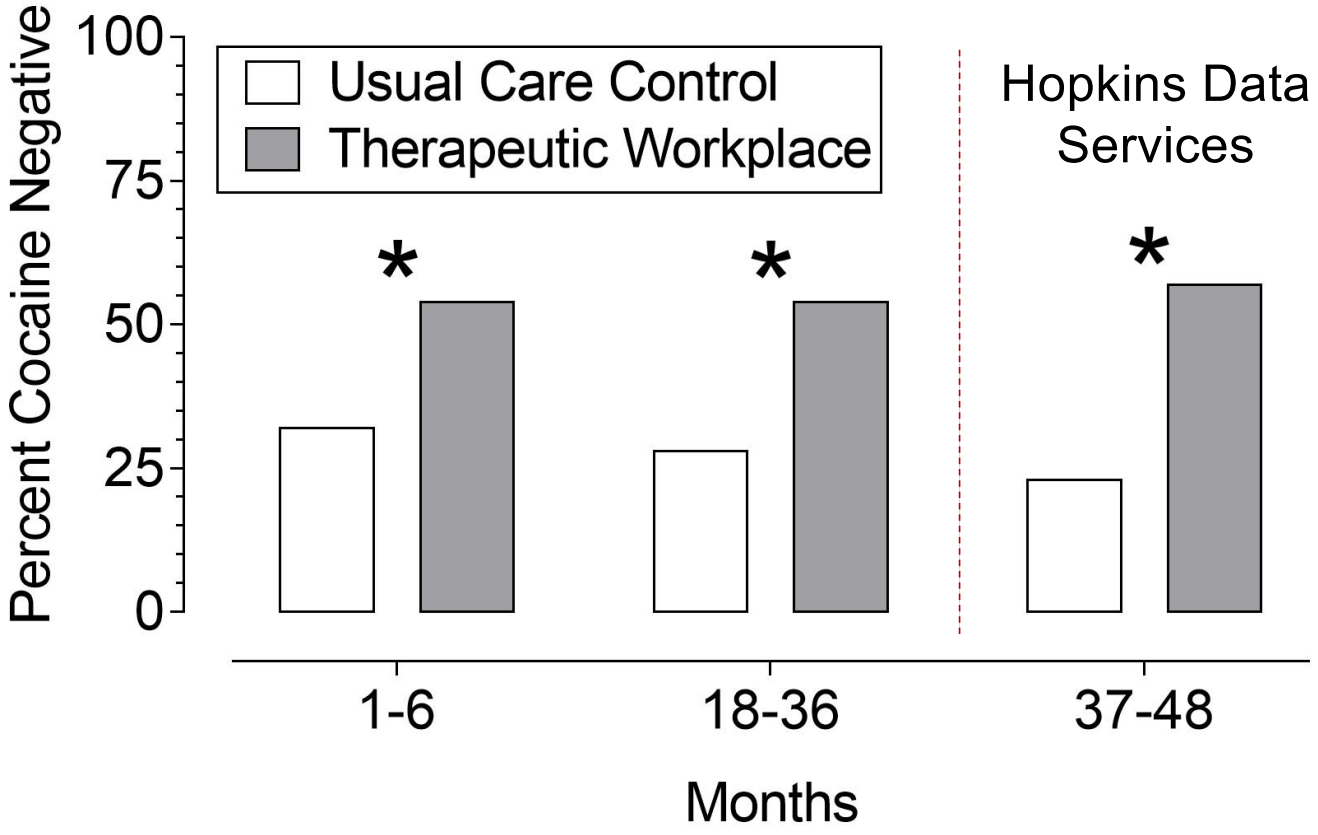
Silverman et al. (2005). Behavior Modification, 29, 417-463

Social Business Model: Study Design



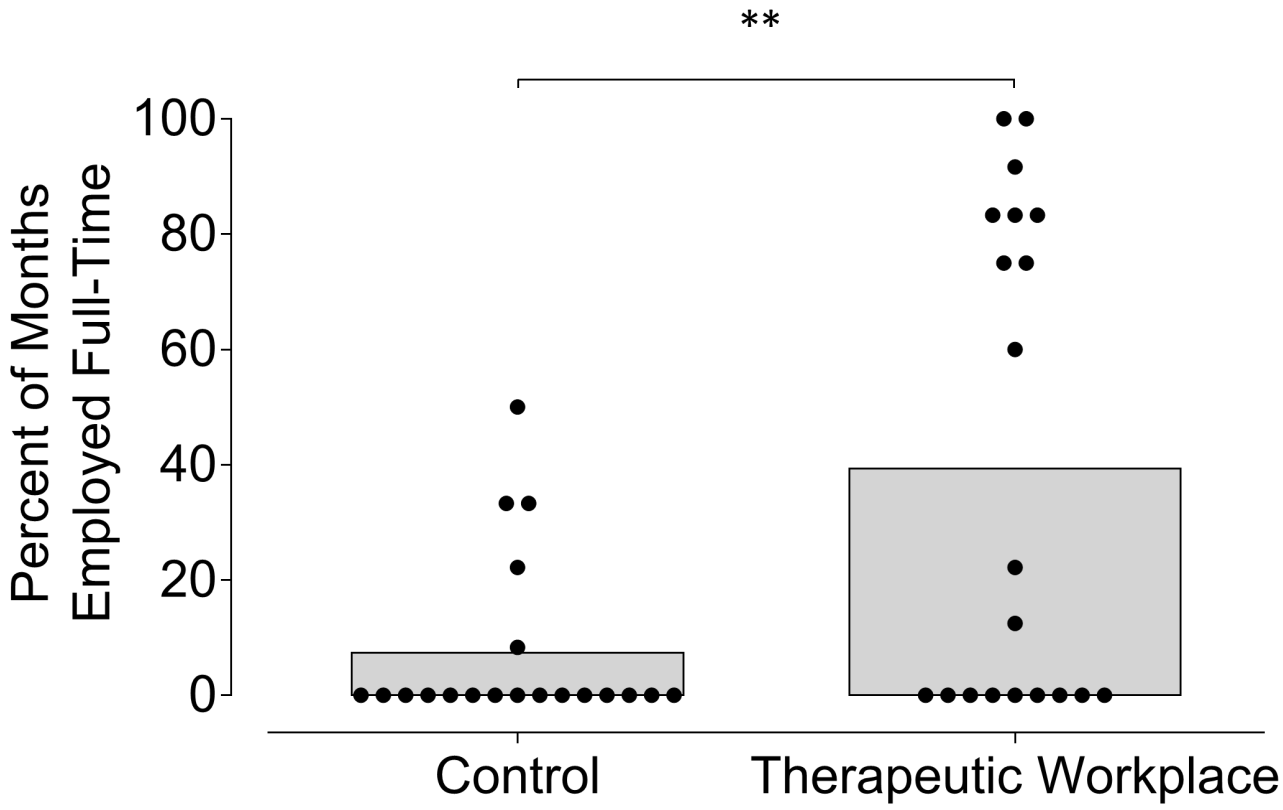
Silverman et al. (2001, 2002). Experimental and Clinical Psychopharmacology
Aklin et al. (2014). Journal of Substance Abuse Treatment, 47, 329–338

