

# The Cognitive and Mental Health Benefits of Exercise

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## Acknowledgment

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At the time of this publication, Miriam E. Delphin-Rittmon, Ph.D, served as Assistant Secretary for Mental Health and Substance Use in the U.S. Department of Health and Human Services and the Administrator of the Substance Abuse and Mental Health Services Administration.

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Presented 2022

The MHTTC Network uses affirming, respectful and recovery-oriented language in all activities. That language is:

STRENGTHS-BASED  
AND HOPEFUL

INCLUSIVE AND  
ACCEPTING OF  
DIVERSE CULTURES,  
GENDERS,  
PERSPECTIVES,  
AND EXPERIENCES

HEALING-CENTERED AND  
TRAUMA-RESPONSIVE

INVITING TO INDIVIDUALS  
PARTICIPATING IN THEIR  
OWN JOURNEYS

PERSON-FIRST AND  
FREE OF LABELS

NON-JUDGMENTAL AND  
AVOIDING ASSUMPTIONS

RESPECTFUL, CLEAR  
AND UNDERSTANDABLE

CONSISTENT WITH  
OUR ACTIONS,  
POLICIES, AND PRODUCTS



# MHTTC

Mental Health Technology Transfer Center Network

Funded by Substance Abuse and Mental Health Services Administration

The purpose of the MHTTC Network is technology transfer - disseminating and implementing evidence-based practices for mental disorders into the field.

Funded by the Substance Abuse and Mental Health Services Administration (SAMHSA), the MHTTC Network includes 10 Regional Centers, a National American Indian and Alaska Native Center, a National Hispanic and Latino Center, and a Network Coordinating Office.

Our collaborative network supports resource development and dissemination, training and technical assistance, and workforce development for the mental health field. We work with systems, organizations, and treatment practitioners involved in the delivery of mental health services to strengthen their capacity to deliver effective evidence-based practices to individuals. Our services cover the full continuum spanning mental illness prevention, treatment, and recovery support.

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# What do we mean by “exercise”?

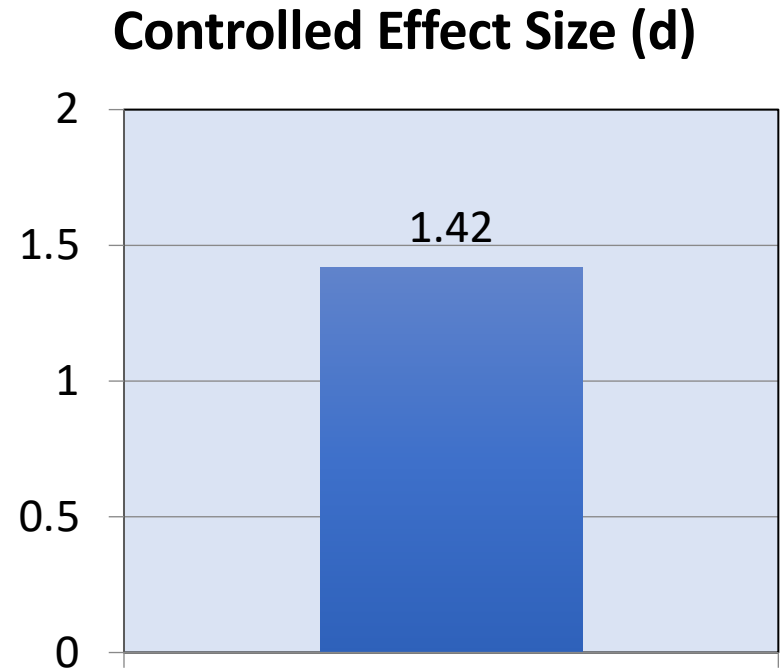
Activity requiring physical effort, carried out to sustain or improve health and fitness.

# Benefits of Exercise

- Decreased depression
- Decreased anxiety
- Increased sleep efficiency, quality
- Improved cognitive functioning
- Increased physical health

# Exercise for depression

- Meta-analysis
  - 11 randomized controlled trials
    - Participants with MDD dx
    - Control = no treatment or stretching
- Intervention
  - Frequency of exercise varied from 2 to 4 times a week
  - Duration from 20 to 45 min per session
  - Intensity from being unspecified to 70–85% of the maximum heart rate





# Meta-analysis of PA and risk of depression

Results show the greatest differences in risk observed between low doses of physical activity, suggesting most benefits are realized when moving from no activity to at least some.

Accumulating an activity volume equivalent to 2.5 hours of brisk walking per week was associated with 25% lower risk of depression

At half that dose, risk was 18% lower compared with no activity.

Only minor additional benefits were observed at higher activity levels.

