

Coping Strategies for Musculo-skeletal Pain at the worksite

Theoretical models for stress and coping
Empirical Research / Experiences
Training lessons

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The aim of the module

- The aim is to analyze, understand and apply the most frequent used coping strategies to prevent-, reduce or change perception of muscle-pain (health problems)
- To understand the relationship between job stress and health problems (i.e neckpain)
- To learn how to implement stress-management-training (SMT)



- The aim of this module
- Key concepts
- Theoretical foundation:
 - Stress and coping
 - Stress Management Training
- Practical exercises – SMT
 - Breathing
 - Relaxation
 - Imaging

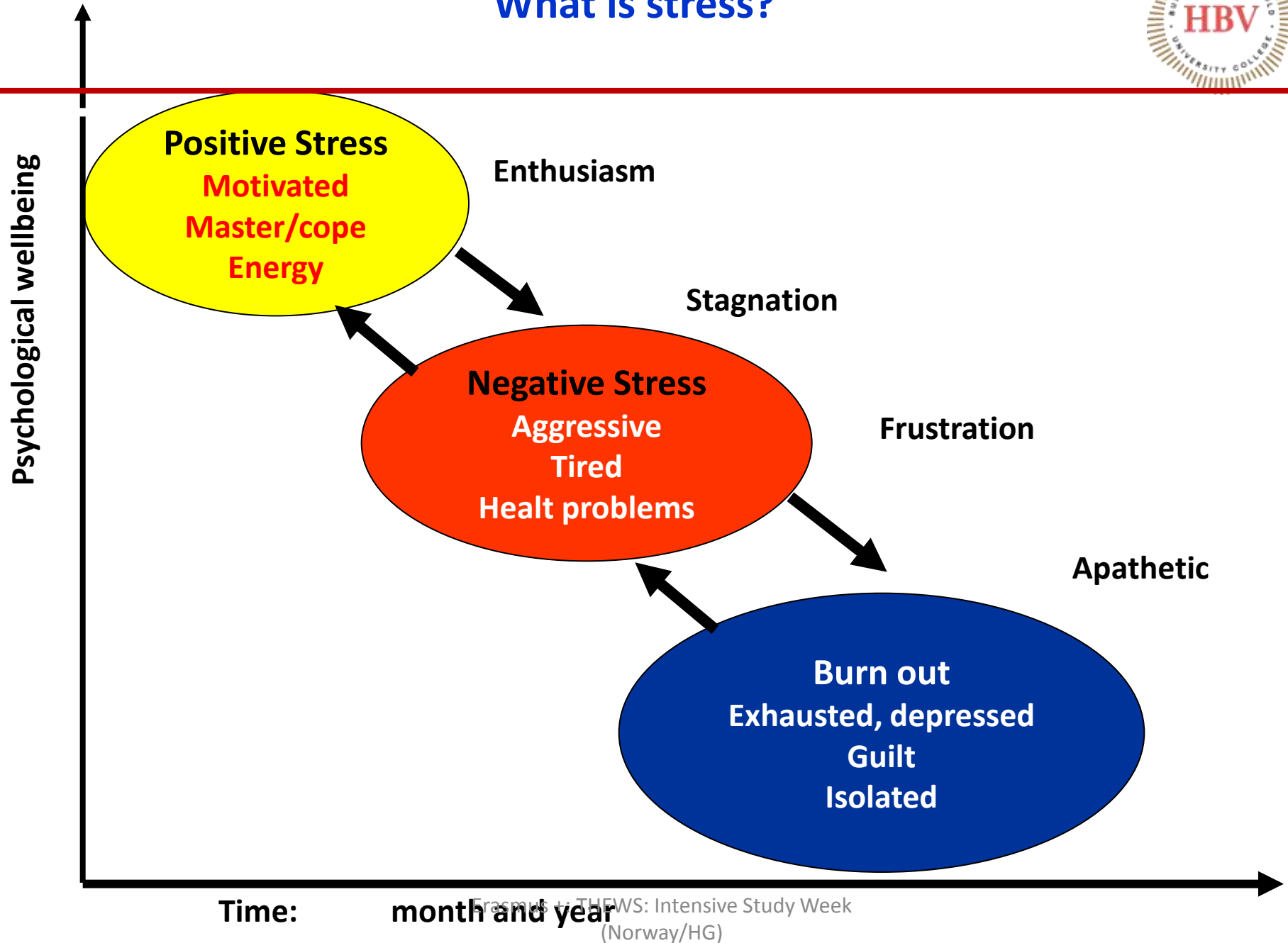


Key concepts - exercises

- **What is stress?: Discuss the most frequent used theories og models**
- **What is coping? Recognize and discuss the differences in the different definitions**
- **What is Stress management? Discuss the models, the exercises used and explain the psysiological foundation:**
- **What is Relaxation? Why and how does it work?**
- **What is Mental training?**
- **What is imagery and visualization? Why and how does it work ?**



What is stress?



History: «The fight – flight response» a psychobiological theory

- **Walter Cannon (1871 - 1941):** among the first in modern time who did research on stress stimuli / stressors
- He first described the **"The fight-or flight" response** ("The wisdom of the body" 1932)
- His theory states that animals react to threats with a **general discharge** of the **sympathetic nervous system**
- **The adrenal medulla** produces a hormonal cascade that results in the secretion of **catecholamines**, especially **norepinephrine** (noradrenalin) and **epinephrine** (adrenalin)
- He introduced a new theory about the **homeostasis**
 - **"Stress":** a force that disturb the inner homeostatic condition



History: «The general adaption syndrome» a psychobiological theory

Hans Selye (1907-1982): Austrian / Hungarian, studied medicine in Prague, worked in Canada

- The father of “stress”
 - **Physiological /biological stress** is an organism's response to a **stressor** such as an environmental condition or a **stimulus**
 - **Stress** is a body's method of reacting to a **challenge**
 - **“Stress” def** is the **physical, mental and emotional** human **response** to a particular **stimulus**, otherwise called a “stressor” (Selye 1936)
-
- Selye proved reactions that were essential for health/survival and disease
 - i.e long-term consequences of stress



History: The general adaption syndrome

GAS = The general adaption syndrome (Selye, H. (1956; 1976): The stress of life)

1. Alarm stage: labels the stressor as a threat or danger to balance

- Activates its fight or flight response system, and releases the “stress” hormones such as adrenaline, noradrenaline and cortisol (see Cannon).
- A shock stage – and an antishock stage

2. Resistance stage: general activation in the pituitary cortex, releasing cortisol at all kinds of stress

3. Exhaustion stage: the gate towards burnout or stress overload, which can lead to health problems if not resolved immediately

- Walter Cannon and Hans Selye cooperated through many years

History: The transactional theory. A Cognitive theory

Richard Lazarus (1922 – 2000): American. Was professor in psychology. Learning psychology and cognitive psychology has contributed significantly to further understanding of stress

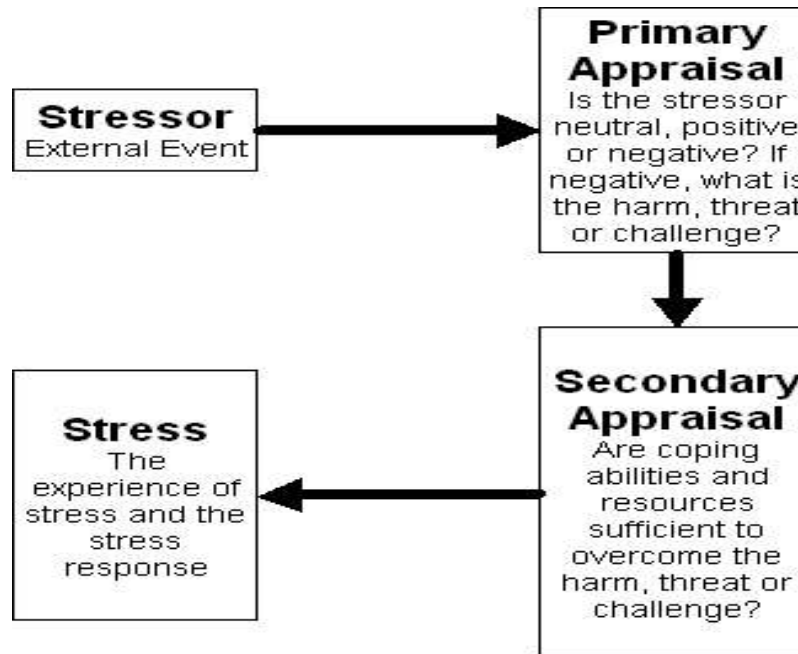
- Lazarus, R. (1966): the interaction between the individual and the environment is sustained processes that goes both ways (transactional)
- Richard S Lazarus (1970): «Stress and Coping»
- Lazarus, R & Folkman, S (1984): «Stress, appraisal, Coping»
- Lazarus, RS & Folkman, S (2006): «Transactional theory and research on emotions and coping”



