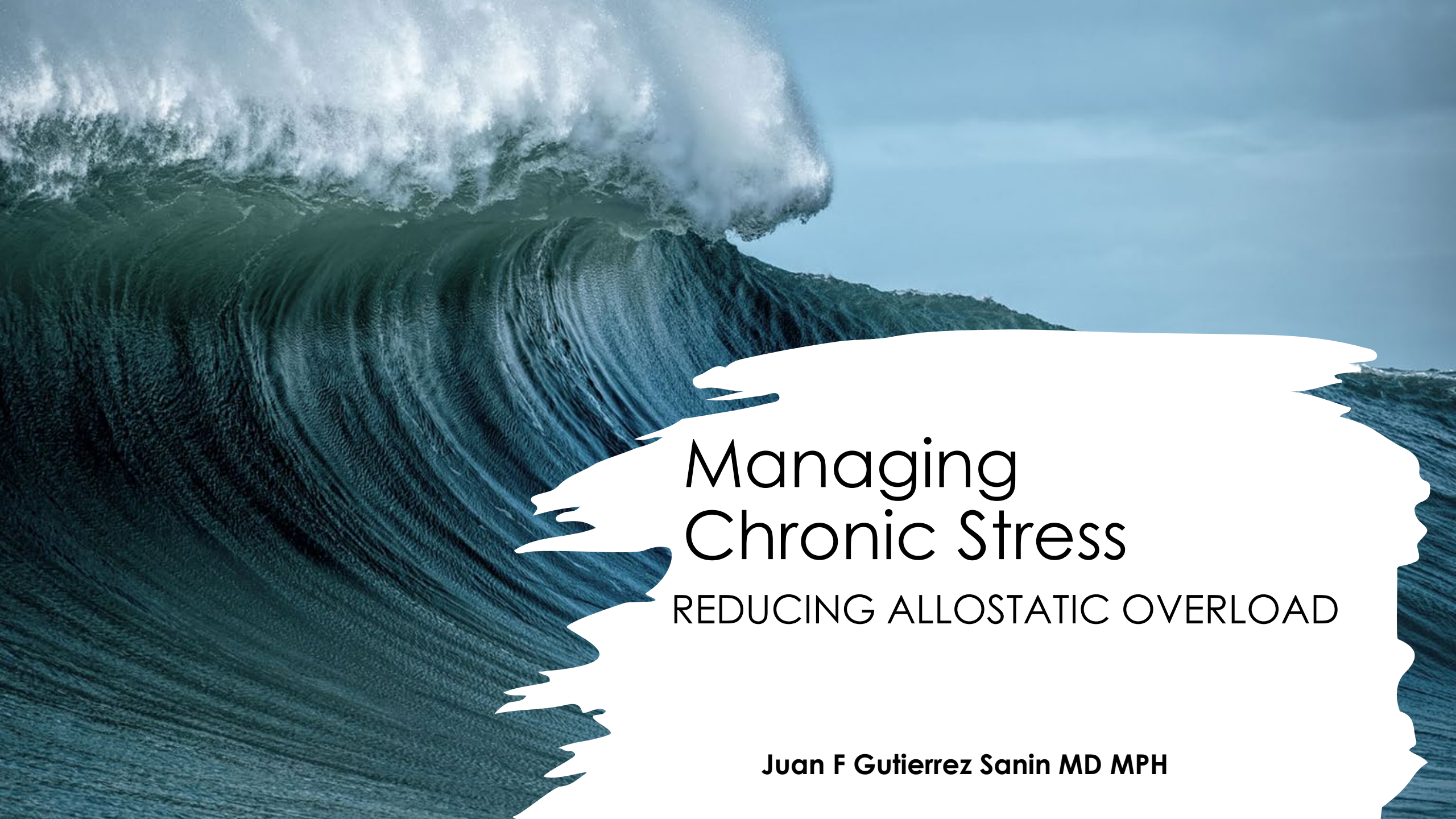


Managing Chronic Stress

REDUCING ALLOSTATIC OVERLOAD

Juan F Gutierrez Sanin MD MPH

Outline

1. Introduction
2. Icebreaker
3. What is Allostatic Overload?
    a. Why does it matter?
    b. What are its impacts on health?
        i. Physical
        ii. Mental

Outline

1. The role of the neuroendocrine and immune systems
2. Sociodemographic association and Social determinants of Health
3. Work and Environment Risk Factors
4. The Role of Childhood Trauma
5. Reducing Allostatic Overload
    a. The role of the parasympathetic nervous system
        i. Deep breathing techniques
        ii. Physical Exercise
        iii. Yoga
        iv. Qigong
        v. Tai Chi
        vi. Re-framing
6. Activity: Mindful Breathing
7. Questions

Have you ever been stressed out?