Social Business Model: Abstinence



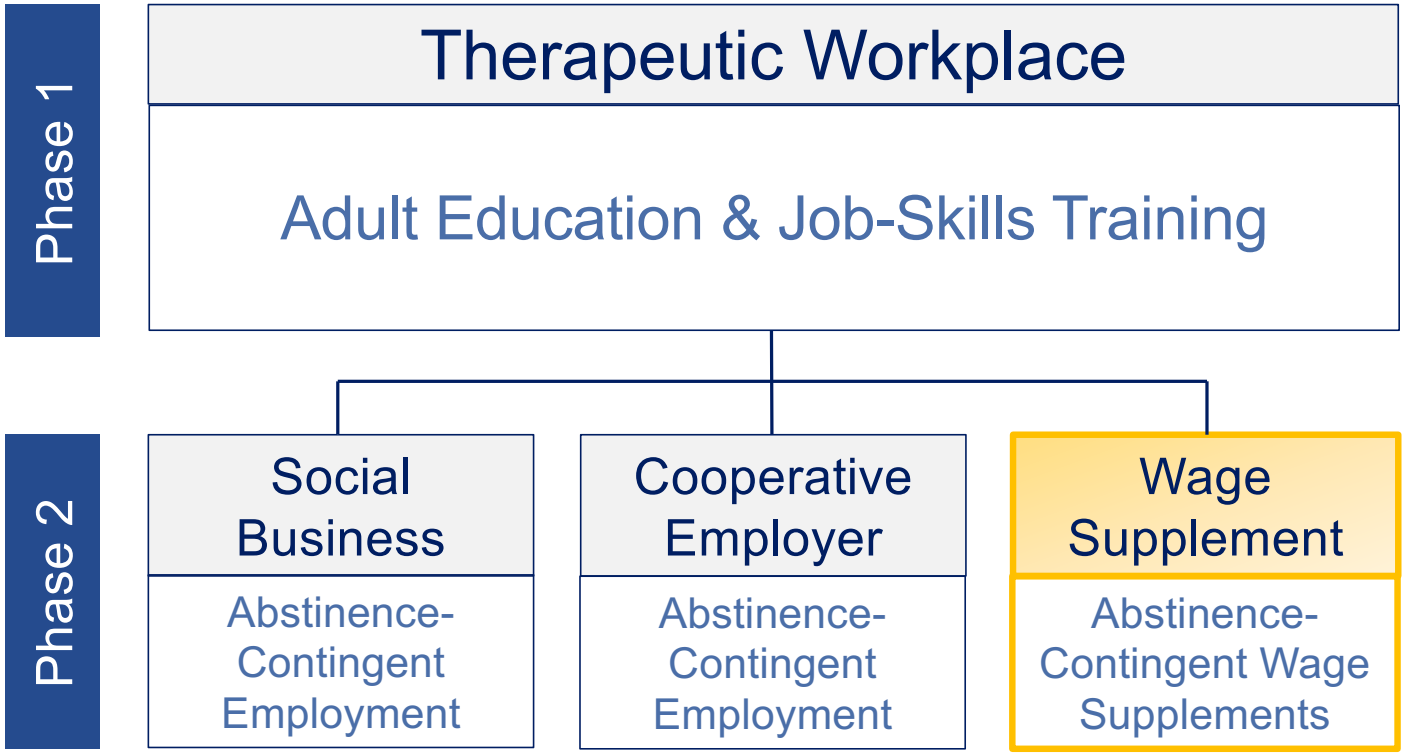
Silverman et al. (2001, 2002). Experimental and Clinical Psychopharmacology
Aklin et al. (2014). Journal of Substance Abuse Treatment, 47, 329–338