1922 - 2002

History: The transactional theory. Cognitive theory

- Reactions to stress (stress) is determined by the individual's perception and assessment of the situation
- **Primary appraisal:** is this a threat, a harm/loss or a positive situation
↓
- **Secondary appraisal** ⇨ Do I have the resources required to minimize, tolerate or eradicate the stressor and the stress it produces?



History: The cognitive activation theory of stress CATS

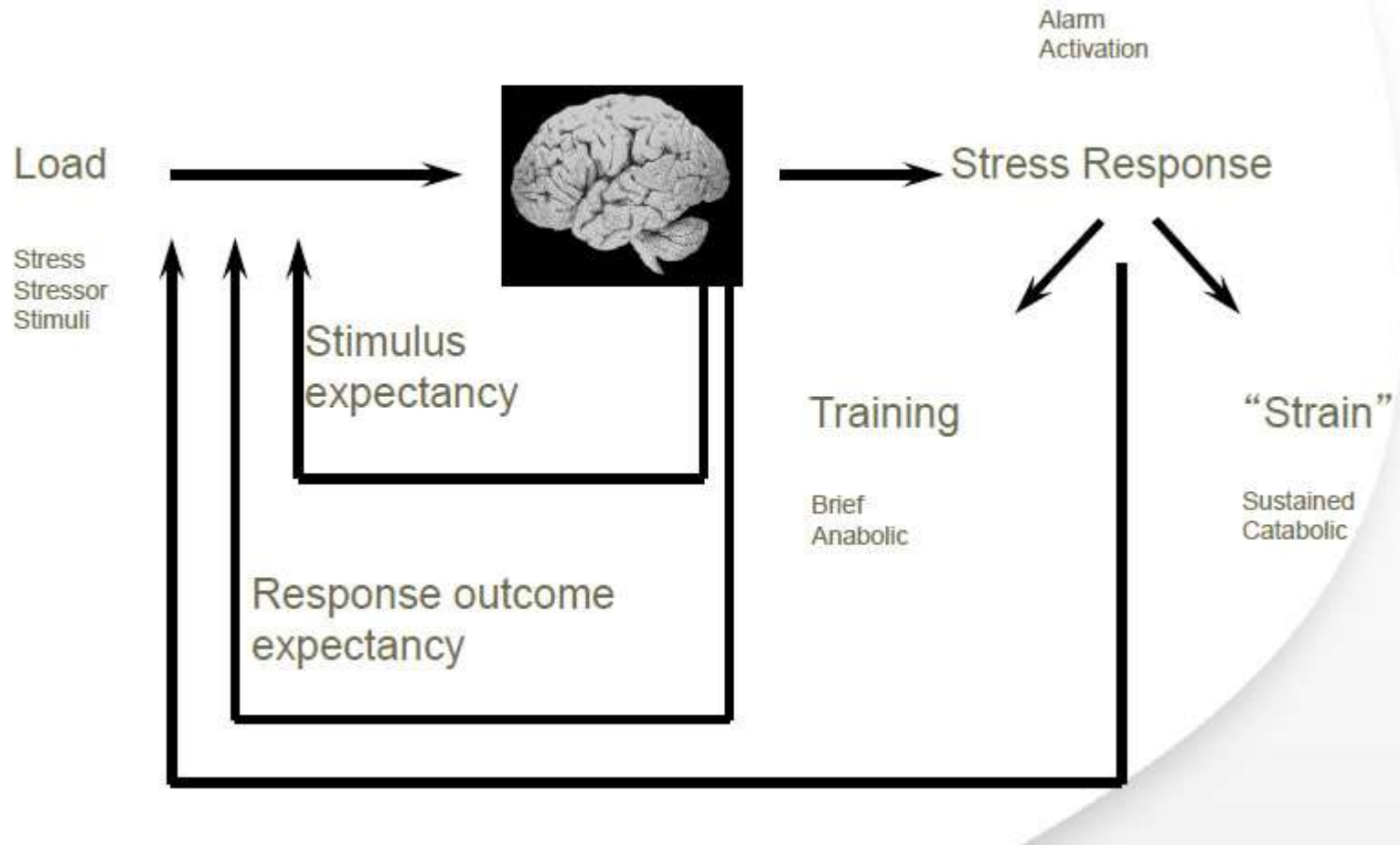
Holger Ursin (f-1934) Norwegian PhD MD, brain researcher, professor emeritus in psychology UiB

- Ursin, Baade og Levine (1978) «Psychobiology of Stress»
- Levine og Ursin (1991) "What is Stress ?"
- Ursin and Eriksen (2004): «The cognitive activation theory of stress»
- The stress response is a general alarm in a homeostatic system, producing general and unspecific neurophysiological activation from one level of arousal to more arousal.
- The unpleasantness of the alarm is no health threat.
- If sustained, the response may lead to illness and disease through established pathophysiological processes ('allostatic load').