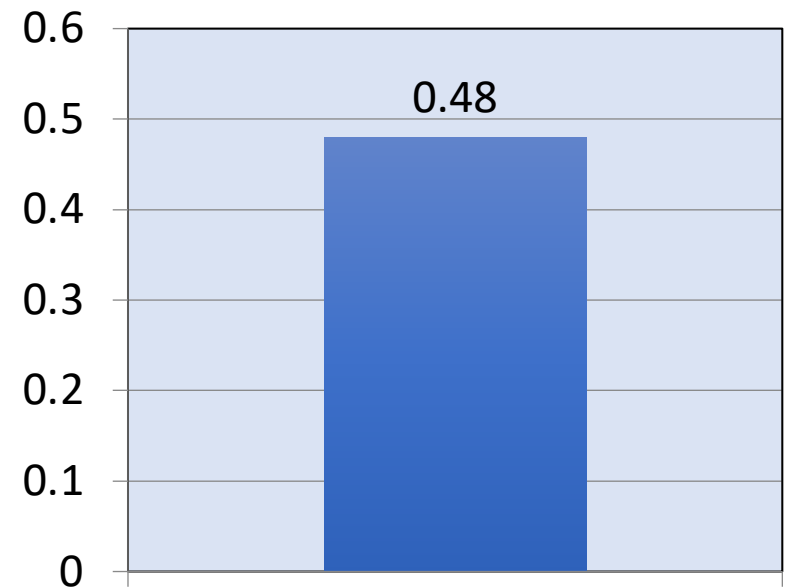
Mental health benefits of physical activity, even at levels below public health recommendations

Higher levels of physical activity associated with lower odds of developing depression

# Exercise for anxiety

- Meta-analysis
  - 49 randomized controlled trials
    - Clinical (N=3) or non-clinical (N=46)
    - Control = no treatment or alternative treatment
- Intervention
  - Frequency of exercise varied from acute bout to 5 times a week
  - Duration from 30 to 90 min per session
  - Intensity from moderate to vigorous

## Controlled Effect Size (d)



# Exercise and Sleep Meta-Analysis

- Regular exercise has:
  - Small beneficial effects on total sleep time and sleep efficiency
  - Small-to-medium beneficial effects on sleep onset latency
  - Moderate beneficial effects on sleep quality.

Kredlow et al., 2015; J Behav Med

- Exercise is increasingly becoming a recommended treatment for psychiatric and health conditions
- Preventative effects of exercise are recognized by insurance companies
  - E.g., Costs of gym memberships often reimbursed

- World Health Organization advises 150-300 minutes of moderate intensity activity or 75-150 minutes of vigorous intensity activity per week
- Common metric of physical activity: metabolic equivalent of task-“MET”
  - resting metabolic rate (1 MET); hours per week (mMET-h/wk).
  - 4 METS= 4x the energy of sitting still

*Sedentary*—Uses 1.5 or fewer METs. Examples are sitting, reclining, or lying down.

*Light intensity*—Uses from 1.6-3.0 METs. Examples are walking at a leisurely pace or standing in line at the store.

*Moderate intensity*—Uses from 3.0-6.0 METs. Examples are walking briskly, vacuuming, or raking leaves.

*Vigorous intensity*—Uses from 6.0+ METs. Examples are walking very quickly, running, taking an aerobics class, or shoveling snow.

Measuring physical activity. (n.d.).

[hsph.harvard.edu/nutritionsource/mets-activity-table/](https://hsph.harvard.edu/nutritionsource/mets-activity-table/)

**SAMHSA**

Substance Abuse and Mental Health  
Services Administration



MHTTC

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Examples of activities and associated MET values; values based on a person weighing 154 lbs.

Light < 3.0 METs	Moderate 3.0–6.0 METs	Vigorous > 6.0 METs
Sitting at a desk: 1.3	Housework (cleaning, sweeping): 3.5	Walking at very brisk pace (4.5 mph): 6.3
Sitting, playing cards: 1.5	Weight training (lighter weights): 3.5	Bicycling 12–14 mph (flat terrain): 8
Standing at a desk: 1.8	Golf (walking, pulling clubs): 4.3	Circuit training (minimal rest): 8
Strolling at a slow pace: 2.0	Brisk walking (3.5–4 mph): 5	Singles tennis: 8
Washing dishes: 2.2	Weight training (heavier weights): 5	Shoveling, digging ditches: 8.5
Hatha yoga: 2.5	Yard work (mowing, moderate effort): 5	Competitive soccer: 10
Fishing (sitting): 2.5	Swimming laps (leisurely pace): 6	Running (7 mph): 11.5