Social Business Model: Employment



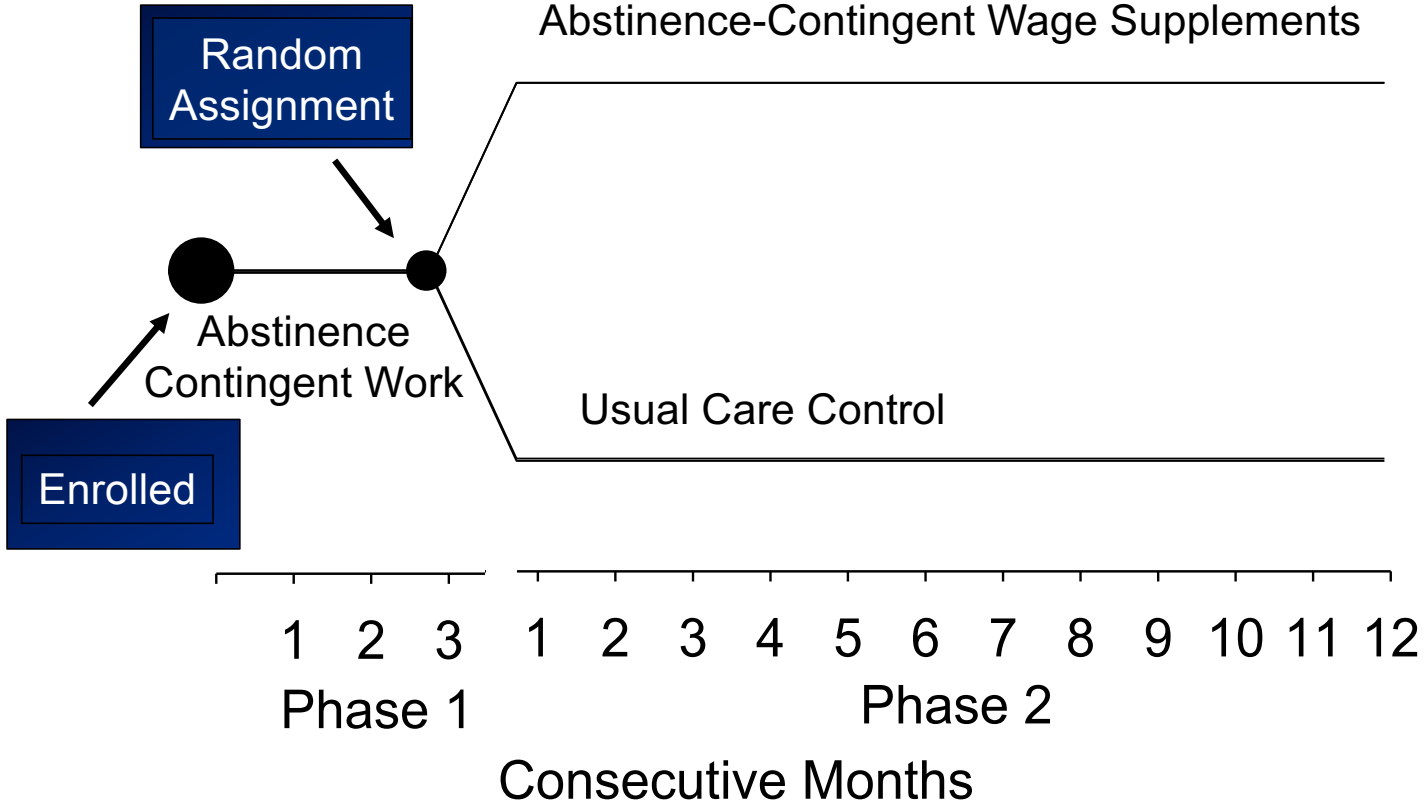
Aklin et al. (2014). Journal of Substance Abuse Treatment, 47, 329–338