WHAT DOES IT FEEL LIKE?

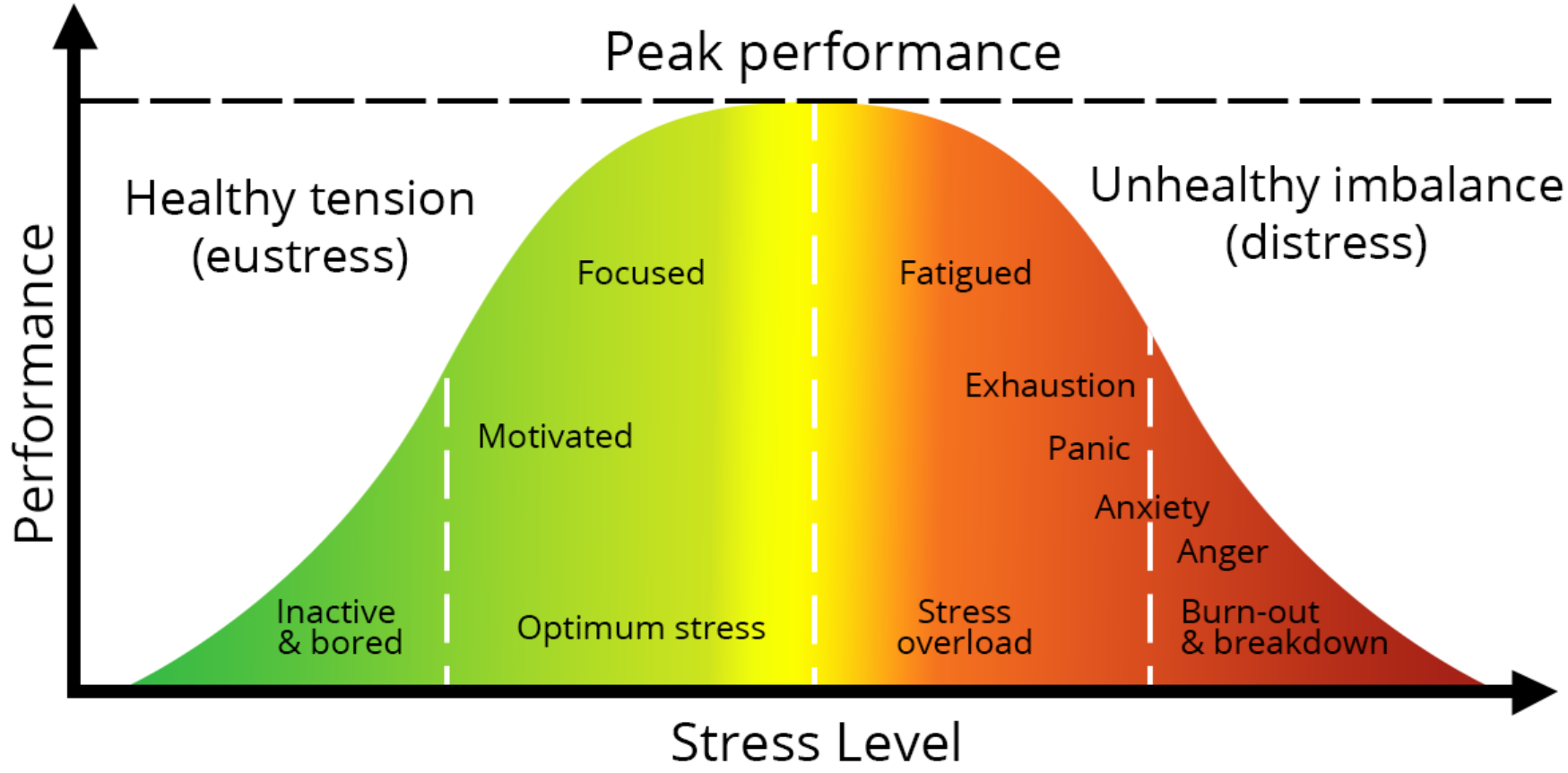
IN YOUR MIND?

IN YOUR BODY?

What is Self-Care?

- What are some of your self-care strategies?

Fight or Flight: The Caveman's Dilemma



Hans Selye - 1932

Allostatic Load

- McEwen & Stellar (1993).
  - The cost to your mind and body of repeated exposure to stressful situations
- Allostasis: “The ability of an organism to achieve stability through change” – Healthy functioning requires constant physiological adaptations.

Chronic Stress – Why does this Matter?

- Situations that can result in allostatic overload are:

1. Constant stress keeps your body in high alert.
2. Inability to adapt to such stressors.
3. Inability to “turn-off” the stress response after the stressor is gone.
4. The adaptive response is not enough to deal with the stressor.

