Contingency Management

2 August 2023

Dr Sean Daugherty
Department of Addiction Medicine | Advanced Trainee Addiction Psychiatry

Introduction

1. **Background on Contingency Management**
2. **Operant Conditioning**
3. **Evidence**
4. **Implementing**

Contingency Management

Background

Background

Contingency Management

Contingency management therapies take advantage of the power of alternative positive reinforcers to make abstinence from substance use a more immediately attractive option and shift behavioural choices towards sustained abstinence over time

Based on operant conditioning principles

Background

Contingency Management

Frequent monitoring of target behaviour

Provision of tangible positive reinforcers when target behaviour

Consistent and immediate link between behaviour and reward

Removal of reinforcer when target behaviour does not occur

Target behaviours generally related to

Abstinence

Attendance

Monetary-based reinforcers

Example

Voucher system for submitting urine drug screens which are negative

Clinic-managed 'bank account'

- 1st negative result = $2.50
- 2nd = $3.75
- 3rd = $5.00
- Incremental increases continue

Over 12 weeks each patient could earn up to $1200

Vouchers can then be exchanged for televisions, stereo equipment, clothing, cinema tickets, etc.

Staff purchase requested items so no cash is handed to the patient; certain items are not approved (e.g. weapons, alcohol)

Contingency Management

Operant Conditioning

Behavioural Modification (Tx) & Reinforcement

Behavioural change model

- the systematic delivery of reinforcing or punishing consequences contingent on the occurrence of a target response (e.g. abstinence) and the withholding of the consequences in the absence of the target response

Reinforcement

- Positive (+) receiving a positive response to the desired behaviour
- Negative (-) not receiving something following the desired behaviour*

Operant conditioning (social learning) = learning that uses reinforcement

* Different to punishment – this is receiving a negative consequence to an undesired behaviour

Operant Conditioning

B. F. Skinner (1948)

Based on Thorndike's (1898) law of effect

- behavior that is followed by pleasant consequences is likely to be repeated, and behavior followed by unpleasant consequences is less likely to be repeated

Skinner introduced 'reinforcement'

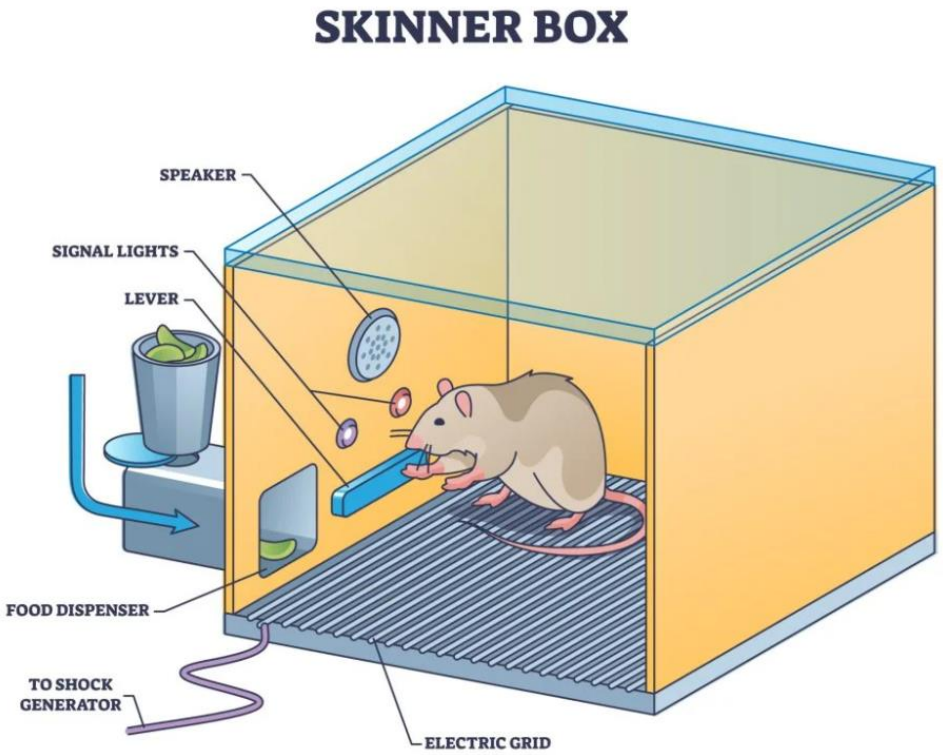
- behavior which is reinforced tends to be repeated (i.e., strengthened)
- behavior which is not reinforced tends to die out-or be extinguished (i.e., weakened)

