

# Cannabis and Health

Module 14: Sports, Exercise, and Recovery

Lecture 1: Endocannabinoids and Exercise

# Why Exercise?

- Physical activity has numerous benefits for *physical health*
  - Decreased overall morbidity and mortality
  - Decreased incidence of cardiovascular disease, Type II diabetes, some cancers
  - Increased mobility and independence among older adults
- Physical activity has numerous benefits for *mental health*
  - Decreased incidence of depression
    - Exercise is as effective as antidepressants for treatment of clinical depression
  - Increased positive affect
  - Decreases in cognitive decline and neurodegenerative disease in older adults

# American College of Sports Medicine Recommendations (2011)

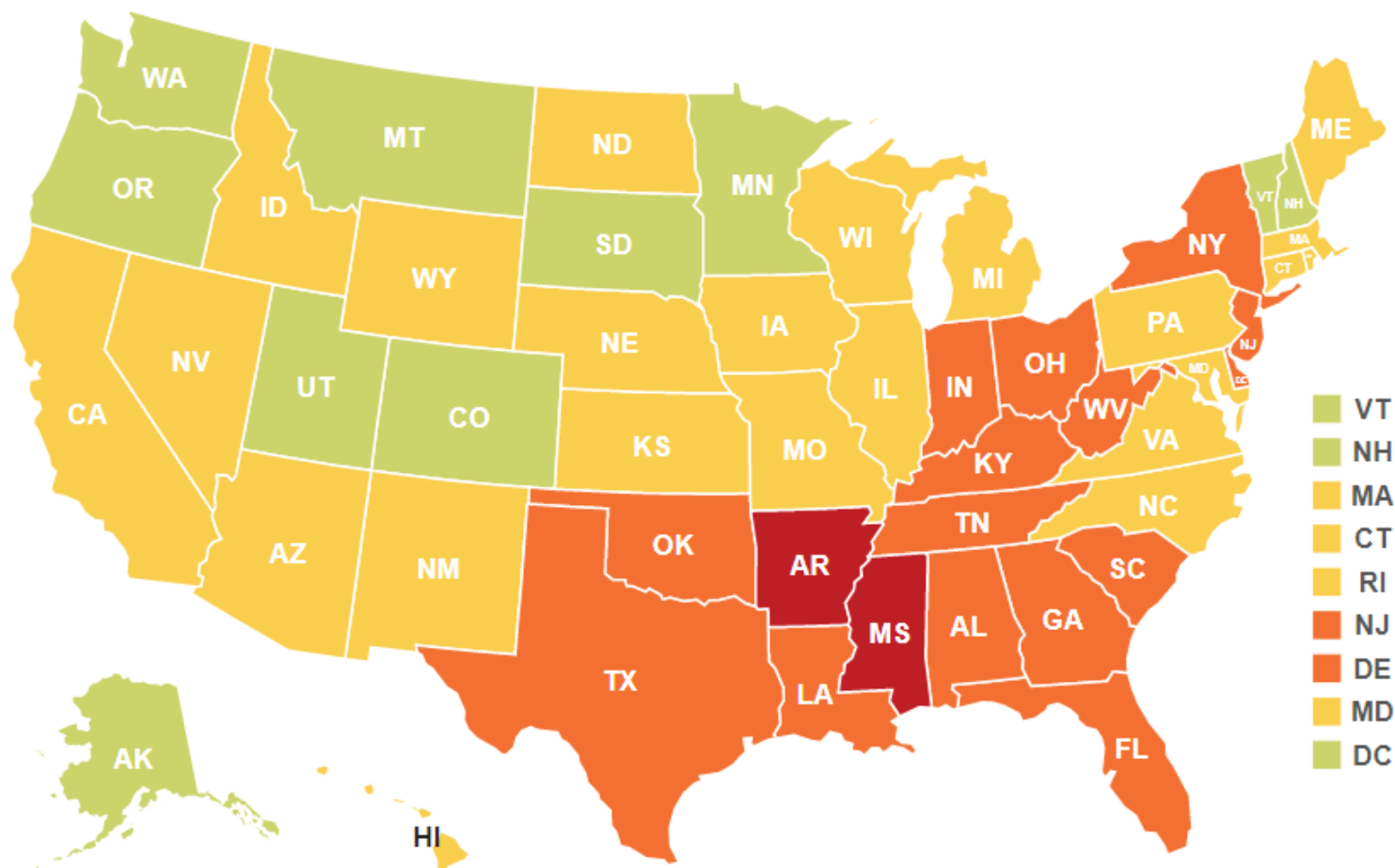
- Cardiorespiratory Exercise
  - Adults should get at least 150 minutes of moderate-intensity exercise per week; either 30-60 minutes of moderate-intensity exercise (five days per week) or 20-60 minutes of vigorous-intensity exercise (three days per week).
- Resistance Exercise
  - Adults should train each major muscle group two or three days each week using a variety of exercises and equipment.
- Flexibility Exercise
  - Adults should do flexibility exercises at least two or three days each week to improve range of motion.
- Neuromotor Exercise
  - Neuromotor exercise (sometimes called “functional fitness training”) is recommended for two or three days per week (e.g., tai chi, yoga)