Ursin, H & Eriksen HR (2004) Psychoneuroendocrinology 29 (2004) 567–592

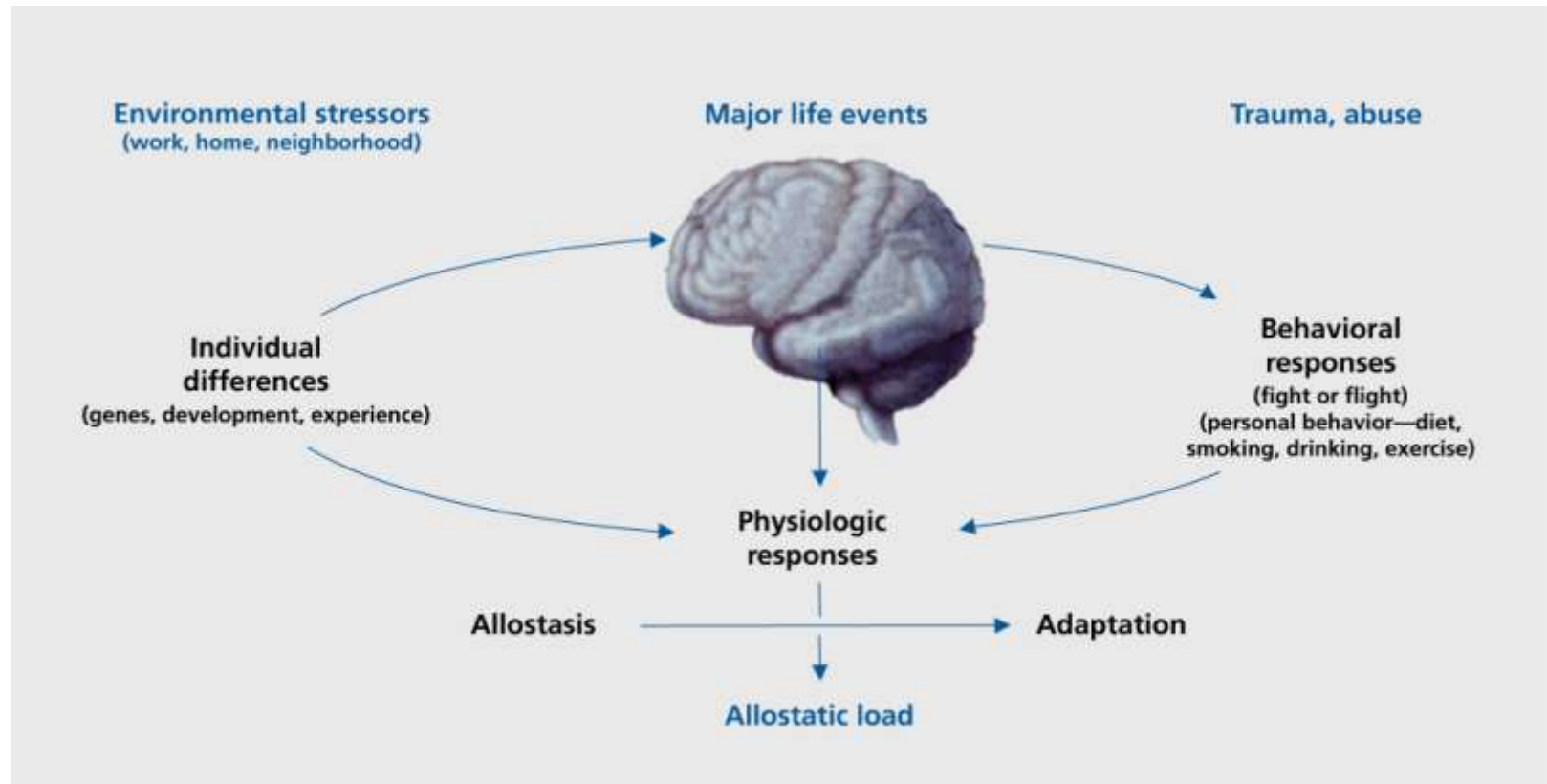


CATS Cognitive activation theory (Ursin & Eriksen 2004)



Allostatic load

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Allostasis, McEwen (22) by permission from the New England Journal of Medicine.

History: Stress and salutogenese



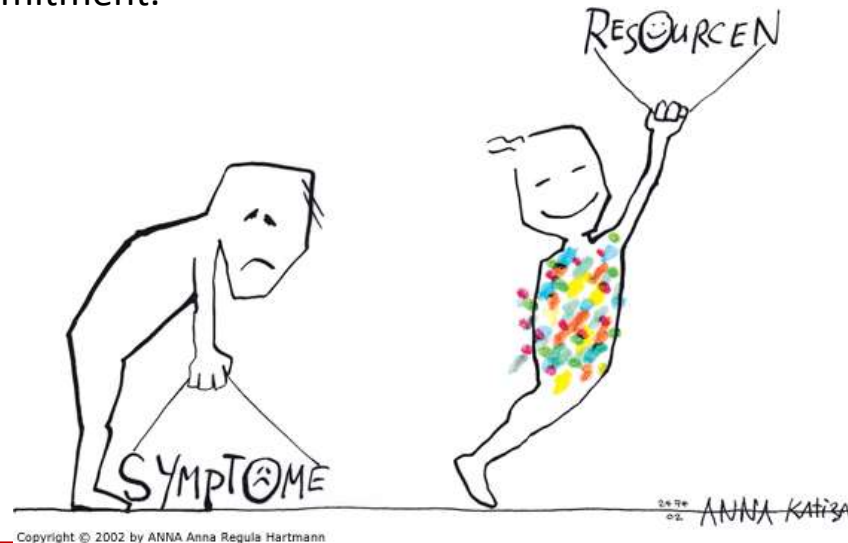
Aaron Antonovsky (1923 – 1994). American/Israeli. Medical sosiologist.

- Health, stress and coping (1979)
- Unraveling the Mystery of Health: How people Manage Stress And Stay Well (1987).
- The Sense of coherence. An historical and future perspective. Isr J. Med. Sci. 1996
- **The salutogenic** approach searched for the origins of health rather than the causes of disease. Explained why some people become ill under stress and others stay healthy
- Introduced the concept of **Sense of coherence (SOC)** (Antonovsky 1979)
- **The SOC is defined as:** “The extent to which one has a pervasive, enduring though dynamic, feeling of confidence that one’s environment is predictable and that things will work out as well as can reasonably be expected.”



The theory of sense of coherence SOC

- SOC has three components:
 - **Comprehensibility** is the extent to which events are perceived as making logical sense, that they are ordered, consistent, and structured.
 - **Manageability** is the extent to which a person feels they can cope.
 - **Meaningfulness** is how much one feels that life makes sense, and challenges are worthy of commitment.



Summary: what is stress?

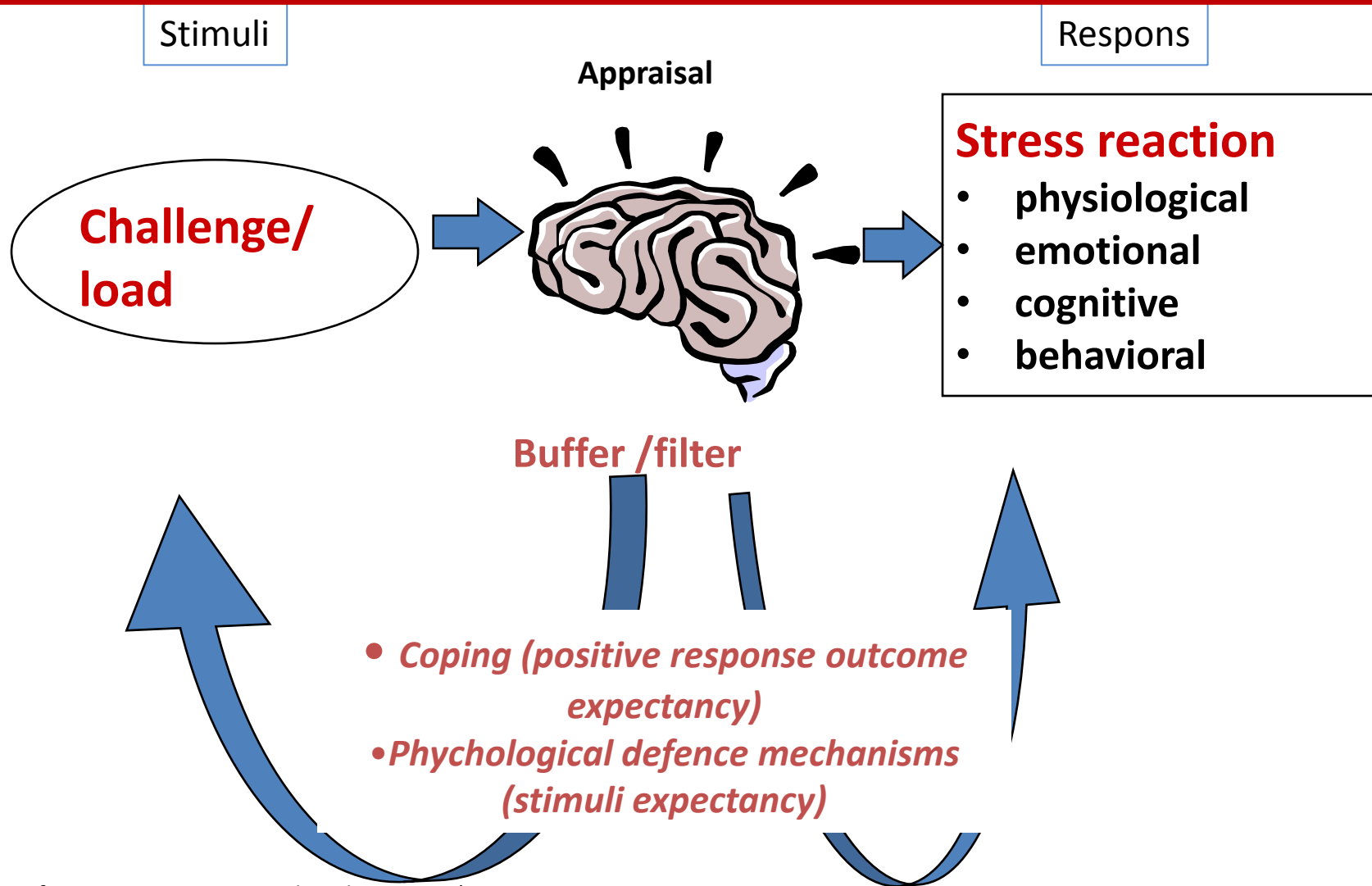
Summary: what is stress?