Jette et al., *Clin Cardiol.* 13, 555-565, 1990



# Understanding motivation



# Motivation for what? Process vs. Outcome

Motivation for outcome



Motivation for process or effort to get there



# Tight linkage between exercise and mood boost

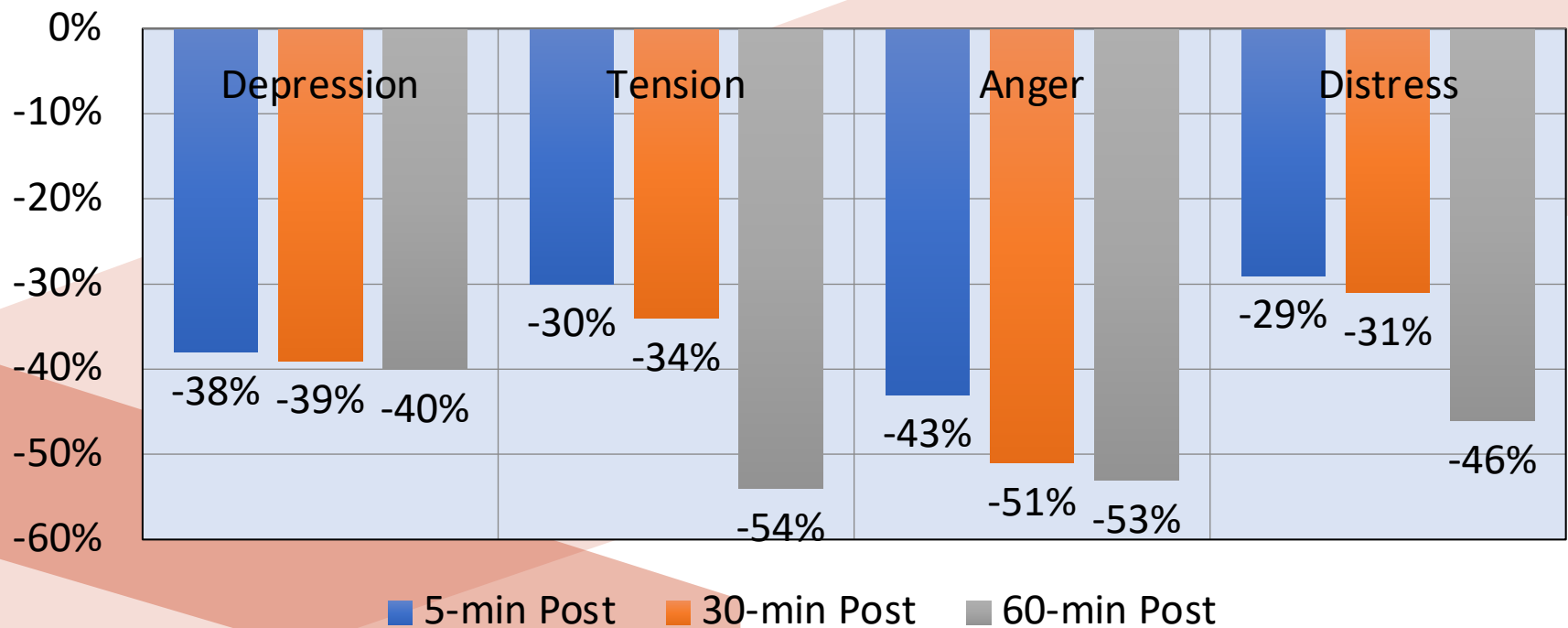
Health boost = takes a while

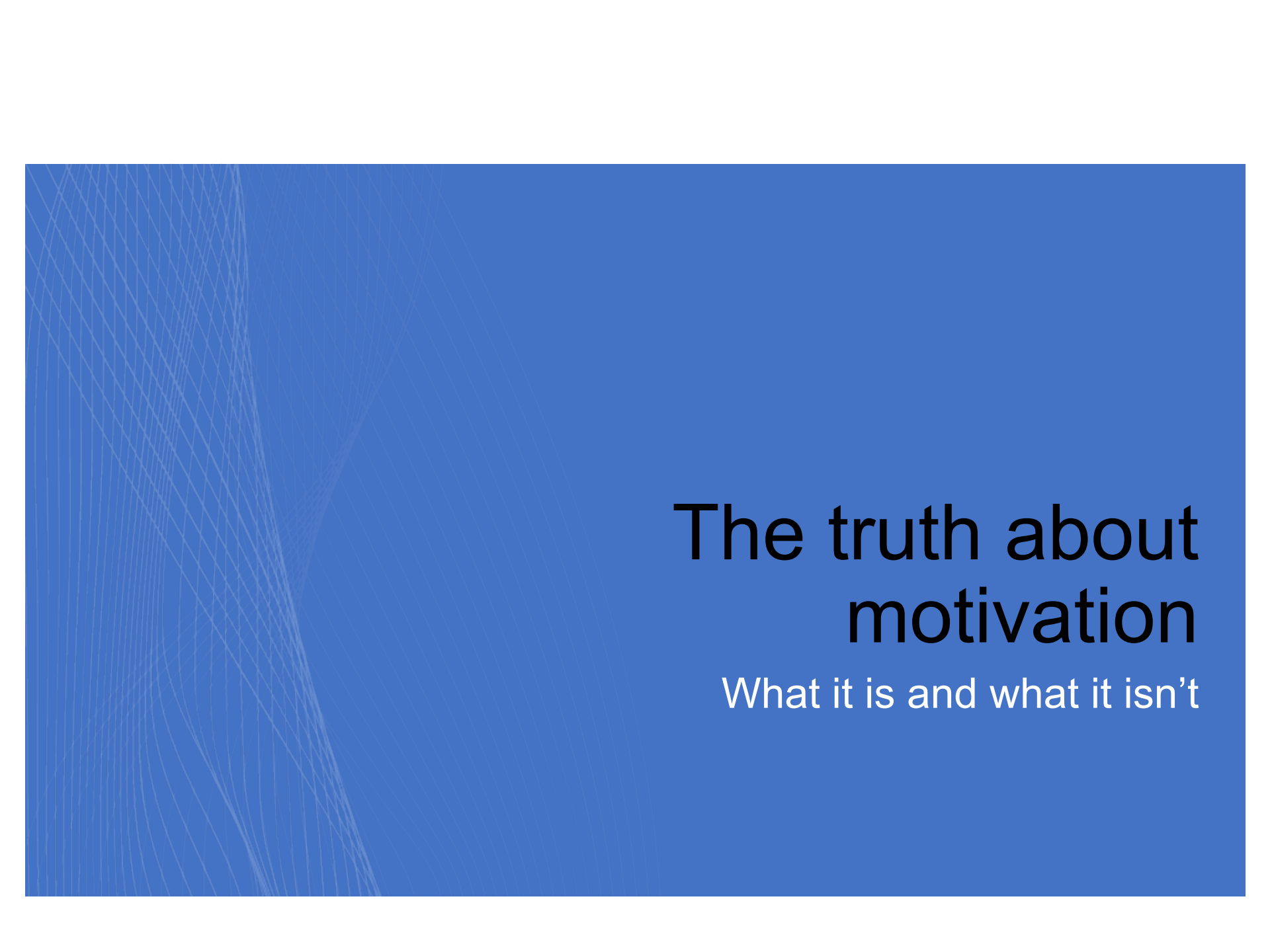


Mood boost = immediate



# Immediate mood boost with exercise in MDD





# The truth about motivation

What it is and what it isn't

# What motivation is not: Motivations are not fixed, internal qualities

*Cultural Notions - Motivation , an inward  