The Wage Supplement Model



Silverman et al., (2016). Trans Issues In Psychological Science, 2, 203–212

Wage Supplement Model: Study Design



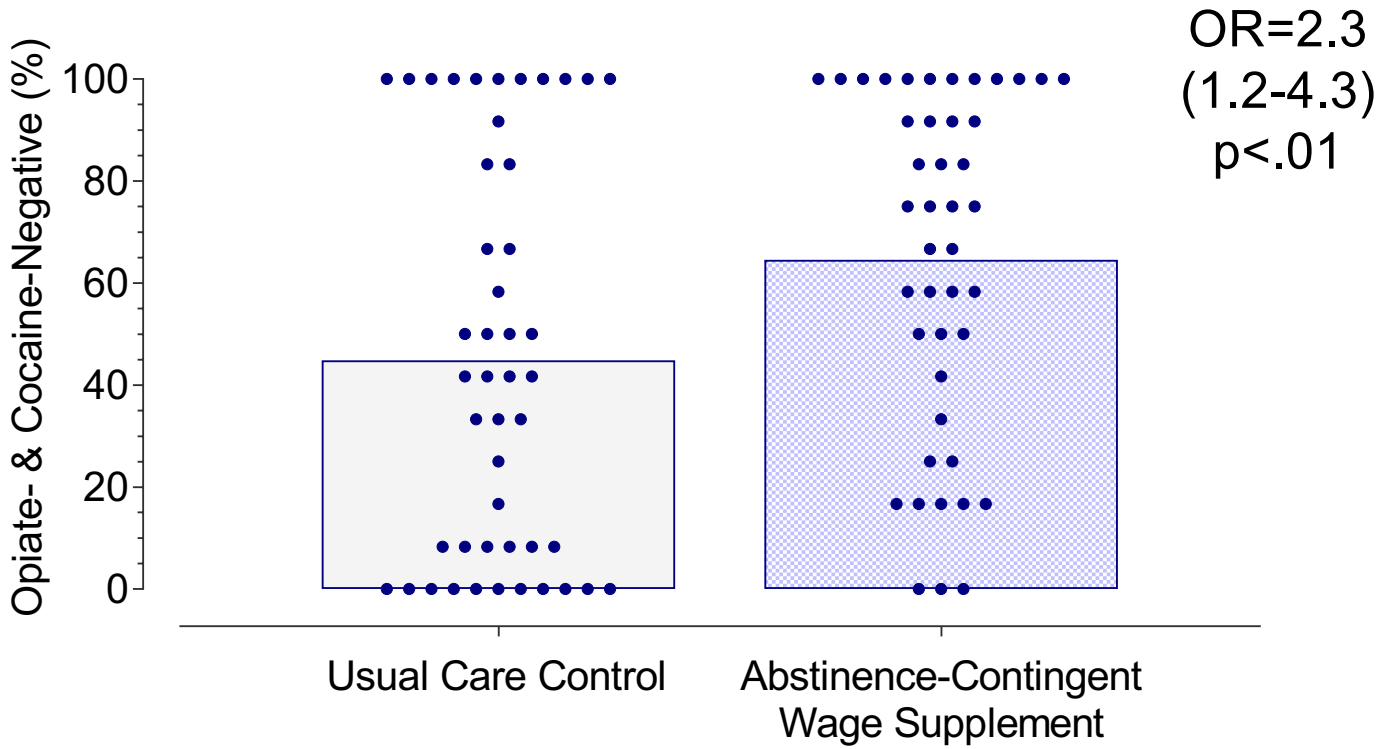
Holtyn et al (2020). J of Epidemiology and Community Health

Wage Supplement Model: Participant Characteristics

	N = 91
Male	55%
Black or African American	56%
Living in Poverty	98%
Injection Drug Use	46%
Opiate- or Cocaine-Positive Urine	63%

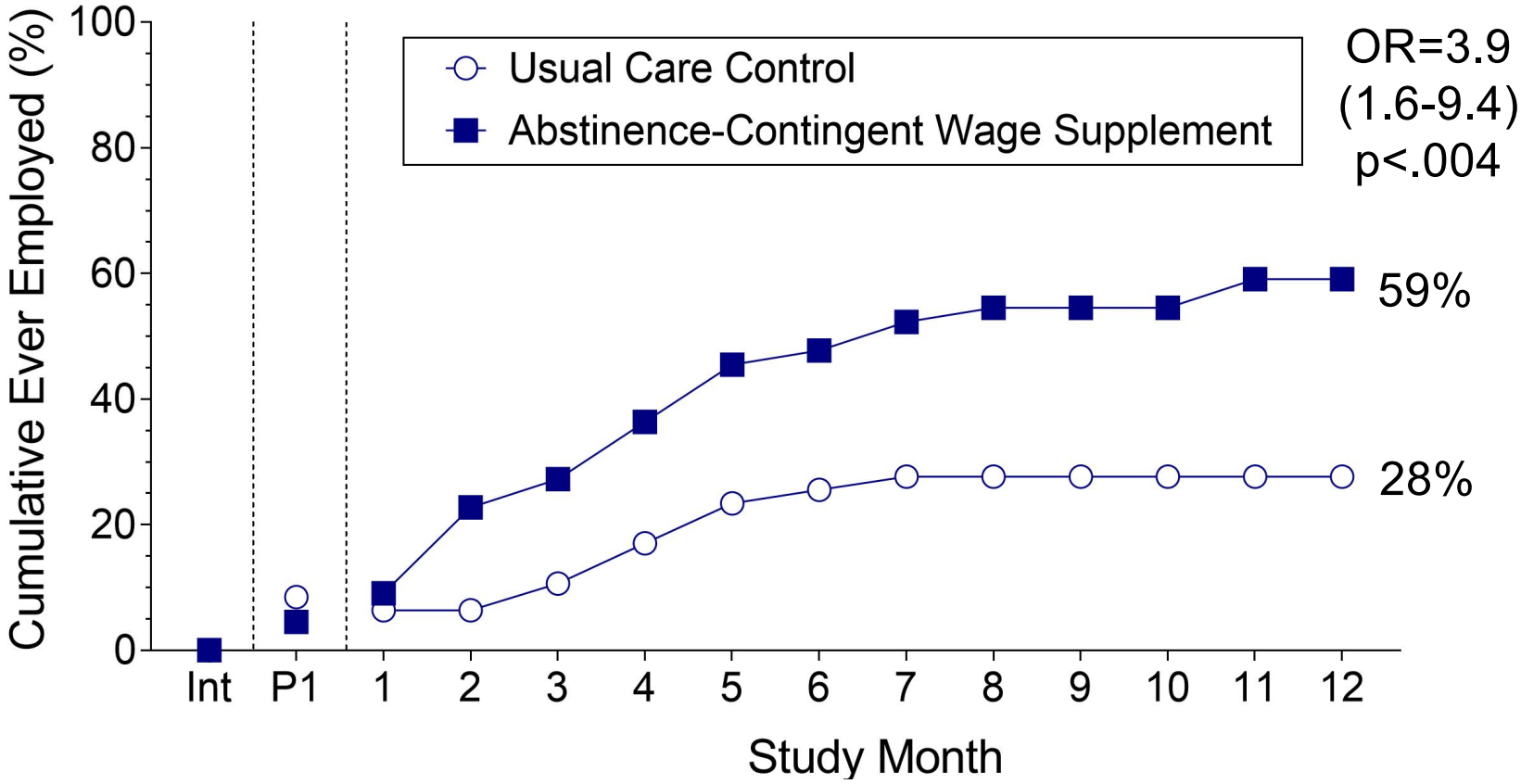
Holtyn et al (2020). J of Epidemiology and Community Health