Skinner Box aka Operant Conditioning Chamber

- **Used to objectively record an animal's behavior in a compressed time frame**
- **Negative and positive reinforcement for engaging in certain behaviors, such as lever pressing (for rats)**

Positive reinforcement introduced to increase a behavior

Negative reinforcement introduced to decrease a behavior



Simply Psychology: https://www.simplypsychology.org/what-is-a-skinner-box.html

Three types of behavioural responses in operant conditioning

ST VINCENT'S HEALTH AUSTRALIA

Neutral operants:

- Responses from the environment that neither increase nor decrease the probability of a behavior being repeated.

Reinforcers:

- Responses from the environment that increase the probability of a behavior being repeated.
- Reinforcers can be either positive or negative.

Punishers:

- Responses from the environment that decrease the likelihood of a behavior being repeated.
- Punishment weakens behavior.
- Problematic – punished behavior not forgotten but suppressed until absent. Sometimes difficult to distinguish from negative reinforcement

Reinforcement

Positive Reinforcement

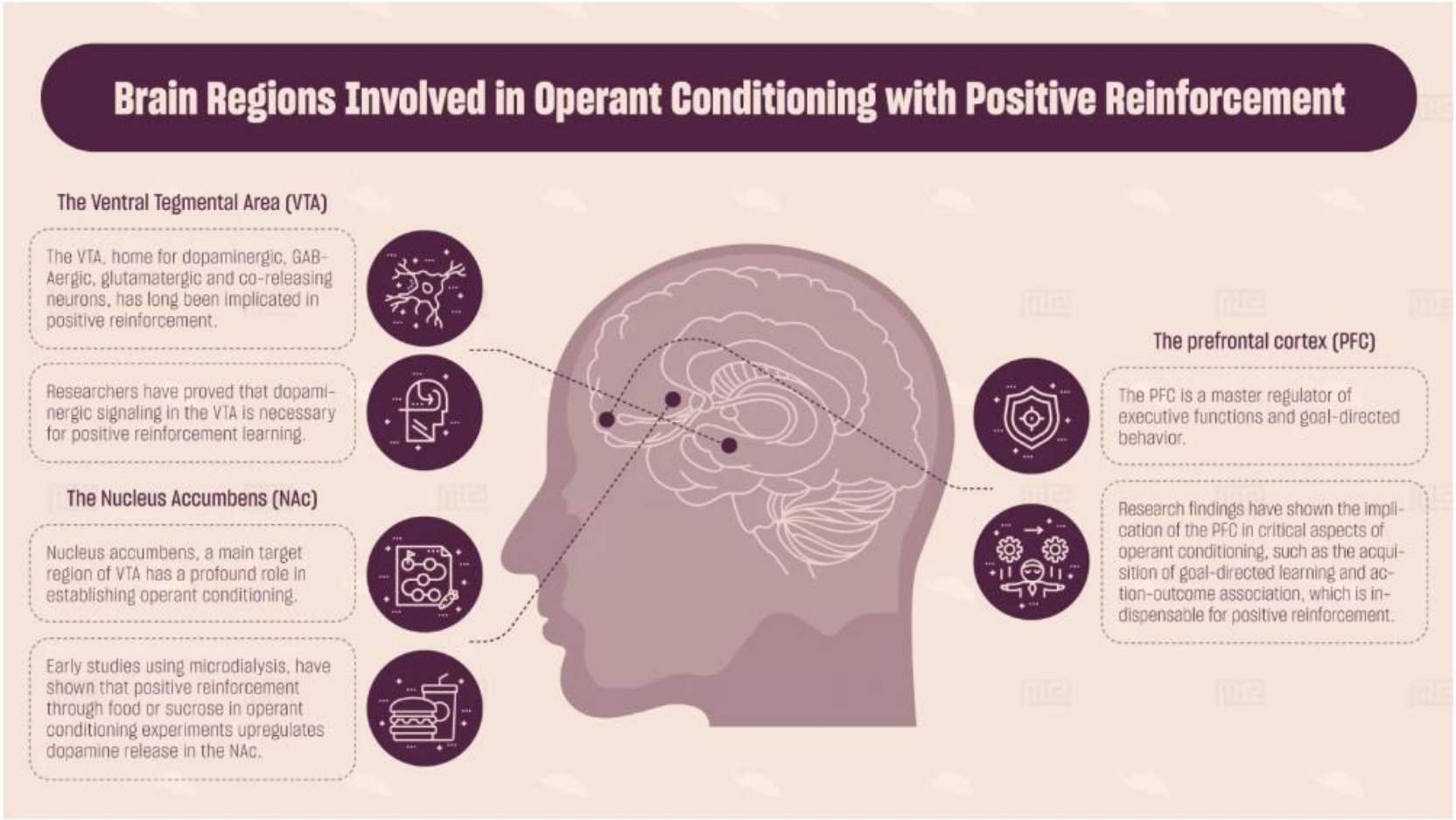
- Response or behavior is strengthened by rewards, leading to the repetition of desired behavior
- For example, Premack principle
  - using a preferred activity (high-probability behavior) as a reward for completing a less preferred one (low-probability behavior).
  - incentivises the less desirable behavior by associating it with a desirable outcome, thus strengthening the less favored behavior (e.g. telling a child to first do your homework, then you can watch your iPad)