# Physical Inactivity by State, 2016

Select years with the slider to see historical data. Hover over states for more information. Click a state to lock the selection. Click again to unlock.

## Percent of adults who are physically inactive

0 - 9.9%   10 - 14.9%   15 - 19.9%   20 - 24.9%   25 - 29.9%   30 - 34.9%   35%+



# Is cannabis good or bad for exercise?

- Cannabis may impact exercise behavior – but direction of effect is not clear
- There are common anecdotal reports that cannabis decreases motivation, including motivation to exercise.
- BUT, there are also anecdotal reports that cannabis is used prior to athletic activity
  - The World Anti-Doping Agency includes cannabis as a prohibited substance in sport, on the grounds that it may enhance sports performance.
- Also evidence that cannabis is used in recovery

# Cannabinoids and Exercise Physiology



- Physical activity improves mood and increases positive affect
- The phenomenon of the ‘runner’s high’
  - Pain reduction, euphoria, decreased anxiety, and difficulties in estimating the passage of time
  - Endorphins do not explain this effect
- Endogenous cannabinoids may be a factor

## REVIEW

## Endocannabinoids and exercise

**A Dietrich, W F McDaniel**

# How would eCB's produce the runner's high?

- Cannabinoid receptors interact closely with endogenous opioid receptors in the reward pathways of the brain
- Laboratory studies conducted in animals and humans show exercise increases circulation eCB levels
- For example, Sparling and colleagues (2003) had male college students exercise at 70–80 % of VO<sub>2</sub>max
  - Exercise led to increased levels of the eCB anandamide in blood plasma
- Increased anandamide has been proposed as a possible explanation for components of runner's high

# Cannabinoids and Motivation

- Animal studies show that, counter to stereotypes of “couch lock,” cannabinoids may also be involved in exercise motivation
- Mice selectively-bred for voluntary running REDUCE running when given a cannabinoid receptor antagonist
- CB1 knockout mice also REDUCE voluntary exercise