Wage Supplement Model: Drug Abstinence



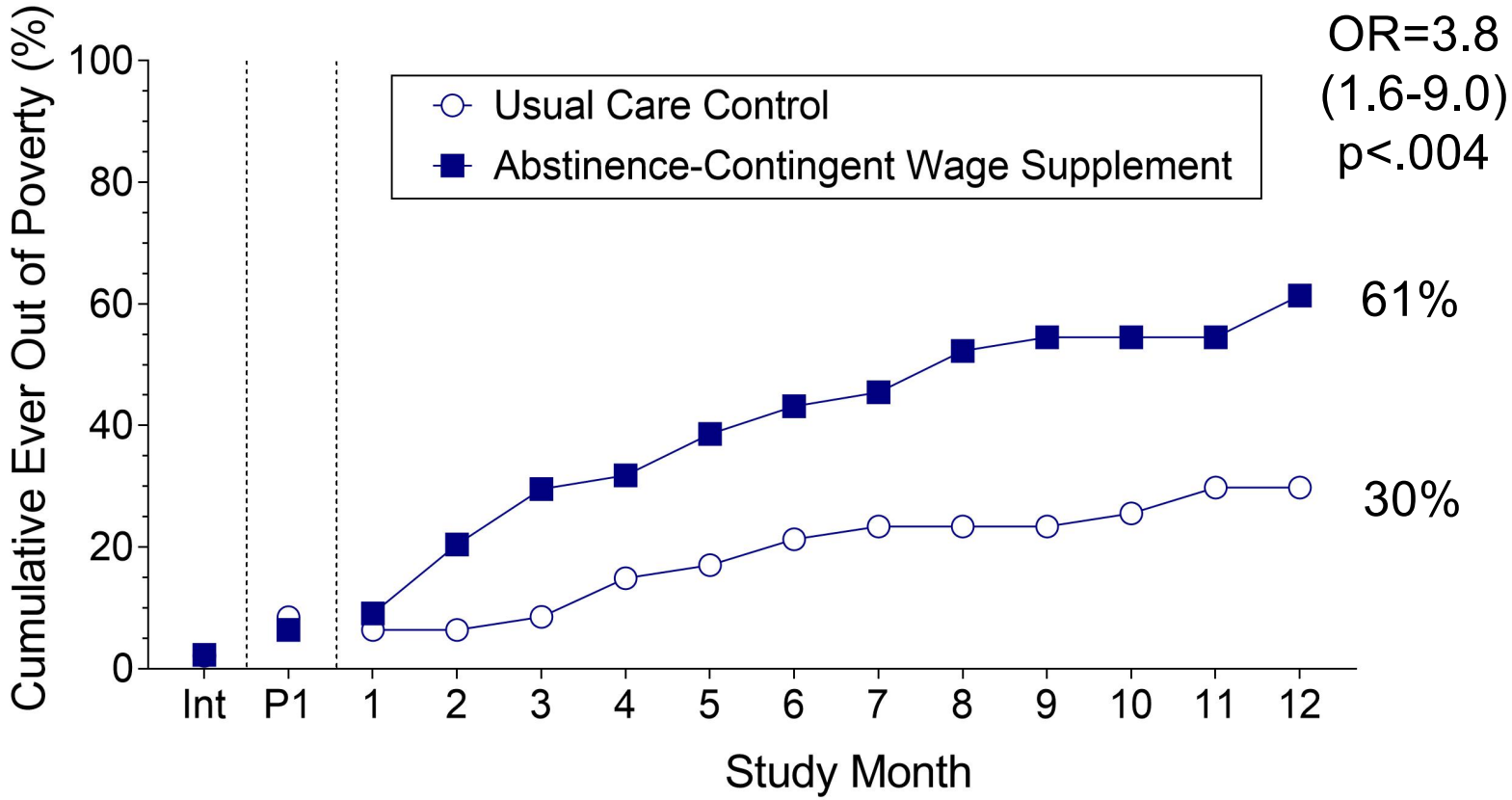
Holtyn et al (2020). J of Epidemiology and Community Health