What are its Impacts on Health?

- Physical and Mental:
- Since allostatic load is an adaptive response its mechanism of action is driven mainly by the:

1.Hypothalamus-Pituitary-Adrenal axis.

2. Increased Sympathetic Tone.

What can Change in my Body under Chronic Stress?

Brain architecture can be changed in a couple of ways:

- By activating dormant genes.
- By non genomic mechanisms.

There are changes to the immune system too:

- The immune system becomes less effective in the long run.
- Alterations to body systems include heart and blood vessels, cardiovascular, endocrine (hormonal) and metabolic imbalances.

How do you measure Allostatic Overload?

- Studies have identified several biological markers including:

  - Cortisol*
  - Dehydroepiandrosterone (DHEA)*
  - Epinephrine and norepinephrine*
  - Resting blood pressure
  - Cholesterol & Triglycerides
  - Hemoglobin A1C
  - Weight relative to height

(* Primary biomarkers)

How do you measure Allostatic Overload?

- Additional biomarkers include:
  - Glucose Levels
  - Lipid profiles
  - (high Cholesterol Triglycerides)
  - Interleukin-6
  - **Heart rate variability**

  Known as the “Allostatic Load Battery”.

  Better predictor of mortality and physical function decline than individual biomarkers alone.

Clinimetric Criteria

To have a more comprehensive understanding including both physiological and experiential factors include:

Criterion A: The presence of a stressor that is to much for a person to handle.

Criterion B: The stressor is associated with one or more of the following features:

Difficulty falling asleep, restless sleep, early awakenings, lack of energy, irritability, generalized anxiety, dizziness, sadness.

Significant impairment of social or occupational functioning.

Significant impairment of environmental mastery (feeling overwhelmed by the demands of everyday life).

Emotional Dysregulation.

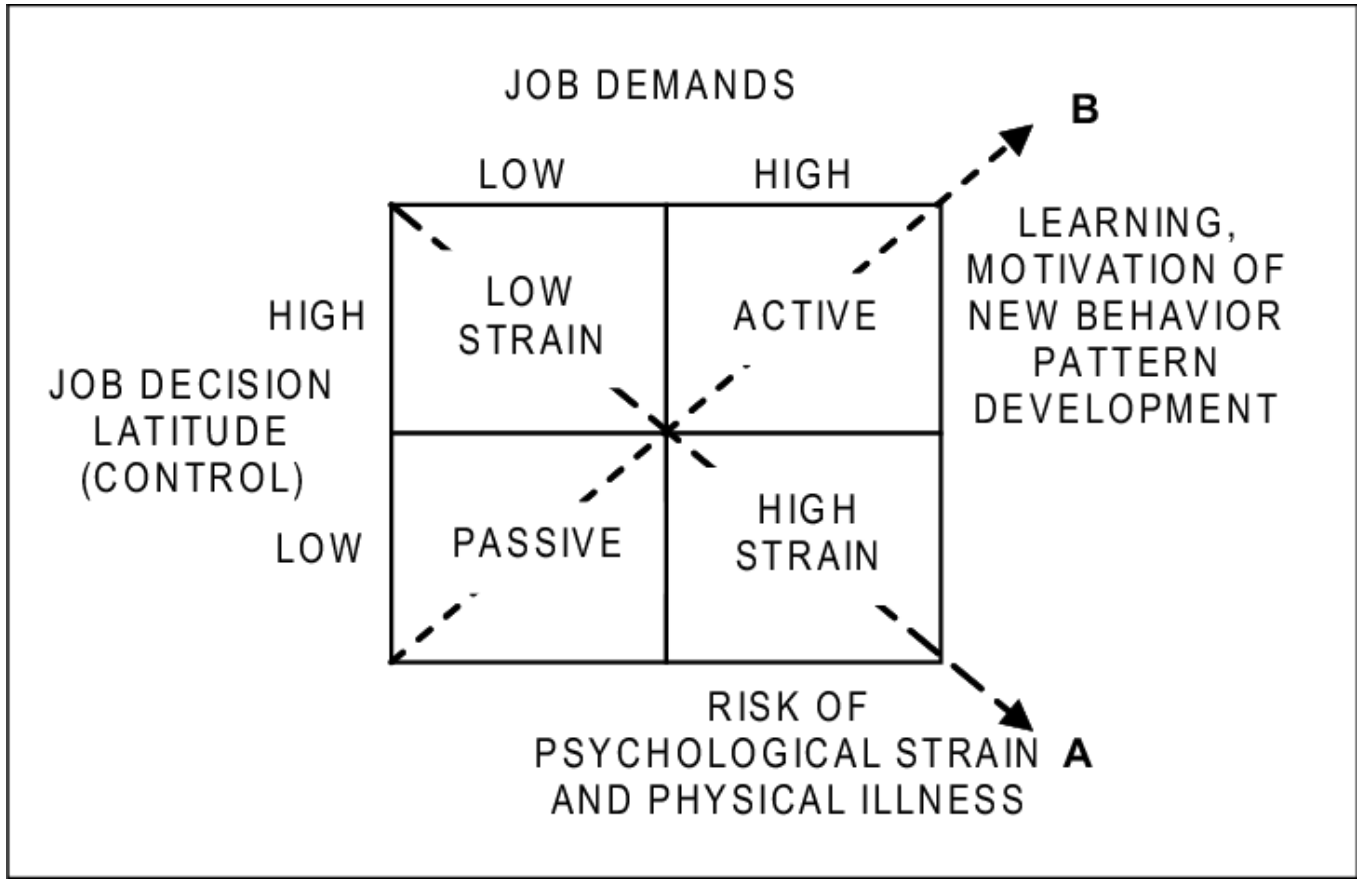
Sociodemographic Associations – Risk Factors