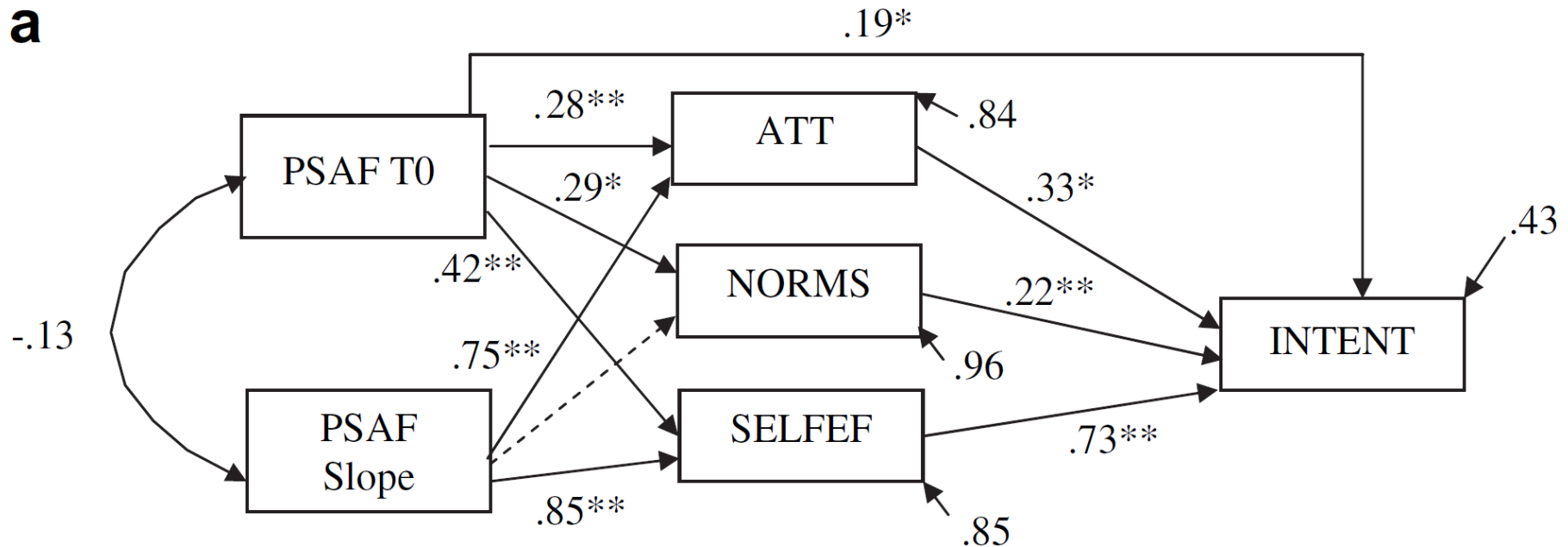
# Affective Response to Exercise

- Affective response to exercise is critical to exercise participation
- Hedonic principle: if something feels more pleasurable we are more likely to do it
- Theories of Health Behavior also show the importance of affect
- Affective response to exercise measured with the “Feeling Scale” asked at multiple points during a bout of moderate intensity physical activity

-5	-4	-3	-2	-1	0	+1	+2	+3	+4	+5
Very Bad		Bad		Fairly Bad	Neutral	Fairly Good		Good		Very Good

# Affect is linked to Exercise Motivation

a



- Greater increases in positive affect during exercise (PSAT Slope) lead to more positive exercise attitudes (ATT) and self-efficacy (SELF EF), which translate into higher intentions (INTENT) to exercise

Kwan & Bryan (2009a). *Psychology of Sport and Exercise*

# Cannabis and exercise in humans

- It is unclear whether cannabinoids directly influence exercise motivation in humans
- However, there is evidence that endocannabinoids are produced during exercise, and are associated with positive affective response



# Building the evidence base



## The New Runner's High? Examining Relationships Between Cannabis Use and Exercise Behavior in States With Legalized Cannabis

Sophie L. **YorkWilliams**<sup>1\*</sup>, Charleen J. **Gust**<sup>1</sup>, Raeghan **Mueller**<sup>1</sup>, L. Cinnamon **Bidwell**<sup>2</sup>, Kent E. **Hutchison**<sup>1</sup>, Arielle S. **Gillman**<sup>1</sup> and Angela D. **Bryan**<sup>1</sup>