Wage Supplement Model: Employment



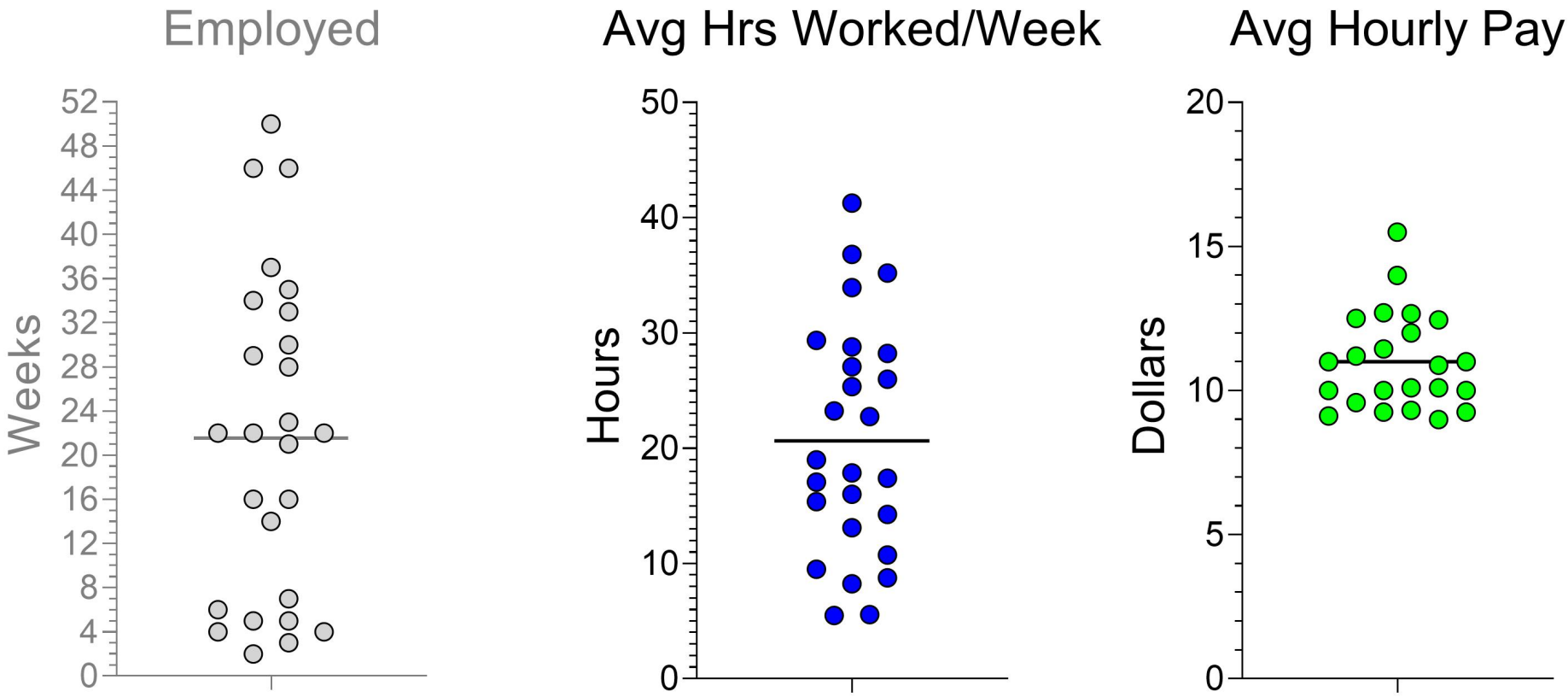
Holtyn et al (2020). J of Epidemiology and Community Health