reservoir*

- Level of motivation (as if the tank were either full or empty)
- Waiting for motivation (as if it were an annoyingly late 3:15 train)
- Digging deep to find motivation (like drilling a new well and hoping for a gusher)

# What motivation is

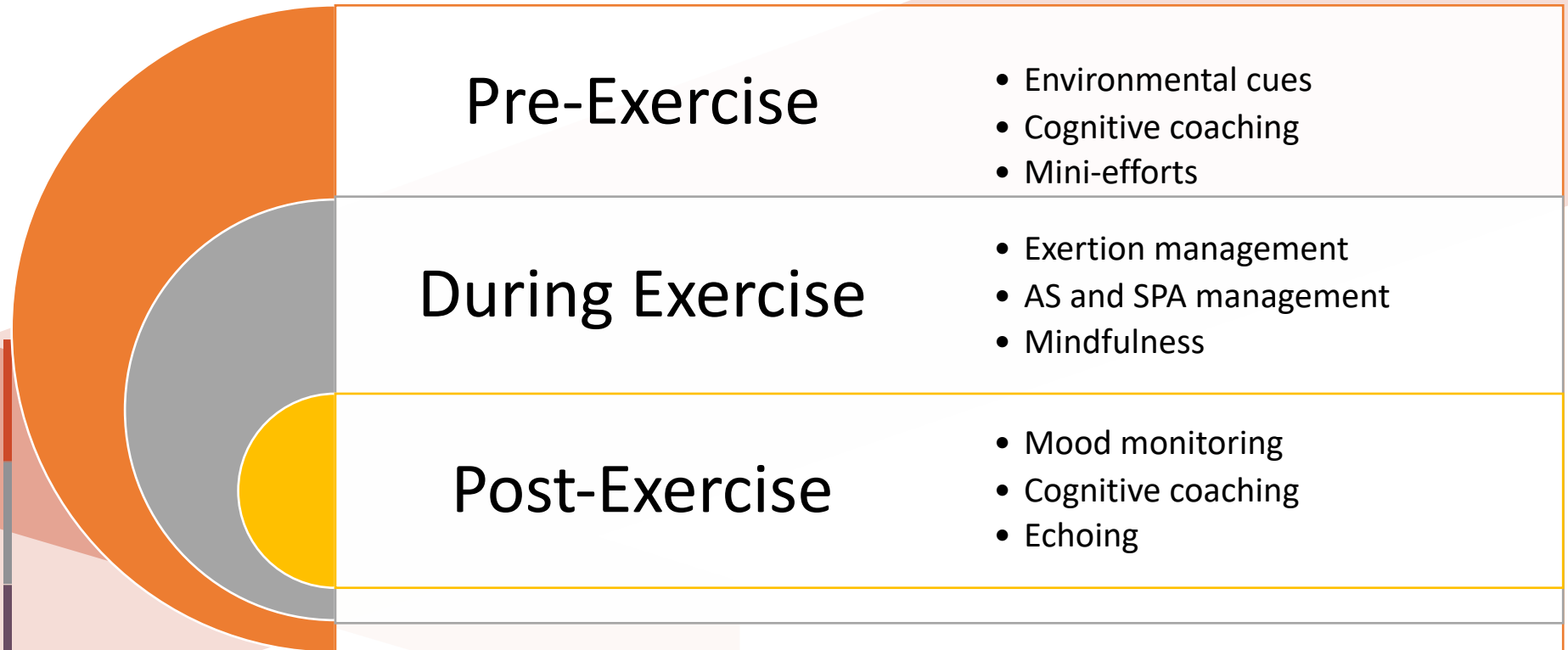
“Motivation can be understood not as something that one has, but as something that one does. It involves recognizing a problem, searching for a way to change, and then beginning and sticking with that change strategy.”