Negative reinforcement

- is the termination of an unpleasant state following a response.
- removal of an adverse stimulus which is 'rewarding'
- strengthens behavior because it stops or removes an unpleasant experience.
- For example, if you do not complete your homework, you will give your teacher $10.

APA: https://www.apa.org/ptsd-guideline/patients-and-families/cognitive-behavioral

Neurobiological Pathways



https://conductscience.com/maze/positive-reinforcement-using-operant-conditioning/

Contingency Management

Does it work and is it cost effective?

Outcomes

Cocaine dependence

Study 1:

- those who received vouchers achieved 11.7 weeks of continuous abstinence while those in the control arm (same psychotherapy no vouchers) achieved 6 weeks continuous abstinence (up to $1000 in vouchers)

Study 2:

- 70 cocaine dependent clients randomly assigned to treatment with contingent vouchers vs. treatment with vouchers independent of urine testing. Almost 40% of contingent voucher arm achieved 12 weeks continuous abstinence while less than 10% in the other condition.

Outcomes

Opiate Agonist Treatment

Methadone Study RCT with 800 participants

- Retention rates high both groups and is likely the reinforcing property of Methadone itself
- No difference in attrition
- Significantly higher negative urine drug samples in those in the prize system over 12 weeks

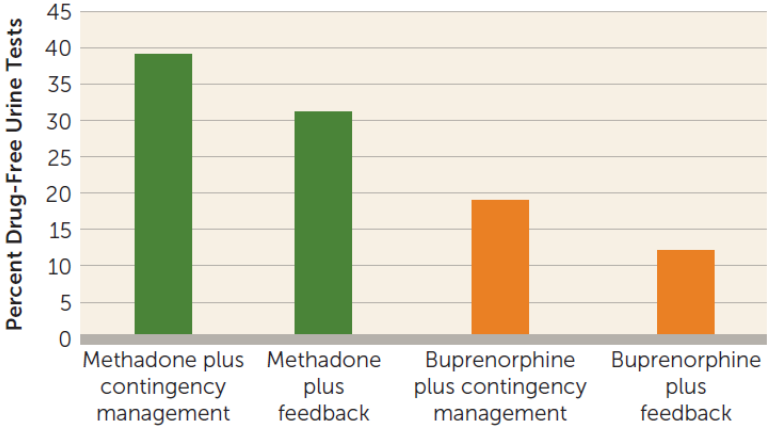
Outcomes

Buprenorphine

Review of 4 studies, found

- Only some benefit for contingency management
- Results were not homogenous
- Led researcher to more questions
  - E.g. study design, is buprenorphine that effective, are behavioural interventions ineffective in this group, etc.
- Is Pharmacotherapy on its own a positive reinforcer?