Most researcher agree that a definition of the concept of stress may contain three factors;

1. Stress as an external factor = **STIMULI**
 - i. **Stimuli: stressor**
2. Stress as the reaction you experience after external or internal influence
= **RESPONS**
 - ii. **Respons: stressreaction, activation, arousal**
3. Stress as interaction / process: stimuli – respons: influences by cognitive appraisal
 - iii. **Appraisal, expectations, coping resources**

References: Selye, H: «The stress of Life» (1976)

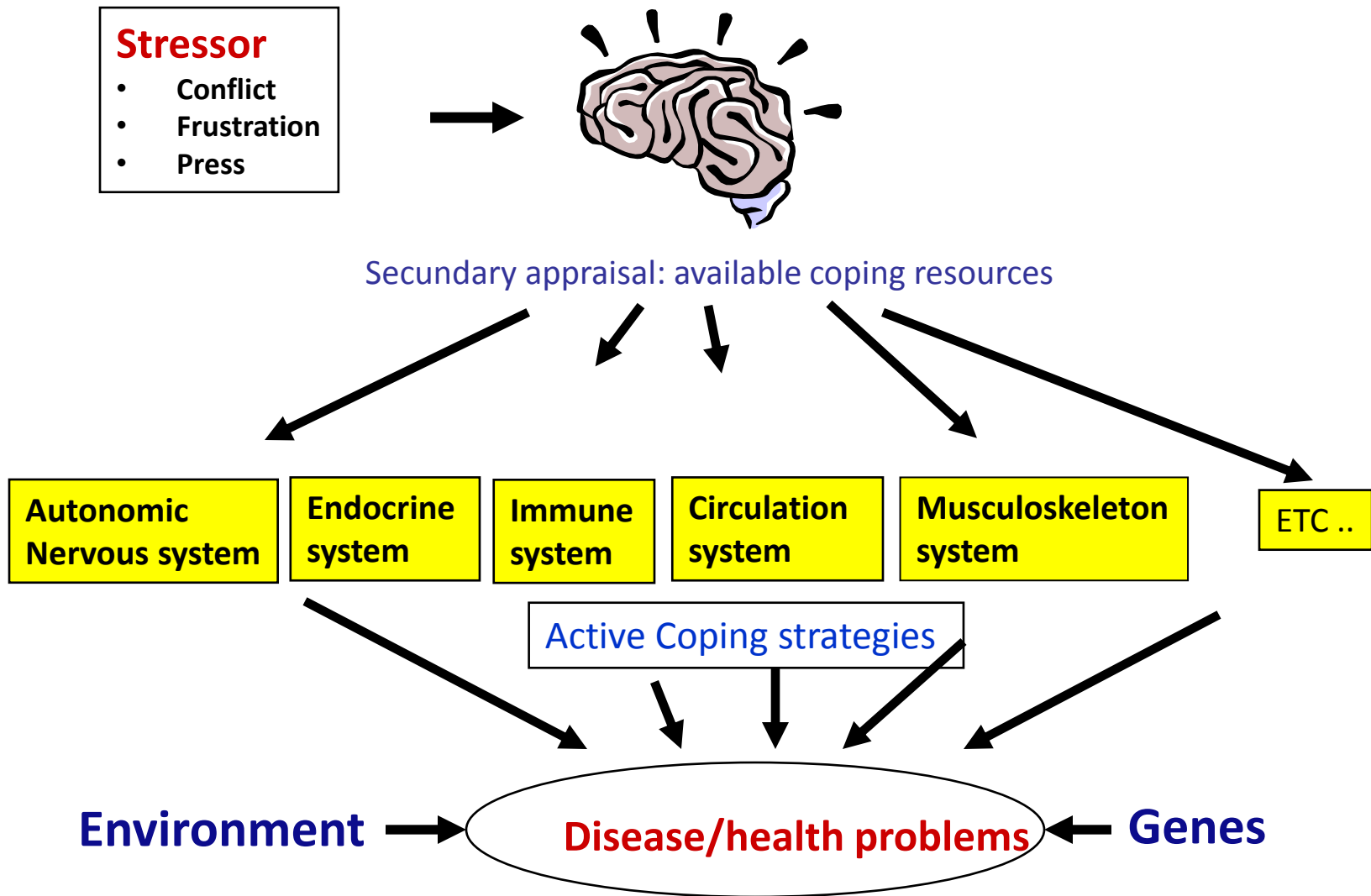
What is stress?



(Early version of CATS: Grønningsæter PhD. thesis 1992)

Stress reactions - the physiological pathways to health or disease

Interprete severity (Primary appraisal: irrelevant, harm or threat)

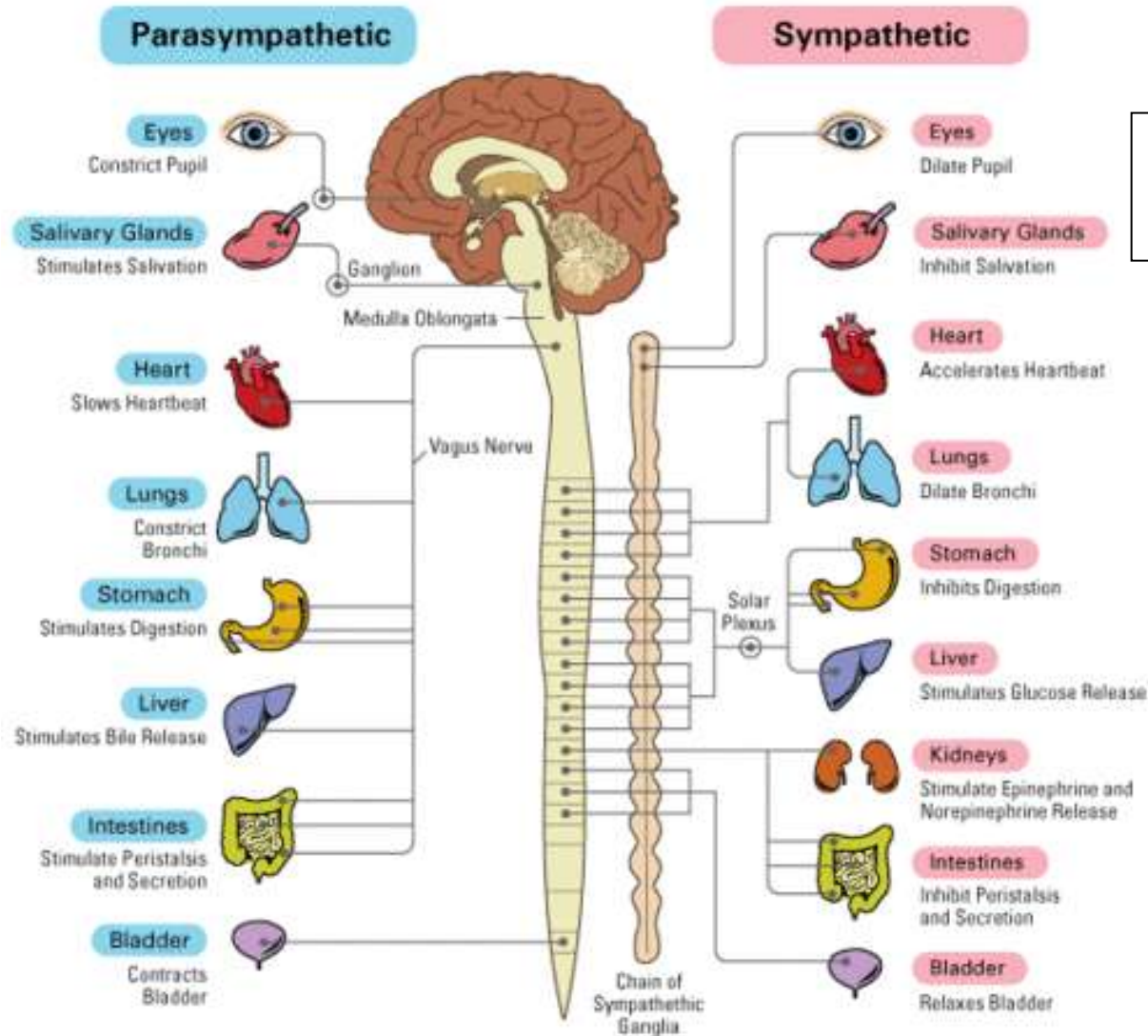


Stress and the autonomic nervous system

Stress activates the sympathetic nervous system.