- Social determinants of health
- Economic issues
  - Renting one's home
  - Neighborhood quality
  - Difficulty affording food
  - Smoking
  - Education opportunities
- Ethnicity and racial discrimination (harassment or microaggressions)
- Attendance to weekly religious services seems to be a protective factor

Aging

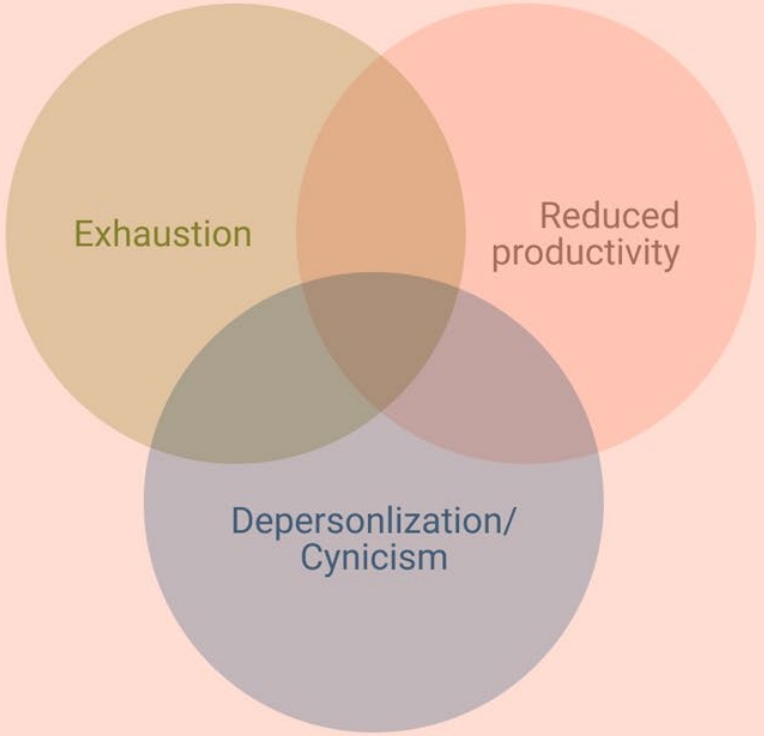
- Frailty and multidimensional loss of individual resources (vulnerability).
- Decline in cognitive and physical functioning.
- Canine companionship was inversely associated.