Wage Supplement Model: Poverty



Holtyn et al (2020). J of Epidemiology and Community Health

Hours Worked Per Week and Hourly Pay

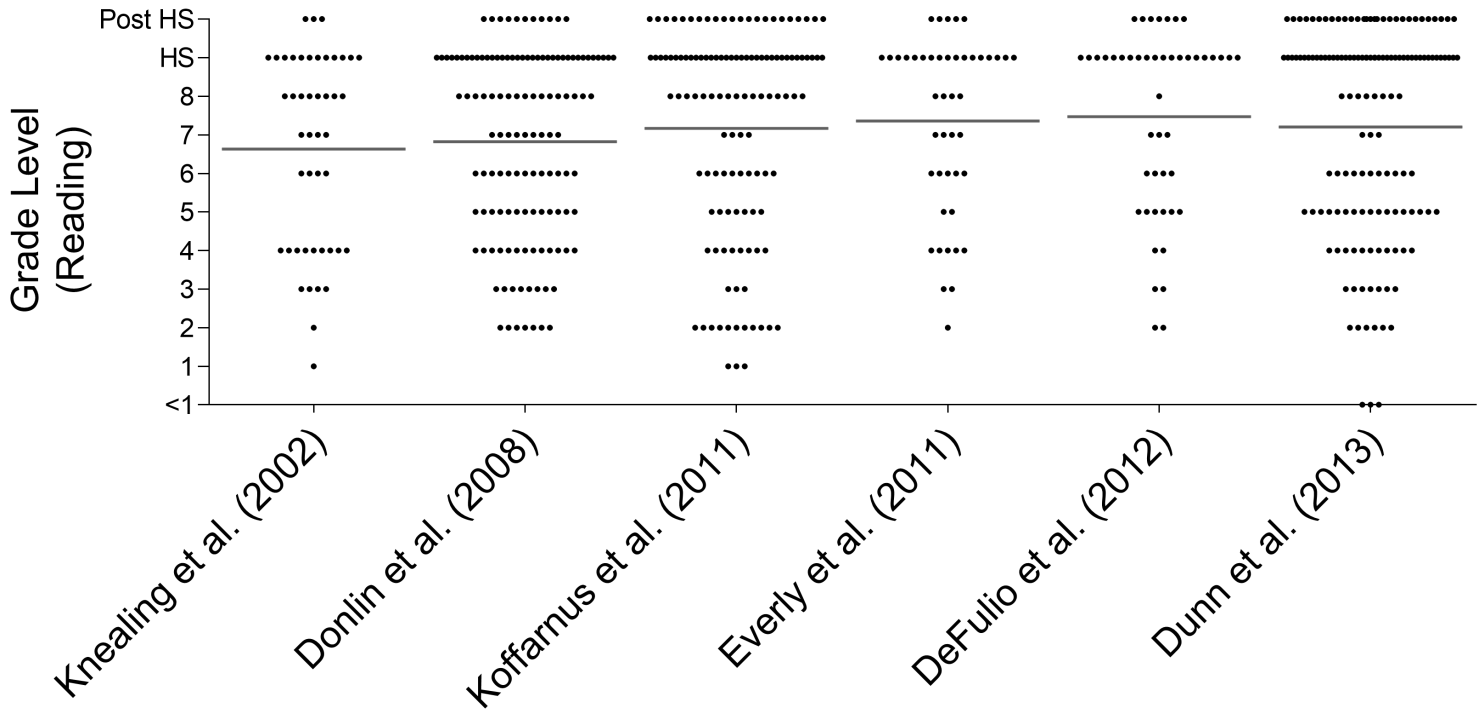


Holtyn et al (2021). Journal of Substance Abuse Treatment

The Therapeutic Workplace: Education Focused Intervention to Promote Employment

Silverman, Holtyn and Subramaniam (2018). Exp and Clin Psychopharm. 26, 515–524.

Limited Skills of Participants - WRAT



Holtyn et al. (2015). J of Vocational Rehabilitation, 42, 67-74

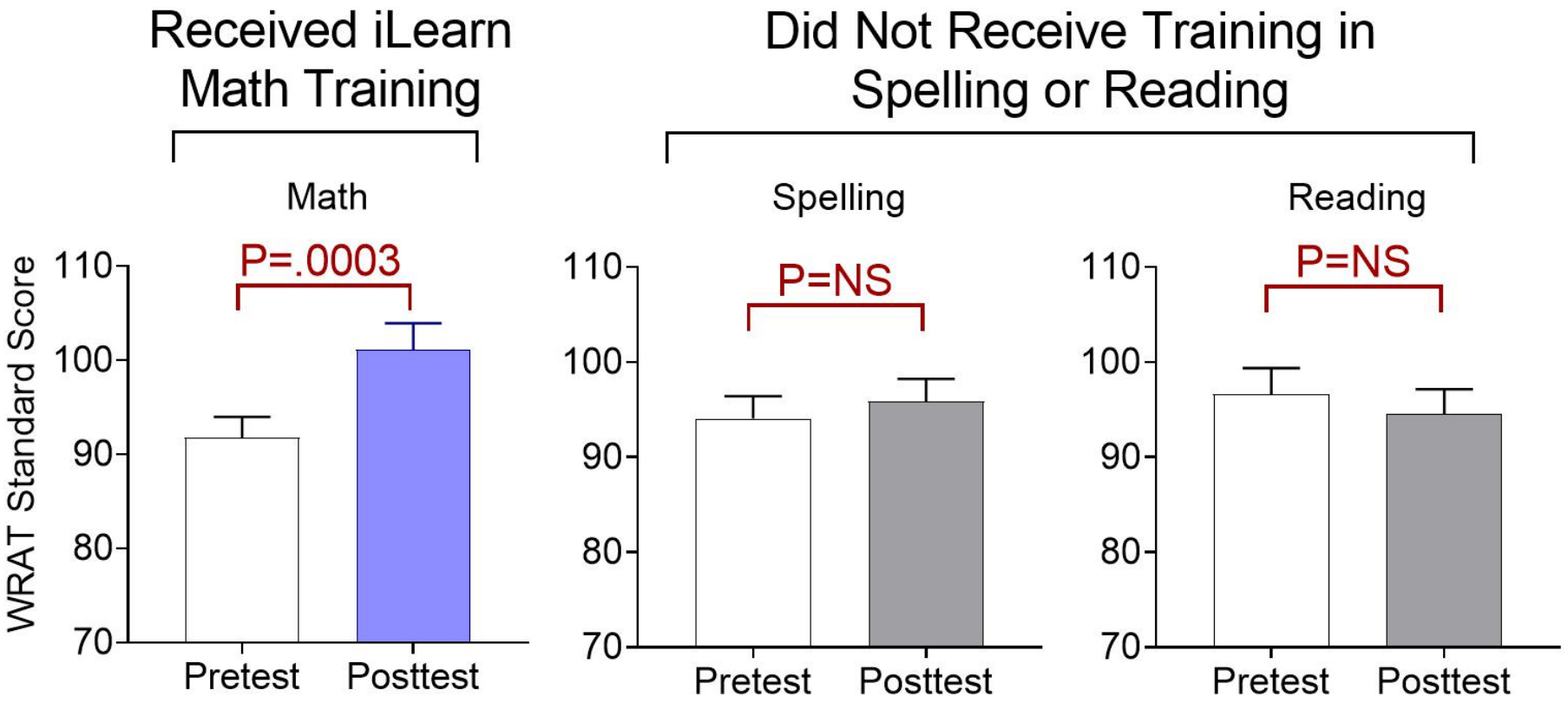
Limitations of Education-Focused Approaches

- Education-focused interventions have failed to retain low income individuals in education.
  - *Bos et al. (2002). Improving basic skills: The effects of adult education in welfare-to-work programs. Washington, DC: Office of Vocational and Adult Education, Department of Education.*

Incentives in Training & Education

- Promotes attendance in training
  - *Silverman et al. (1996). Drug and Alcohol Dependence, 41, 197-207.*
  - *Koffarnus et al. (2011). Alcohol and Alcoholism, 46, 561-569.*
- Promotes punctuality and complete work shifts
  - *Wong et al. (2004). Exp and Clin Psychopharm,12, 39-46.*
  - *Wong et al. (2004). Drug and Alcohol Dependence, 74, 319-323.*
- Promotes productivity and progress in training
  - *Wong et al. (2003). Exp and Clin Psychopharm,11, 46-55.*
  - *Koffarnus et al. (2013). J of Applied Behavior Analysis, 46, 395-406.*
  - *Koffarnus et al. (2013). J of Applied Behavior Analysis, 46, 582–591.*

Effects of Stipend-Supported iLearn Math on WRAT



Addressing Poverty-Related Health Disparities

- Incentives and the Therapeutic Workplace can promote and maintain drug abstinence and medication adherence.
- The Therapeutic Workplace can promote employment and reduce poverty.
- Stipend-supported education may be useful to promote employment in high paying jobs.