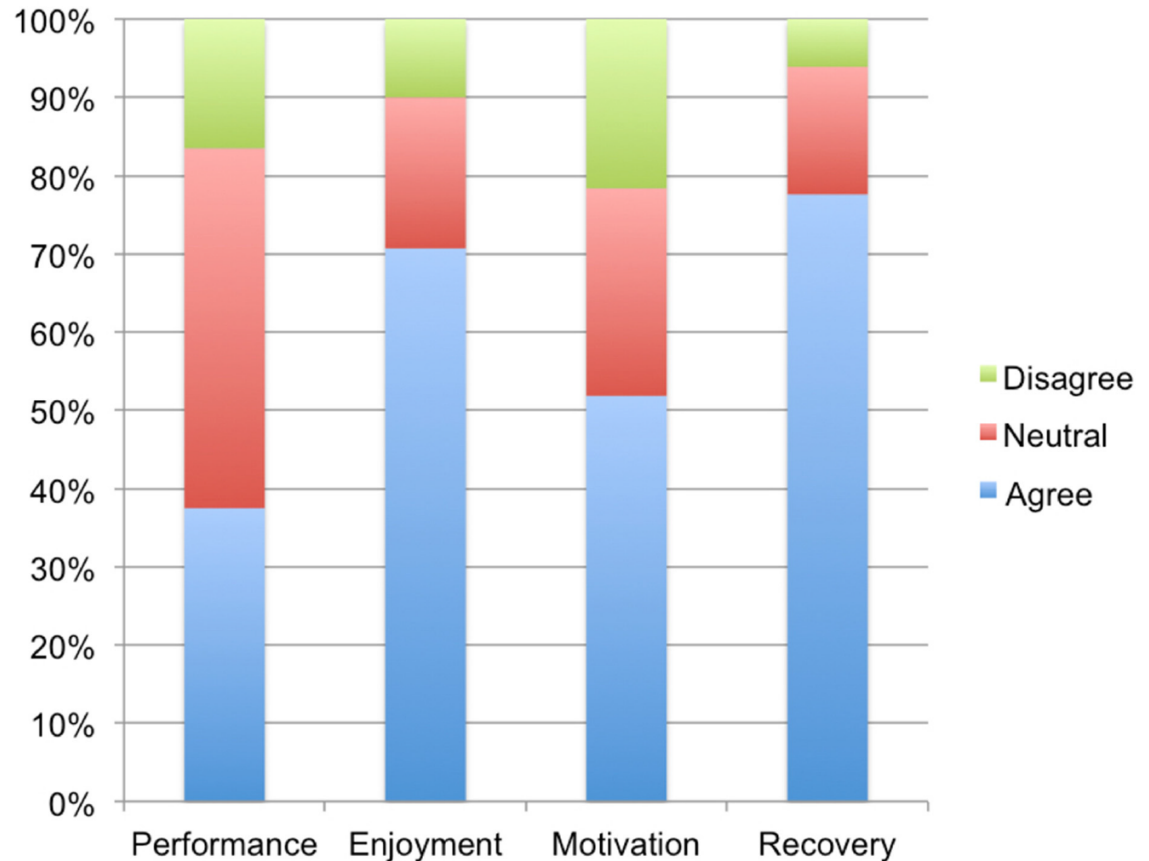
- Study of 605 cannabis users living in U.S. states will full legal access to cannabis

# Exercise among Cannabis Users

- 81.7% of users reported using cannabis immediately before (within one hour) or immediately after (within four hours) of exercise
- These users were more likely to be younger, more likely to be male, and had lower BMI than those who did not use cannabis with exercise
- Co-using participants reported significantly more exercise ( $M = 159.7$  min per week) than those who did not use cannabis with exercise ( $M=103.5$  min per week)
  - This difference was still significant controlling for age and gender

# Self-reported effects of cannabis on exercise

- Good for recovery and enjoyment
- Less so for motivation
- Perhaps not helpful for performance



**FIGURE 1** | Percentage of co-using participants who agreed, disagreed, or felt neutral toward whether use of cannabis shortly before and/or after exercise enhanced exercise performance, enjoyment, motivation, and recovery.

# Summary

- Exercise is clearly a critical health behavior, so it is important to understand whether cannabis use is harmful, beneficial, or has no effect
- Physiological evidence suggests interesting interactions between the endocannabinoid system and exercise
  - Perhaps particularly affective responses to exercise?
- Survey data suggest people who use cannabis during exercise perceive some benefits to enjoyment (affect) and recovery
- More research is clearly needed!!!