Occupational Factors



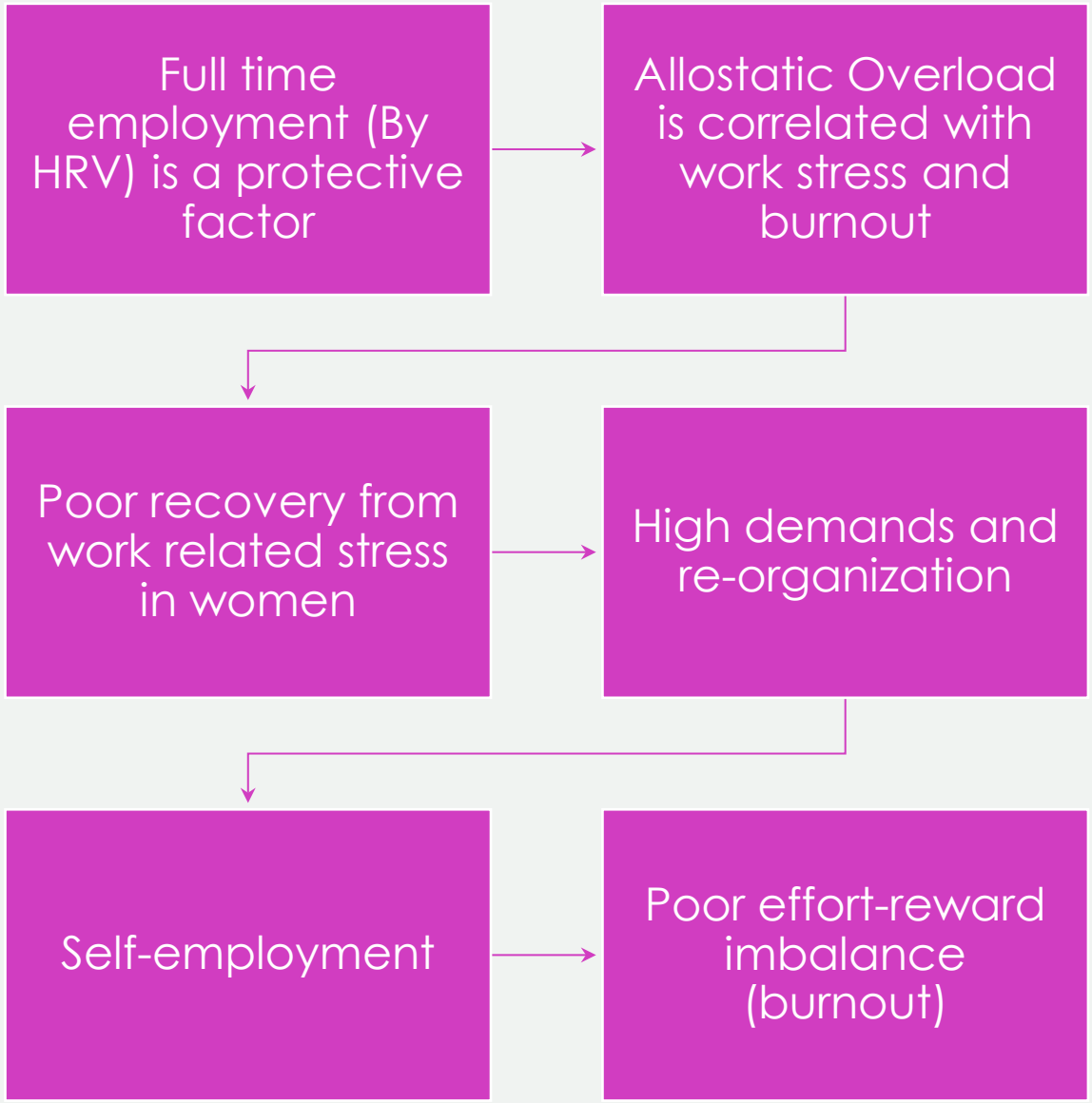
Robert Karasek, 1979

The 3 symptoms of burnout (Maslach Burnout Inventory)



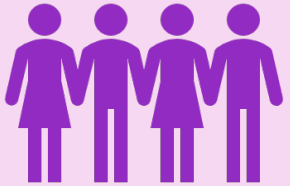
Christina Maslach, 1976

Occupational Factors



Environmental Factors

More vegetation cover is a protective factor



Risk Factors:

Unhealthy living environment
Lead exposure
Perception of pollution
Dangerous traffic
Household crowding
Environmental riskscapes

Early Life Trauma

- Childhood Trauma.
- Harsh Family Environment.
- Low family support.
- Negative family interactions.

Caregiving and Allostatic Overload

- Caregiving for elderly or disabled persons is a risk factor for developing allostatic overload.
- Caregivers of clients with Alzheimer's have higher allostatic load levels.
- Mitigated by a sense of mastery.
- Parents of children with developmental disabilities had lower levels of AL when reporting positive affects (propensity to being in a good mood).

Physical Health

- Chronic stress is associated with poor health status, including:
  - Chronic conditions
  - Disability
  - Pain
  - Higher Mortality

Perception of Poor Health

Associated with physical effects, such as increased cytokine levels, gaining weight, worse lipid profiles.

Metabolic Syndrome:

- High Blood Sugar
- High blood pressure
- Excess fat around the waste
- High cholesterol and triglycerides

Risk Factors:

Poor sleep quality

Unhealthy diet

Gaining weight

Alcohol Consumption

Smoking

Protective Factors:

Physical activity

Good quality sleep

Appropriate Body Mass Index

No alcohol consumption

Non-smokers

Lifestyle

Cardiovascular Disease (CVD)