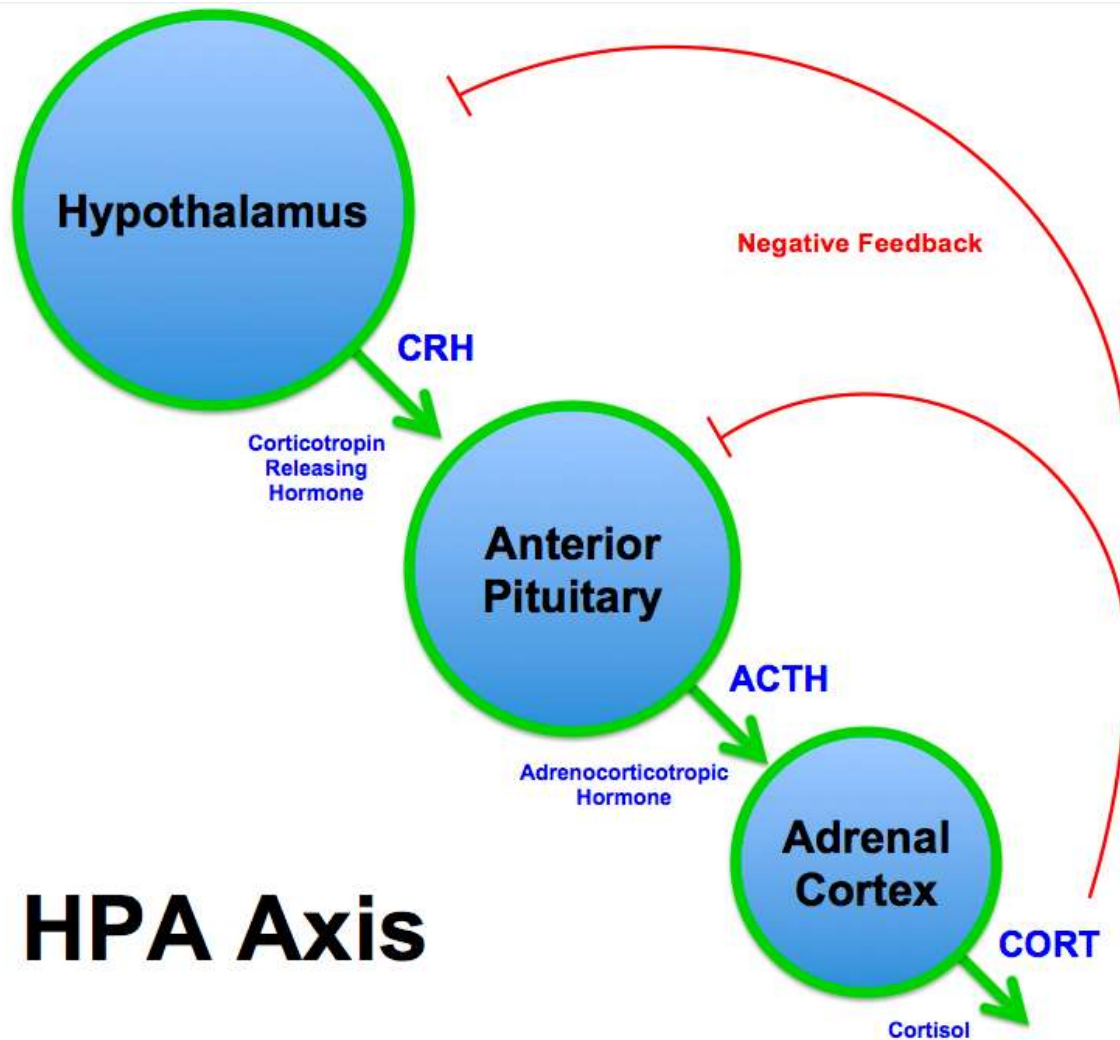
Schema Explaining How Parasympathetic and Sympathetic Nervous Systems Regulate Functioning Organs

Relaxation activates the «rest or digest» system

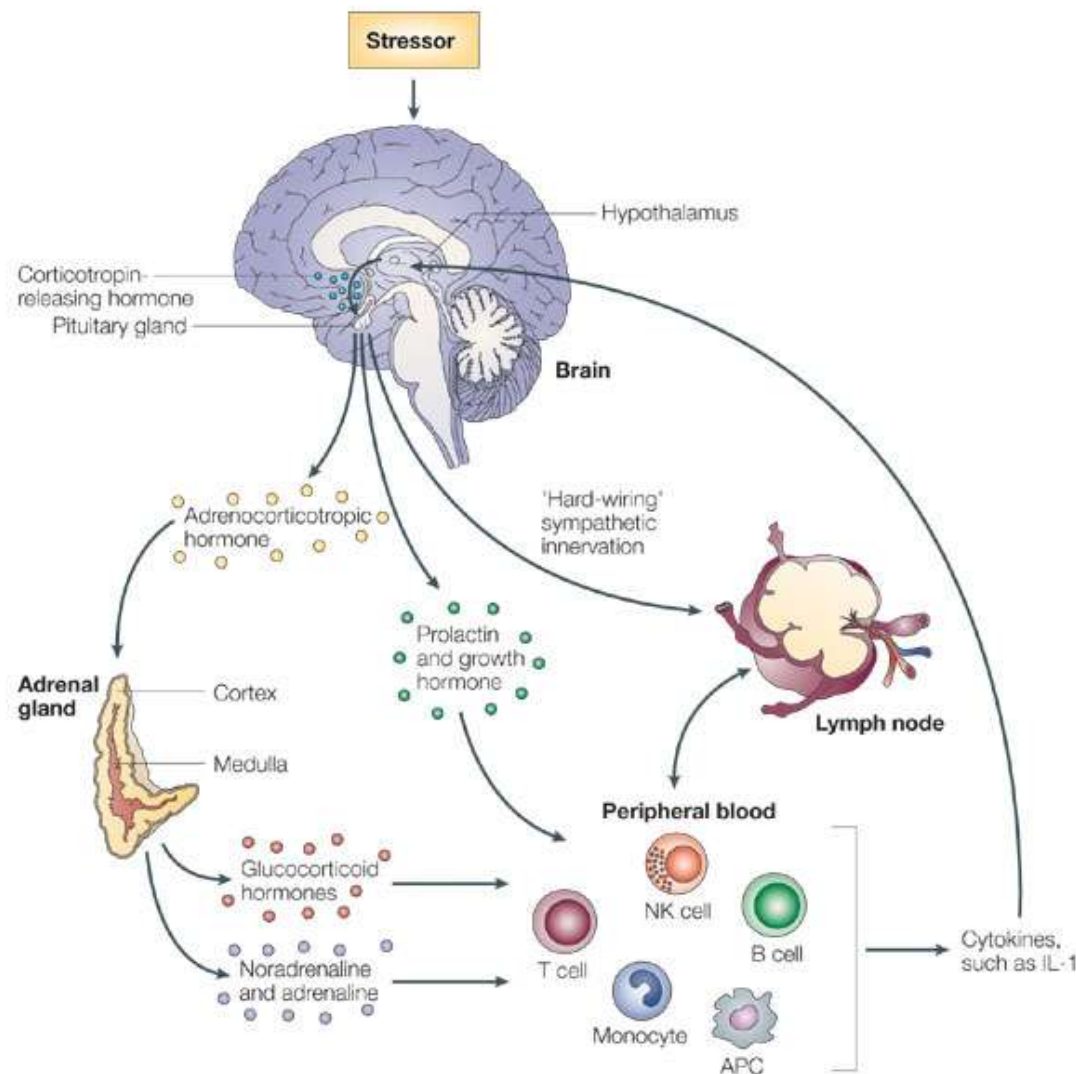


Stress activates The «fight or flight» system»