Questioned research design given previous studies and their results



[a] Data from Schottenfeld et al. (40).

Benefit to costs

Counselling plus ‘rewards’

Benefit-Cost Review with two methods reviewed

1: Voucher system

2: Prize/raffle system

- Max value $500*

Treatment lasted 2-3 months and reward opportunities 2-3 times per week

Benefit-Cost Summary Statistics Per Participant

Benefits to:

Taxpayers	$3,198	Benefits minus costs	$23,016
Participants	$4,118	Benefit to cost ratio	$39.30
Others	$1,592	Chance the program will produce benefits greater than the costs	77 %
Indirect	$14,709		
Total benefits	$23,617		
Net program cost	($601)		
Benefits minus cost	$23,016		

Overall benefits based on affecting the outcome of illicit drug use and the:

1. Criminal justice system
2. Labor market earnings associated with illicit drug abuse or dependence
3. Health care associated with illicit drug abuse or dependence
4. Mortality associated with illicit drugs

Lower cost model with increased length of treatment of up to 12 months
Net program cost ($263)
Benefits minus cost $2,773

Contingency Management

Implementation

Hurdles to implement

Politics and ideology?

‘paying drug abusers to do what they should anyway’

Abstinence model vs harm reduction model

Conflict between the two

Ethical dilemmas - switching from one disorder to another?

Prize-based techniques may mimic gambling

Clinical dilemmas

Many clinicians do not believe contingency management improves outcomes

Funding

‘Adding tangible reinforcers increases cost to treatment, as contingency management is generally an add-on to usual care’

What about other chronic diseases?

Contingency management for people with diabetes maintaining an HBA1c < 7

Research to Practice in Australia

Costs of implementing

How is it funded

Addressing various hurdles to implement within society

Government policy setting

Contingency Management

Questions?

References

- Carroll KM, Weiss RD. The Role of Behavioral Interventions in Buprenorphine Maintenance Treatment: A Review. Am J Psychiatry. 2017 Aug 1;174(8):738-747. doi: 10.1176/appi.ajp.2016.16070792. Epub 2016 Dec 16. PMID: 27978771; PMCID: PMC5474206.
- Petry, N. (2006). Contingency management treatments. The British Journal of Psychiatry, 189(2), 97-98. doi:10.1192/bjp.bp.106.022293
- Petry NM, Alessi SM, Olmstead TA, Rash CJ, Zajac K. Contingency management treatment for substance use disorders: How far has it come, and where does it need to go? Psychol Addict Behav. 2017 Dec;31(8):897-906. doi: 10.1037/adb0000287. Epub 2017 Jun 22. PMID: 28639812; PMCID: PMC5714694.
- Stitzer ML, Vandrey R. Contingency management: utility in the treatment of drug abuse disorders. Clin Pharmacol Ther. 2008 Apr;83(4):644-7. doi: 10.1038/sj.clpt.6100508. Epub 2008 Feb 27. PMID: 18305456.
- Washington State Institute for Public Policy. Contingency management (higher cost) for substance use disorders; Substance Use Disorders: Treatment for Adults. Benefit-cost methods last updated December 2019 (https://www.wsipp.wa.gov/BenefitCost/Program/297).

Project ECHO®

St. Vincent's Hospital, Melbourne
Australia

ST VINCENT'S HEALTH AUSTRALIA

Thank You

UNDER THE STEWARDSHIP OF MARY AIKENHEAD MINISTRIES