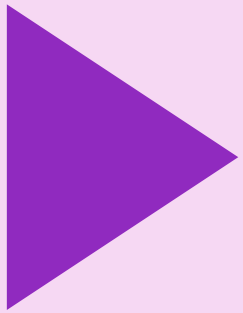
- Allostatic Overload increases the risk of heart attacks
  - Ischemic Heart Disease
  - Peripheral Artery Disease
- In persons with cardiovascular disease and Essential Hypertension:
  - Higher disease-related emotional burden
  - Poor psychological functioning
  - Higher rates on mental illness
- Atrial fibrillation:
  - Depression and anxiety

Diabetes (Type II)

- Stress is associated with more depressive and hostile symptoms
- Widespread dysfunction of stress indicated by:
  - Increased blood pressure
  - Heart rate variability
  - Total cholesterol
  - Salivary cortisol
  - Increased A1C Hemoglobin
  - Increased fasting sugar levels

OBGYN

AL is higher in women with preeclampsia (high blood pressure and proteins in urine)



Possible role of chronic stress as a risk factor

Musculoskeletal System

- Lower bone density
- Associated with fibromyalgia

Neurological Disorders

- AL appears to be associated with depressive symptoms after traumatic brain injury.
- Higher risk of seizures.
- The most frequent psychosomatic diagnosis in people with migraine.

Cancer

Allostatic Overload is more common in cancer patients.

Women with breast and ovarian cancer had elevated cortisol levels.

Periodontal Disease

- Allostatic overload is associated with periodontal disease.
- Children of mothers with high AL have more dental cavities.

Mental Health

- Association with mental illness in general.
- Lower well being and poor quality of life.
- Mood and anxiety disorders.
- Somatic and affective depressive symptoms.
- Post Traumatic Stress Disorder (PTSD).
- Psychotic Disorders.

Reducing Allostatic Overload

- Well-Being and Coping Strategies
  - Positive effects (stronger in women than men).
  - Greater sense of purpose in life.
  - Cognitive reappraisal.
  - Good social support system.

The Parasympathetic Nervous System

The Autonomic Nervous System is responsible for most of the "automatic" functions of the body. It is also heavily involved in emotional self-regulation.

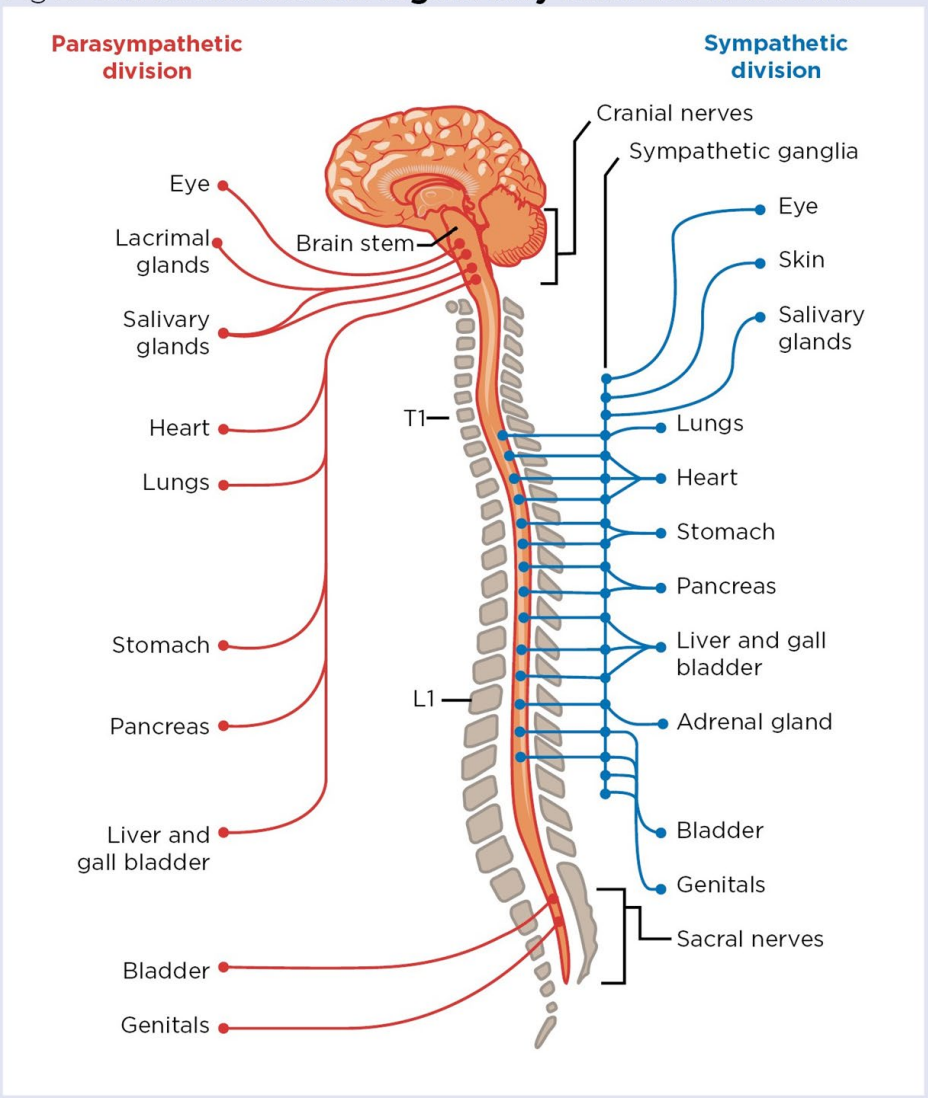
The sympathetic (alarm) works mainly through the thoracic and lumbar segments of the spinal cord and the hypothalamus-pituitary-adrenal axis.