Stress and the hypothalamic, pituitary adrenal axis



Stress and a link to disease: the hypothalamic, pituitary adrenal axis and the immune reactions

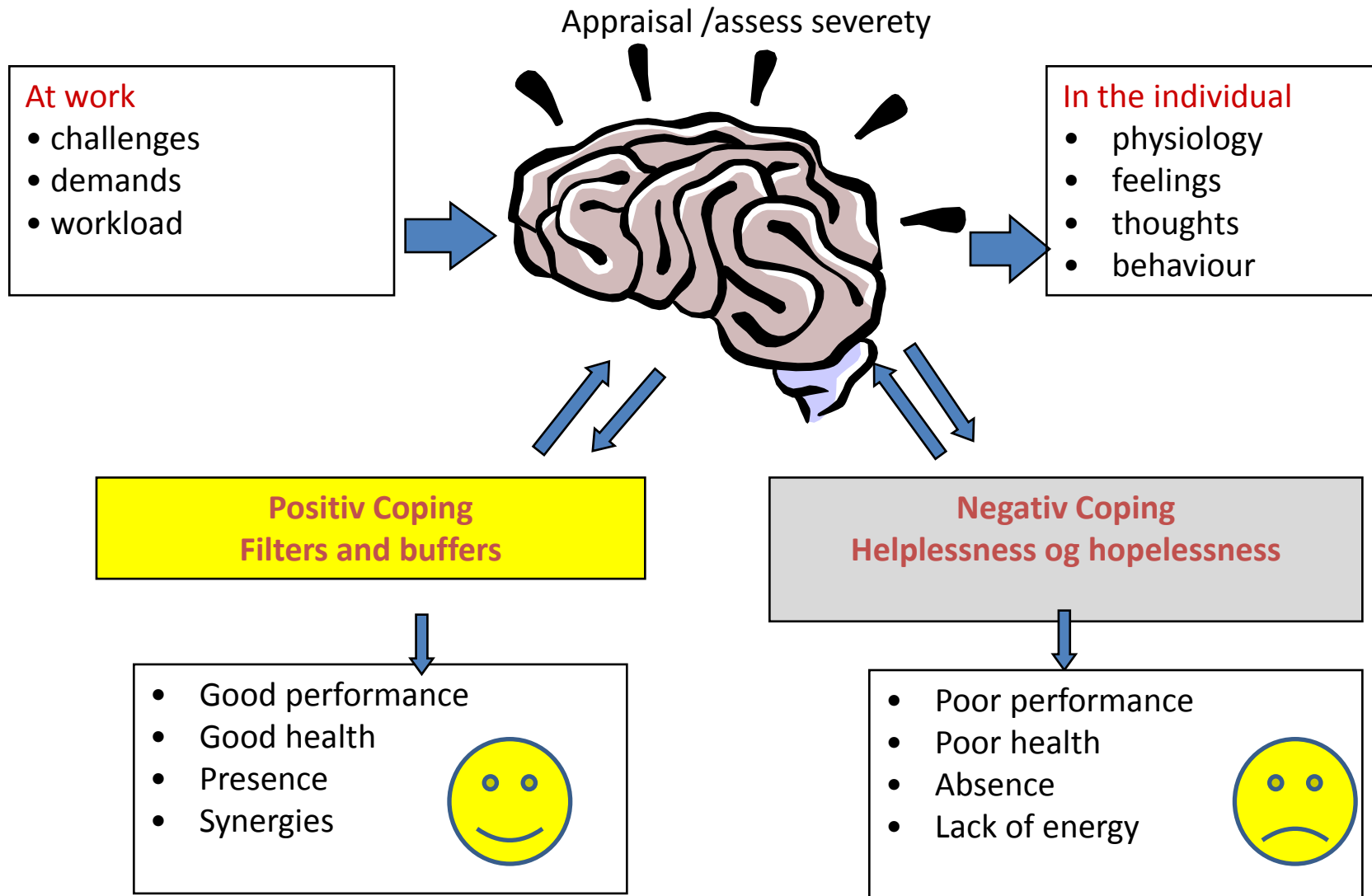


Glaser & Kiecolt-Glaser 2005, Nature Reviews Immunology 5, 243-251 (March 2005)

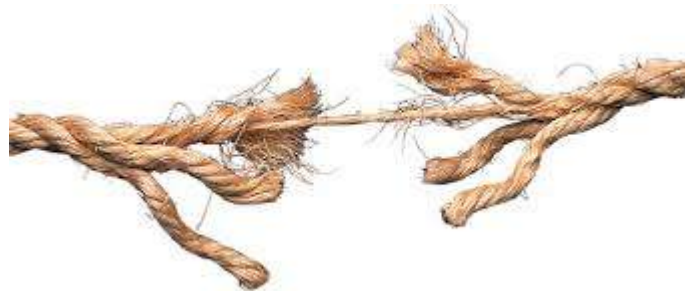
Nature Reviews | Immunology

Erasmus +: THEWS: Intensive Study Week
(Norway/HG)

Stress and coping



What is coping?

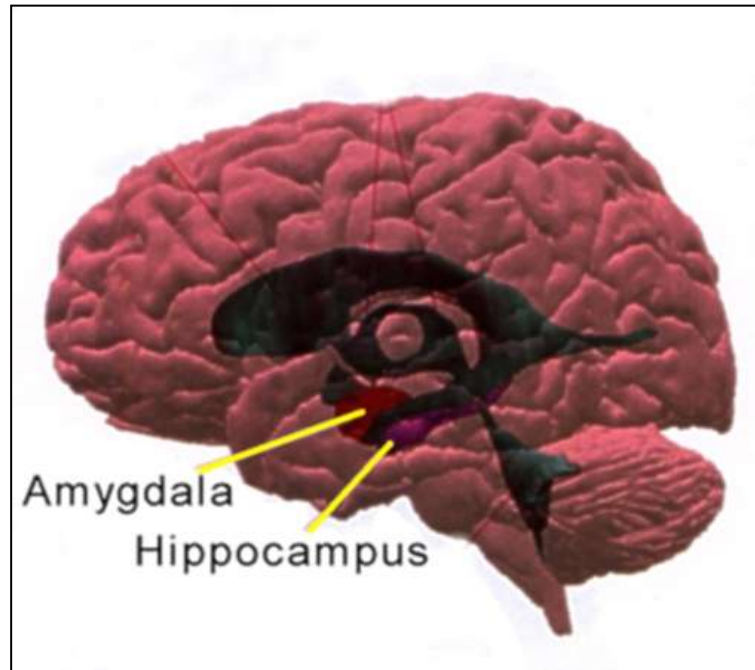


What is coping? (in cognitive terms by Lazarus and Folkman 1984)