- William R. Miller

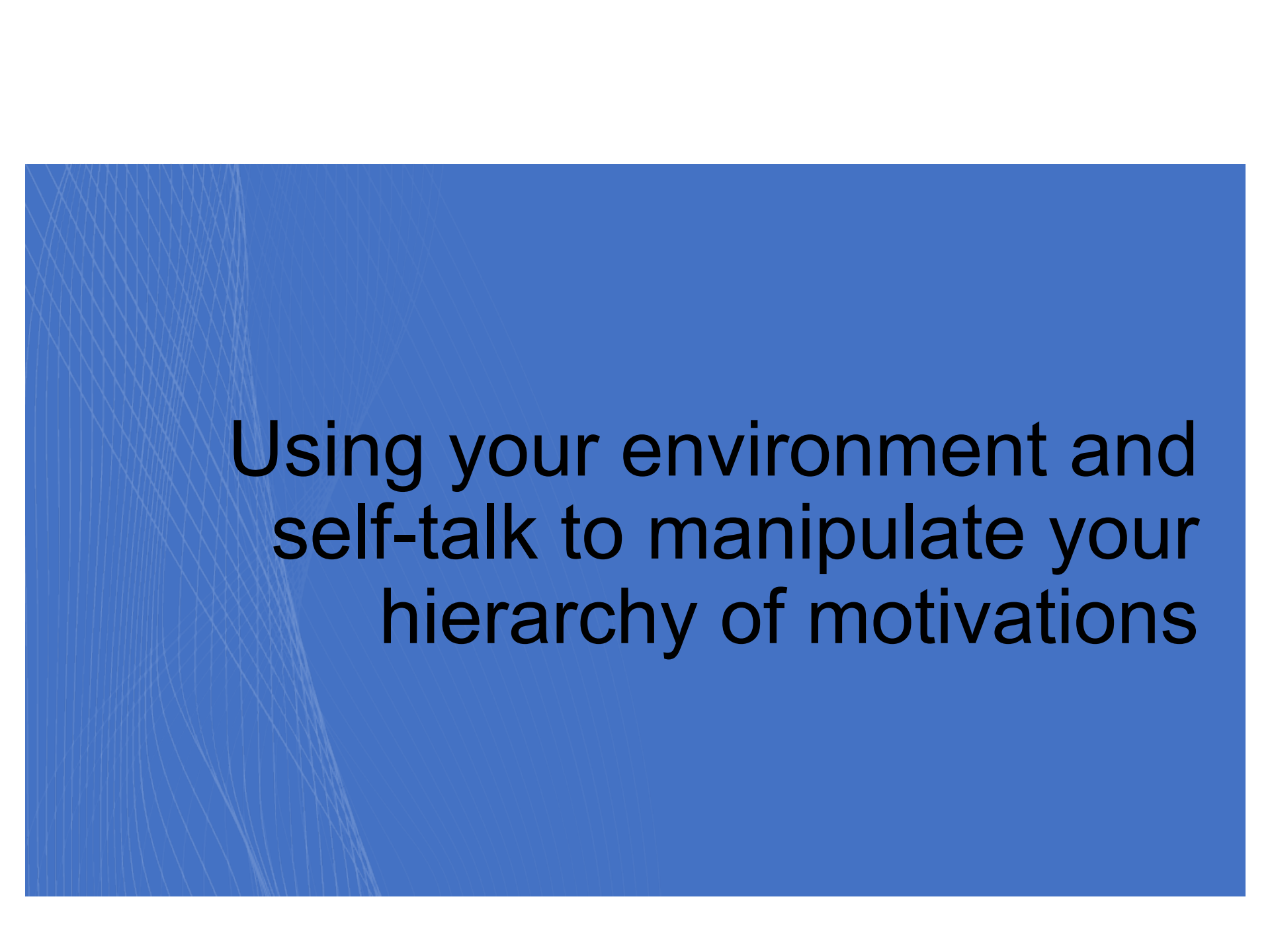
# Hierarchy of competing motivations



# Programming motivation for exercise: Intervening at every stage





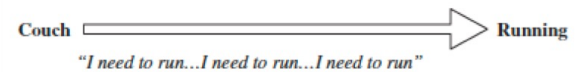


Using your environment and  
self-talk to manipulate your  
hierarchy of motivations

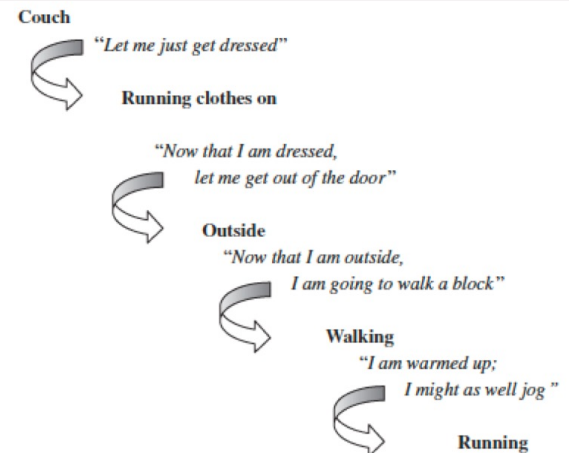
# Mini-efforts – chaining small efforts



Hard way to get yourself to exercise:



Easier way to get yourself to exercise



# Manipulating motivation

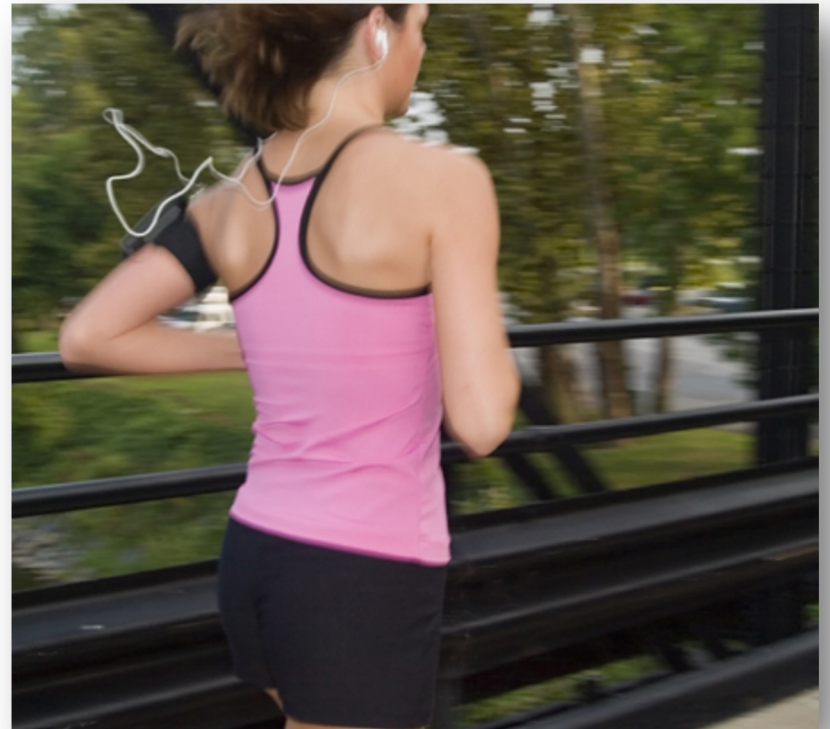
- Whenever possible combine motivations



AIM  
WELL!

# Manipulating my environment to support exercise

- I value my reading time, therefore I will only “read” while I run:
  - Audiobooks



# Cognitive coaching – addressing your negative thinking

## Potential goal contagion



## What do I say?

- I want to feel fit like that
- I bet they are having a good time; maybe I should go running

**OR**

- I will never look like that
- I am so out of shape; it would be embarrassing if I ran in public like that

# Preparing for morning exercise

- Negative thoughts:
  - It is too cold to get out of bed
  - It will be more valuable for my mood to sleep in
  - Missing my workout this once time won't matter
  - I am too tired to exercise well
- Adaptive thought:
  - Don't let an asleep mind trump an awake mind's decision

# Building in a social component

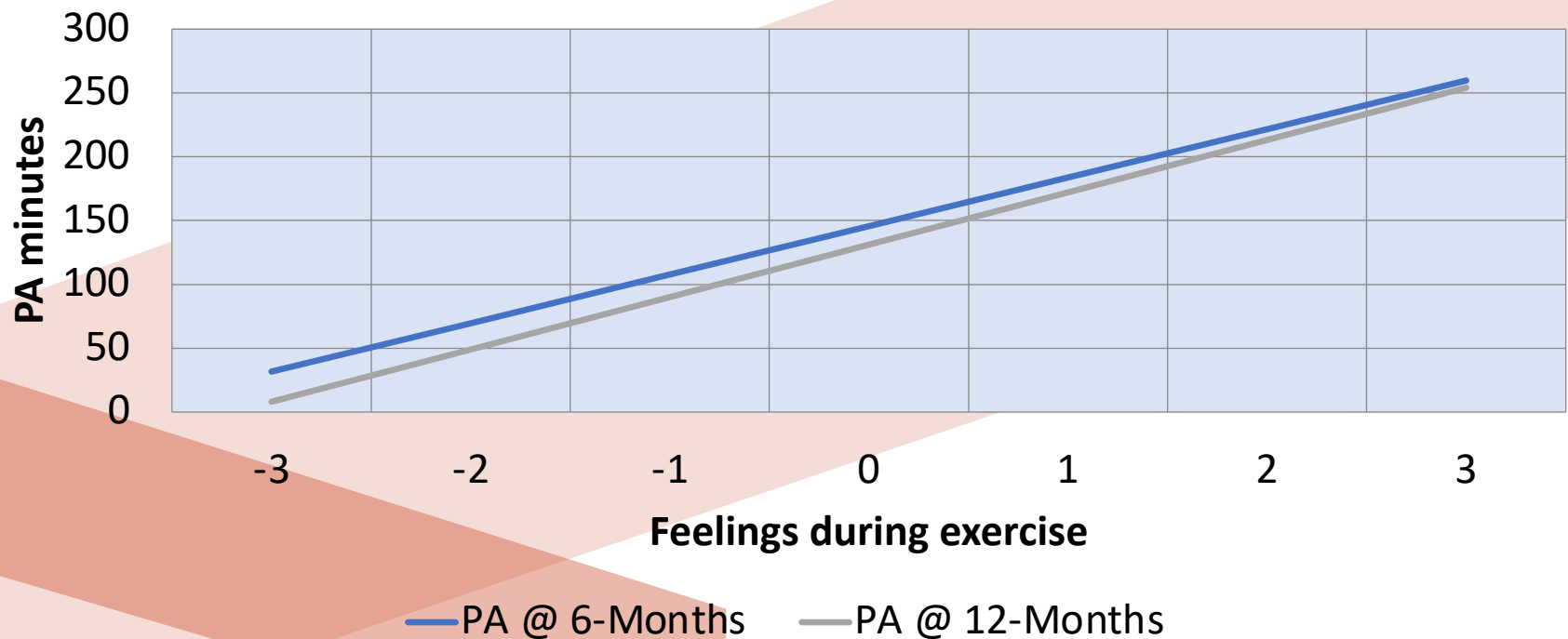
- Scheduling exercising with others can increase chances of follow-through on plans for exercising
  - Avoiding disappointing other person
  - Felt “obligation” to others/group
- Socialization before, during, and after exercise is reinforcing
- Potential opportunities for bigger social events related to activity (e.g., race, group hike)
- Provides distraction from some of the discomforts associated with strenuous exercise, and sense of “not being alone”
- Not all exercise needs to be with others, but regular exercise with others can boost motivation