The Parasympathetic functions as a "break" for the sympathetic and acts primarily through cranial nerves and the sacral segment of the spinal cord. The main cranial nerve involved in autonomic regulation is the Xth cranial nerve or Vagus nerve.

The term "vagal tone" refers to the activity of the Vagus nerve necessary to regulate bodily functions such as respiratory and heart rate.

The Parasympathetic Nervous System plays a central role in reducing allostatic load

Fig 2. **Cell bodies and the organs they innervate in the ANS**



ANS = autonomic nervous system.

When we take a conscious, deep breath, we contract the diaphragm (the muscle between the chest and the abdomen).

This stimulates baroreceptors in the blood vessels, heart and lungs, sending signals to the brain to regulate our heart rate, respiratory rate and blood pressure, promoting a higher vagal tone.

Deep breathing also brings more oxygen to our brain and other vital organs, reducing stress and promoting well being.

Deep Breathing

Effects of Deep Breathing on Health

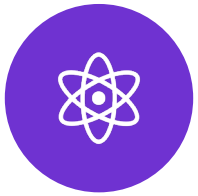
Research has shown that deep breathing can have a huge impact on our overall well being.

It can help reduce anxiety and stress.

Improve digestion.

Enhance the Immune System.

Improve cardiovascular performance.



Lipid profiles.

Diabetes (HbA1C).

And others.

Many Ancient Practices Use Different Deep Breathing Techniques

- Yoga
- Meditation
- Qigong
- Tai Chi

Physical Activity

- Associated with lower depression and anxiety levels.
- Better outcomes in depressive patients.
- May prevent the development of depression.
- Can reduce the risk of anxiety.
- Improves cognitive performance:
    - Hippocampal neurogenesis
    - Higher levels of BDNF (Brain Derived Neurotropic Factor)
    - May act as a major adjunctive treatment.