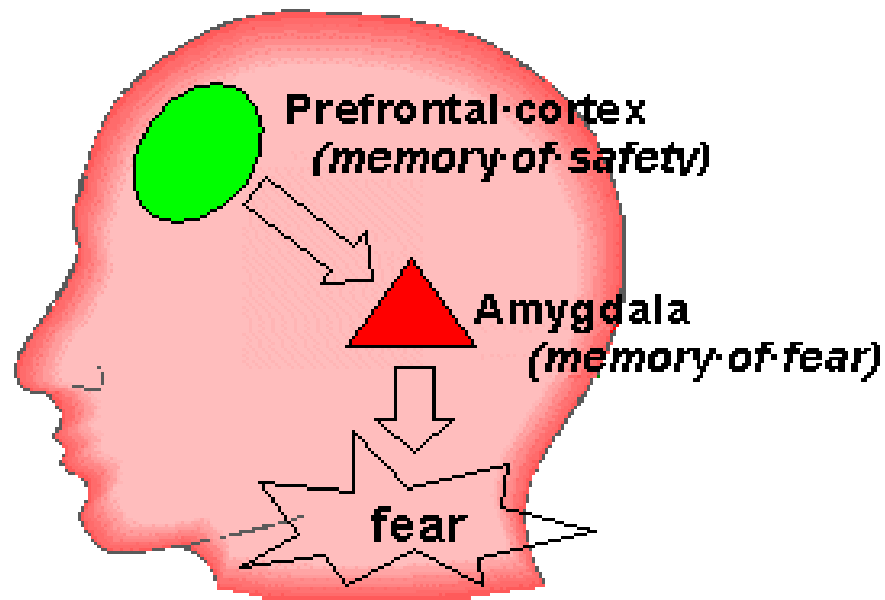
- **Coping** is conscious effort to solve personal and interpersonal problems, and seeking to master, minimize or tolerate stress or conflict.
- **The effectiveness of the coping efforts** depend on the type of stress and/or conflict, the particular individual, and the circumstances.
- **Coping mechanisms** are commonly termed coping strategies or coping skills.
- **The term coping** generally refers to adaptive or constructive coping strategies, i.e. the strategies reduce stress levels.
- **Maladaptive coping strategies**, i.e. negative coping: stress levels increase (smoking, alcohol, drugs).
- Subconscious or non conscious strategies are often referred to as **psychological defense mechanisms**

The limbic system – essential in the stress-coping process



The **limbic system** (“the emotional brain”) deals with three key functions: emotions, memories and **arousal** (or stimulation).

Positive intentions reduce stress



- By insecurity and uncertainty the amygdala will automatically activate adverse reactions (anxiety / stress).
- Positive intentions, positive outcome expectancies, self-efficacy reduce activation in amygdala
- Positive thoughts and strategies must be learned and re-learned

Coping is described in many ways:

I Internal resources – cognitive, personal factors:

Positive outcome expectancy, self-efficacy, will-power, resilience, faith....

- I can change the situation *if I want so*
- I am conscious of my situation and can act appropriately

II Coping patterns (as measured by Schreurs et al 1993)

- Action oriented (problem solving)
- Passive avoidance
- Emotion focused

III Coping strategies or mechanisms (Seaward 1994:138)

- All possible efforts/ techniques to reduce negative effects of stress / anxiety
 - Action oriented (i.e time management)
 - Intrapsychic (acceptance)



(See also «The coping model» by Lazarus in Seaward 1994:139)

Du kan ikke styre bølgene, bare surfebrettet...

Emotion focused coping

This involves attempts to reduce negative emotional reactions to stress

- Embarrassment
- Fear
- Anxiety
- Depression
- Tension
- Frustration



This may be the only realistic option in situations where one has no control

Problem focused coping

- **Focuses causes of stress:** think practical and/or pragmatic
 - Take control. Make concrete changes related to the sources of stress
 - “Plan your work and work your plan”: Shift work, move.....
 - Seek social support; information, help, knowledge
 - Make a situational analysis of pros and cons

Problem focused coping does not work when the stress factor is beyond reach, i.e in chronic disease , by grief....



Sense of Coherence SOC and muscle pain



- Stress is known to alter the pain threshold
- SOC is a factor in pain perception and symptom reporting
- A low SOC predicts musculoskeletal symptoms (neck, shoulder, and low-back) in later life
- SOC is a predictor of response to pain management programs for chronic pain sufferers
- SOC predicts the outcome of low-back surgery, possibly through increasing ability to cope with pain
- In arthritis patients, lower SOC is linked to pain levels, as well as greater difficulty in performing daily activities and general health
- Extended research over the past fifteen years

(Reference: Collingwood, J: Ppsychsentral.com)

(Google Scholar: 39 700 treff)

Psychobiological explanations of musculoskeletal disorders

New theories have been proposed to explain the development of musculoskeletal disorder symptoms in psychologically stressful jobs with a moderate or low physical load (Hägg, 1991; Schleifer & Ley, 1994; Johansson et al., 2003; Knardahl, 2002).

"The Cinderella Hypothesis" (referring to Cinderella, who was first to rise and last to go to bed):

- The motor units in the trapezius muscle are recruited in a fixed order
- Small, low-threshold motor units are recruited at low levels of contraction, before larger ones
- These are activated until complete relaxation of the muscle
- Long-lasting activation of these units may cause degenerative processes, damage and pain (Wærsted, 1997)

Cognitive factors and mental stress may induce muscle tension.

- Ongoing psychological stress may keep low-threshold motor units active more or less continuously (Wærsted 1996, Lundberg, Forsman et al., 2002)
- This means that the same muscle fibers may also be active during breaks at work and after work, unless the individual is able to relax **mentally**.

Psychobiological explanations of musculoskeletal disorders

Stress and breathing

- Stress-induced hyperventilation decreases peak CO₂ levels
- Increases the blood pH level (beyond 7.45 = alkalosis).
- This contributes to elevated muscular tension and a suppression of parasympathetic activity (Schleifer & Ley, 1994)

Vicious circles

- Vicious circles may start in muscle spindles during stress and repetitive work
- May contribute to elevated muscle stiffness and dysfunctional coordination, including co-contractions
- High concentration of inflammatory substances and increased pain sensitivity.
- The pathological processes may spread from one muscle to another via nerve signals (Johansson et al. 2003)

Psychobiological explanations of musculoskeletal disorders

Vessel – nerve interactions

- Pain originates from the vessel-nerve interactions of the connective tissue of the muscle
- (rather than from energy crisis of the muscle cells).
- Different vessel-nociceptor mechanisms known to cause pain, i.e in migraine, may be involved
 - vasodilation stretching the vessel wall, release of algogenic substances from the nerves and/or the vessels, such as prostaglandins
 - and inflammatory processes which may sensitize nociceptors (Knardahl (2002:68)

Sensitization

- A possible pathogenic mechanism for muscle pain is that nociceptors are sensitized due to local metabolic changes in fatigued low-threshold (Type I) muscle fibres (Sejersted & Vollestad, 1993).
- The hypothesis of overload of certain motor units is supported by the observation of an increased number of "ragged red" Type I muscle fibres in the trapezius muscle of workers exposed to monotonous shoulder load (Larsson et al., 1988; Bengtsson and Henriksson, 1989; Lindman et al., 1991; Larsson et al., 1992).
- If motor units are constantly active, there is no time for the healing of damaged muscle fibres.

Hentet fra <http://www.macses.ucsf.edu/research/allostatic/muscle.php#tension>

Psychobiological explanations of musculoskeletal disorders

Lack of clear signals

- In light physical work (i.e computer work) - no adequate signals of fatigue.
- In contrast to heavy physical work, the worker can continue to work for hours or days without knowing that certain motor units are exhausted.

Conclusion:

The most important factors in preventing MSD in the modern society:

- **Rest, recovery and restitution.** (Lundberg for The Allostatic Work Load 2008)

Hentet fra <http://www.macses.ucsf.edu/research/allostatic/muscle.php#tension>

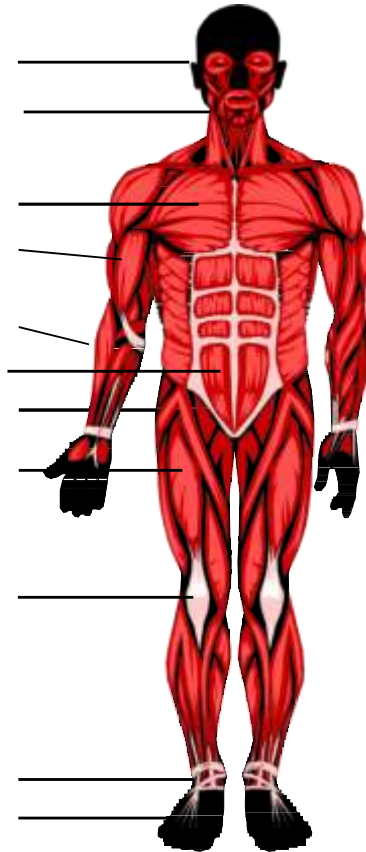
Occurence: Reported health complaints in Bankemployees