# Intervening during exercise



# Feeling Bad During Exercise Matters



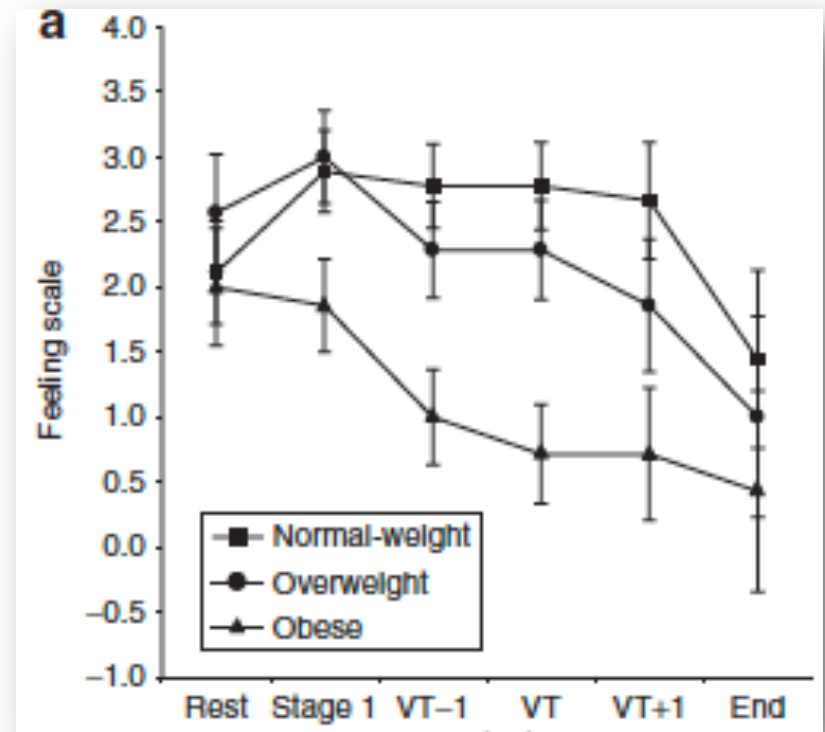
# What explains feeling bad during exercise?

- Intensity too high?
- Uncomfortable with physical exertion
  - Anxiety sensitivity
  - Social physique anxiety



# Intensity matters, especially if you are not fit

- As intensity increases feelings change
  - Normal-weight
  - Overweight
  - Obese



# Setting and intensity matter

## Social physique anxiety (SPA)

- Rests on the assumption that others take notice of your body when you exercise and that they care enough to judge it negatively.
- The higher the SPA, the more uncomfortable a workout when other people are around, particularly if a mirror is present.

## Anxiety sensitivity (AS)

- Refers to fears (and catastrophic interpretations of) somatic sensations of autonomic arousal
- Enhances the averseness of sensations of exertion

# Manage the aversive aspects of exercise

## Reducing the Negatives

- Over-exertion (respiratory threshold)
- Cognitive coaching:
  - Anxiety Sensitivity
  - Social Physique Anxiety



Intervals  
Amazing  
10 min  
workouts



# Making Exercise Fun: Enhance well-being strategies around exercise

Play!

And Increasing the Positives

- Mindfulness
  - e.g., feel breeze
  - Notice colors
  - Music
- Finish well (recency effects on preference)
- Memory effects (picturing exercise accurately)

# Keeping Exercise Fun – Play!





Intervening post-exercise



# Rehearsal of benefit

- That was hard, but I feel good now.
- I have to remember how good I feel now.
- Echoing.....hours after exercise
  - I can still feel fatigue: I gave myself a good workout today
  - I am doing well, I got in 3 exercise sessions this week. I will feel this benefit.

# Become an experimenter and track...

How I felt before  
exercise

My mood was:	0	10	20	30	40	50	60	70	80	90	100
My thoughts were:	0	10	20	30	40	50	60	70	80	90	100
My energy level was:	0	10	20	30	40	50	60	70	80	90	100