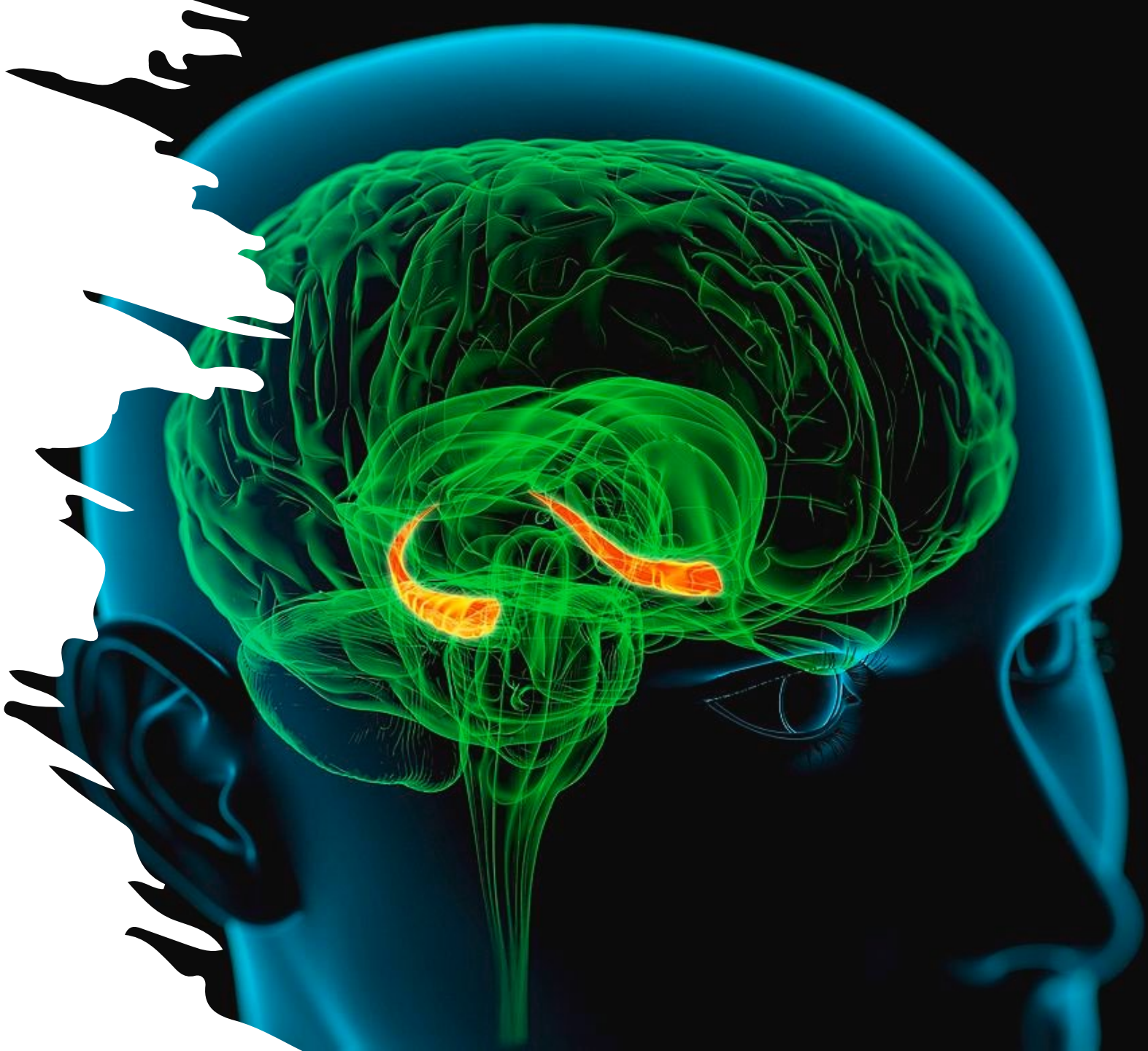

Yoga

Postures, Breath Control and Meditation

- May reduce cortisol, regulate systolic blood pressure and heart rate.
- Decrease cytokines and lipid levels.
- Positive effects on anxiety and depression.
- Higher vagal tone.
- Reduced self-perceived stress.
- Evidence based programs have been developed combining yoga *asanas* and mindfulness.

Neural Effects

- Hippocampus Activation.
- Larger Hippocampal Volume.
- Higher volumetric measures in different brain areas.




Qigong

What is Qigong?

- Ancient Chinese Martial Art created over 2000 years ago
- Part of traditional Chinese medicine
- “Qi” means life energy and “gong” means work
- It coordinates slow conscious breathing with soft, sometimes complex, movements
- 4 main components:
  - Relaxation
  - Coordination
  - Balance
  - Flexibility

Effects on Health

- Similar to Yoga:
- Regulates blood pressure.
- Increases HR Variability (vagal tone).
- Increased lung capacity and oxygen intake.
- Improved immune function.
- Reduced perceived stress and norepinephrine excretion in urine (reduced AL).
- Improved quality sleep.
- Reduced fatigue.
- Improved cognitive performance (memory and attention).
- Improved emotional regulation.


Tai Chi

What is Tai Chi?

- Ancient Chinese Martial Art.
- Initially developed for combat thousands of years ago.
- Considered a mindful exercise.
- It consists of a series of slow flowing movements performed with a strong inward focus.

Effects of Health

- As a form of exercise, tai chi has been recommended as adjuvant therapy for anxiety and depression.
- It appears to be more effective than non-mindful exercise.
- Its overall health effects are similar to yoga or qigong.

Positive Cognitive Reappraisal (PCR)

What is Positive Cognitive Reappraisal?

Positive Cognitive Reappraisal (PCR) is a strategy for self-regulation in which the person seeks to modify their emotional response by changing their thoughts.

It consists in re-framing an emotionally charged situation from a different perspective.

It can prevent someone from becoming stuck in a negative thought cycle and elicit more positive feelings about it.

Our thoughts can go a long way in regulating our emotions.

Benefits of PCR

- It builds resilience
  - It seems to be more effective when combined with mindfulness.
- It reduces anxiety contributing to activate the pre-frontal cognitive process.
  - It helps problem solving.
- Over time it can regulate the excessive activation of alarm centers of the brain such as the amygdala.

Benefits of PCR

PCR reduces negative emotions not by avoidance or suppression but by refocusing our attention on the more positive aspects of the situation.

PCR can be done by asking oneself a series of questions about the stressor I.E.:

Am I engaging in a cognitive distortion like "catastrophizing"?

What is the evidence supporting my negative thoughts?

What evidence is there to the contrary?

Are there any potential positive outcomes?

Am I grateful for any aspect of the situation?

How am I better off after what happened?

What did I learn from it?


ACTIVITY: Mindful Breathing

Questions

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