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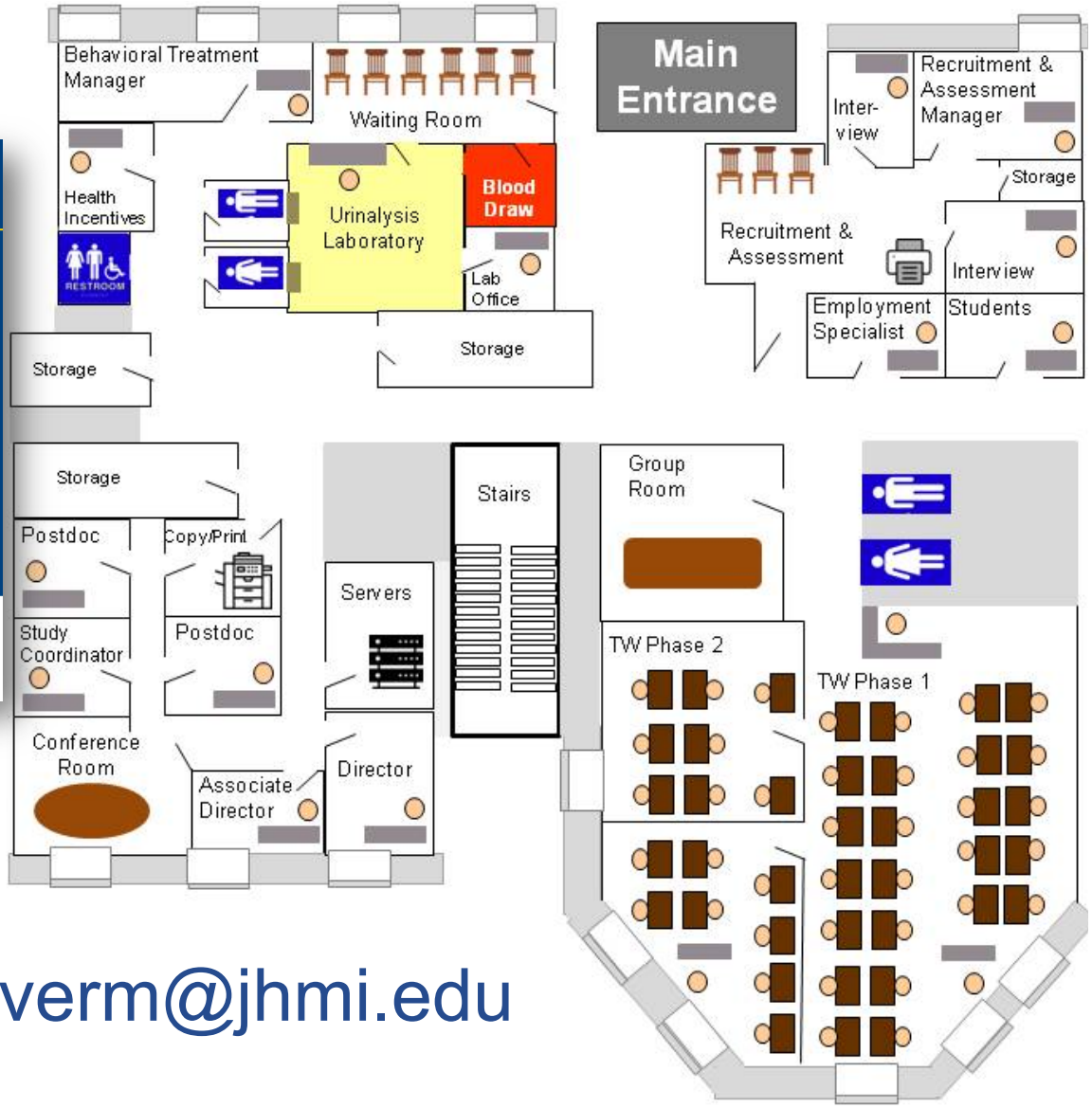

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Title of Program: VCBH Monthly Lecture Series FY2021

Title of Talk: *Utility of Operant Conditioning to Address Poverty-Related Health Disparities*

Speaker/Moderator: Kenneth Silverman, PhD

Planning Committee Members: Stephen H. Higgins, PhD, Philip Ades, MD, Diann Gaalema, PhD

Date: November 18, 2020

Workshop #: 21-265-03

Claiming Instructions

Vermont Center on Behavior and Health Monthly Lecture Series FY 2021-
Utility of Operant Conditioning to Address Poverty-Related Health Disparities
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Is there anything to disclose? ☐ **Yes or** ☒ **No**
Please list the Potential Conflict of Interest (*if applicable*): ****

All Potential Conflicts of Interest have been resolved prior to the start of this program.
☒ **Yes or** ☐ **No** ***(If no, credit will not be awarded for this activity.)***
(CMIE staff members do not have any interests to disclose)

All recommendations involving clinical medicine made during this talk were based on evidence that is accepted within the profession of medicine as adequate justification for their indications and contraindications in the care of patients. ☒ **Yes**

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