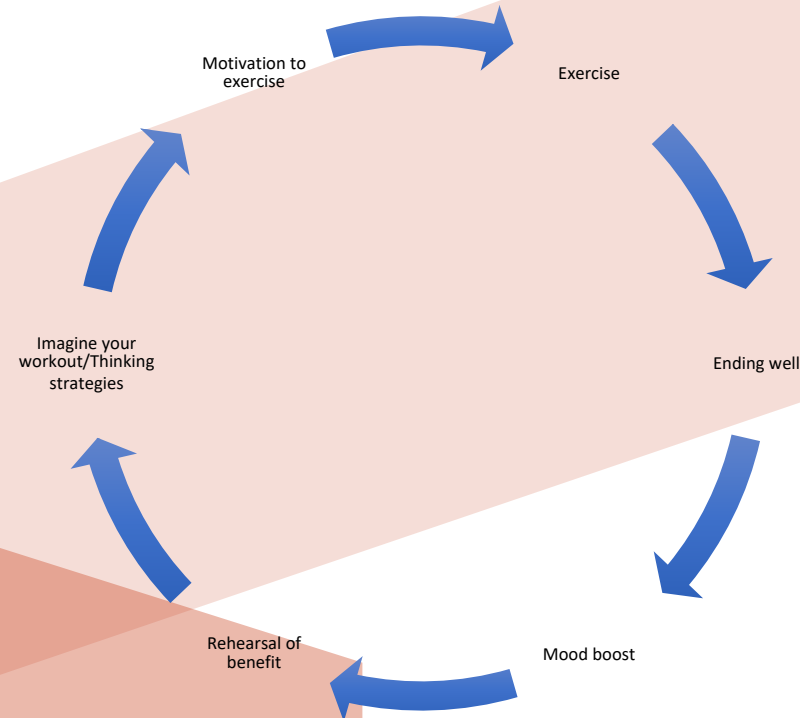
How I felt after  
Exercise

My mood was:	0	10	20	30	40	50	60	70	80	90	100
My thoughts were:	0	10	20	30	40	50	60	70	80	90	100
My energy level was:	0	10	20	30	40	50	60	70	80	90	100

What I have learned  
from this:

Seeing the difference between before and after tells me that: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

# Creating a positive cycle





# What works for us

Kim's story

# Background for Kim

- Ran cross country 3 years in high school (hopelessly mediocre)
- Did lots of hiking & skiing up through college (1974-1978)
- Occasional hikes & ski trips in graduate school in Chicago and 1<sup>st</sup> job in Philadelphia (1978-1994)
  - 3 attempts to get in running shape but none lasted > 6 weeks
  - Falling further and further behind my kids hiking
- Regular running began at 2<sup>nd</sup> job in New Hampshire, with 3-4 colleagues who ran at lunch (1994-2011)
  - Facilitated by research center in former state hospital building with accessible shower
  - Ran 3-4 X/week, 3-5 miles
  - Began running on my own over weekends
  - Began entering local races

# Kim's story, cont'd

- Continued running when moved to Boston for 3<sup>rd</sup> job and haven't stopped
  - Occasional races (5K, 10K, sometime ½ marathon)
  - Lots of trail running since living mostly in Maine
- My long-standing running goals:
  - Run at least 4 times/week (usually met)
  - Run at least 20 miles/week (usually not met)
- My current routine:
  - Take our dog ("Venus") out for a run in the woods every workday about 45 min (including stops), rain or shine, snow or sun
  - Change from relaxed, meditative, continuous running to fast, frantic speedwork interspersed with stops for Venus

# Kim's story, cont'd

- My current routine:
  - Schedule an hour every workday between Zoom calls to take our dog (“Venus”) out for a run in the woods (about 45 min, including stops)
  - Occasional runs on my own over the weekend
  - Swim in the cove or lake after runs in the summer
  - Run rain or shine, snow (wearing Yak Tracks) or sun (it’s all part of the “adventure”!)
  - Change in running routine from relaxed, meditative, continuous jog to fast, frantic speedwork aimed at keeping up with Venus (and not breaking my neck), interspersed with stops for Venus when I catch my breath
  - Occasional runs with friends and family; races about monthly
  - Record # of miles run (Nike app) on schedule, add up miles weekly and yearly
  - My Nike app coach provides encouraging words after every workout, including a .20 mile walk
- My most recent accomplishment:
  - Organized a 10K race through the trails around our house in Maine for family reunion over 4<sup>th</sup> July, 2022

VENUS









# Kim's tips for getting in running shape

- Jog 3 miles/day, at least 3-4 times/week for 1 month
  - If you can't run 3 miles without stopping: jog 1 min, walk 1 min, jog 1 min, walk 1 min for 3 miles for 1-3 days; THEN jog 2 min, walk 1 min etc. for 1-3 days; THEN jog 3 min, walk 1 min etc. for 1-3 days; THEN you'll be able to jog 3 miles straight
- It doesn't matter how fast you run
- Don't expect it to feel good for the first 4 weeks
- Expect you will sweat when running and your legs will feel it that night and the next day (it's OK, you'll survive!)
- After a month, you'll notice that it doesn't seem so hard or unpleasant, you won't feel as sore as before, and at times it actually feels good!
- Remember: SOME runners get a "high" when they are running, but ALL runners get a "high" when they stop running!

# Susan's story

- I achieved my target weight through a period of tracking, measuring, counting, logging, restricting and exercising.
- My primary motivation to work out is to be able to eat more candy.

# Summary

Significant mental health, and other benefits of being active.

This association is found even at physical activity levels below the public health recommendations

# Susan's tips for working out

- I work out most consistently with in-person classes
- I find class facilitators who count down during challenging movements the most motivating, because pain is more bearable when it is timed
- I am most likely to work out early in the morning, before my body figures out what I am doing to it
- When I wake up and don't feel like it, I think about how much money I will lose by not going to class
- Also, I remind myself that I have never regretted getting up and going, and always regret not going
- The competition provided by races motivates me to put some effort into it