Øyne: 15,5
Kjeve: 5,4%

Bryst: 6,1%
Overarm: 15,5

Underarm: 9,5%
Mave: 10,8
Hofte: 14,2
Lår foran:
6,1%

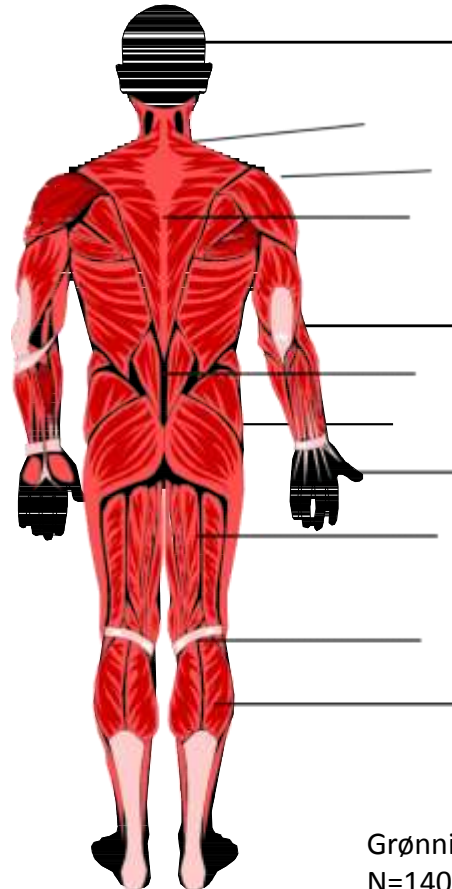
Kne: 19,6



Head: 23,0%
Neck/shoulder: 45,9%
Shoulder: 24,3%

Upper back: 14,9%

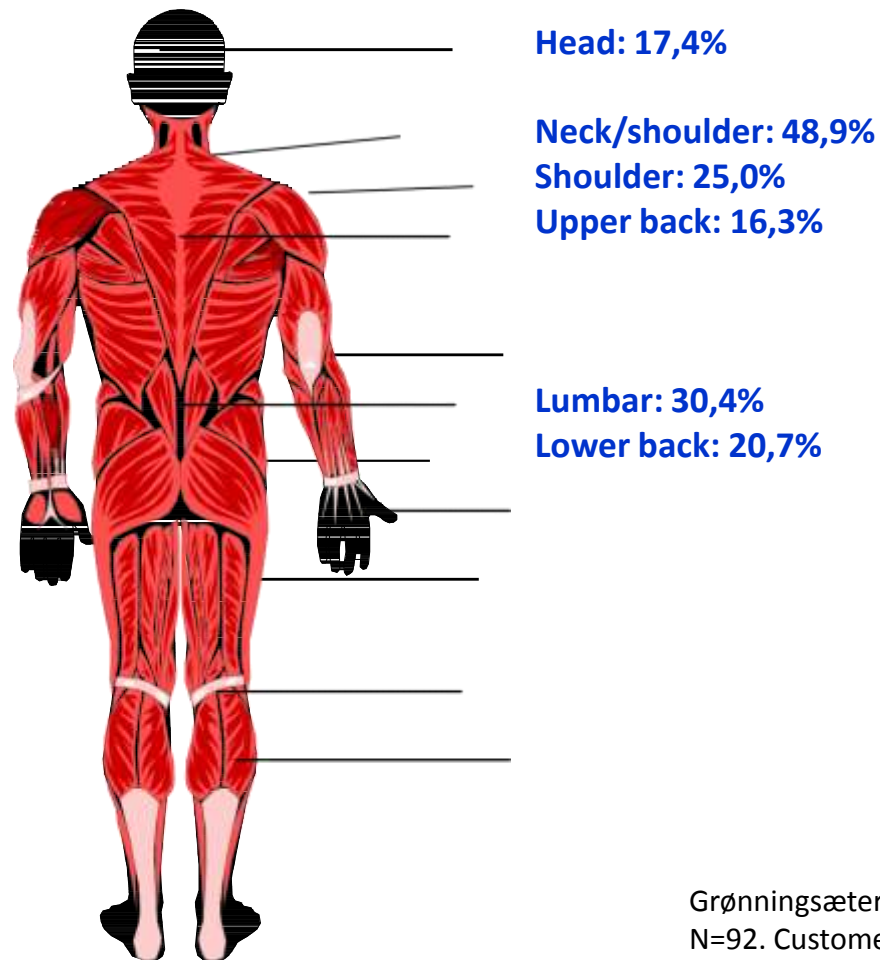
Lumbar: 26,4%
Low back: 12,8%



Grønningsæter H.(1999):Health profile test
N=140. Bankemployees.

Average reduced productivity reported due to health complaints is 9,1%

Occurence: Reported health complaints in Costumer Service Workers



Grønningsæter H.(1999): Health profile test
N=92. Customer Service Airlines

Average reduced productivity reported due to health complaints is 10.1%

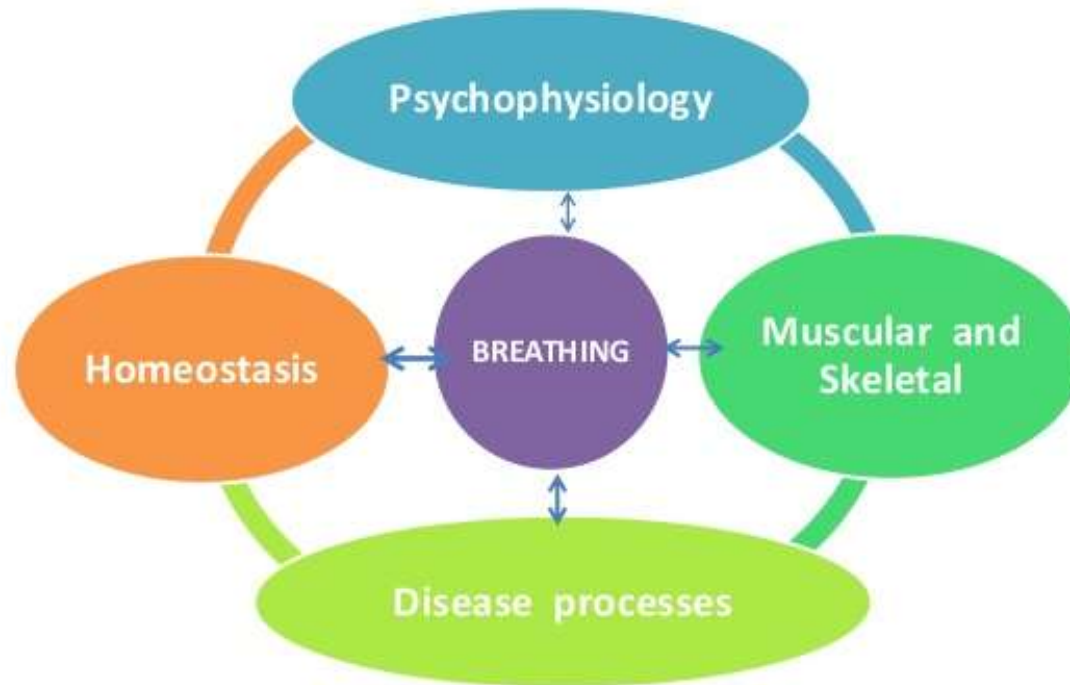
- **Stress management** encompasses techniques intended to equip a person with **effective coping mechanisms** for dealing with psychological stress.
- Any technique developed to help someone **cope with or lessen** the physical and emotional effects of everyday life pressure (Lazarus & Folkman 1984).



- **Relaxation techniques (examples)**
 - Breathing
 - Mental imagery
 - Autogenic Training
 - Progressive Muscular Relaxation
 - Biofeedback
 - Physical exercise and nutrition
 - Meditation
 - Yoga
- **Coping strategies (examples)**
 - Cognitive Restructuring
 - Behavior Modification
 - Communication skills
 - Time management
 - Humor therapy
 - Art Therapy
 - Creative Problem solving



Breathing responds to many conditions.
Breathing functionality depends on context.

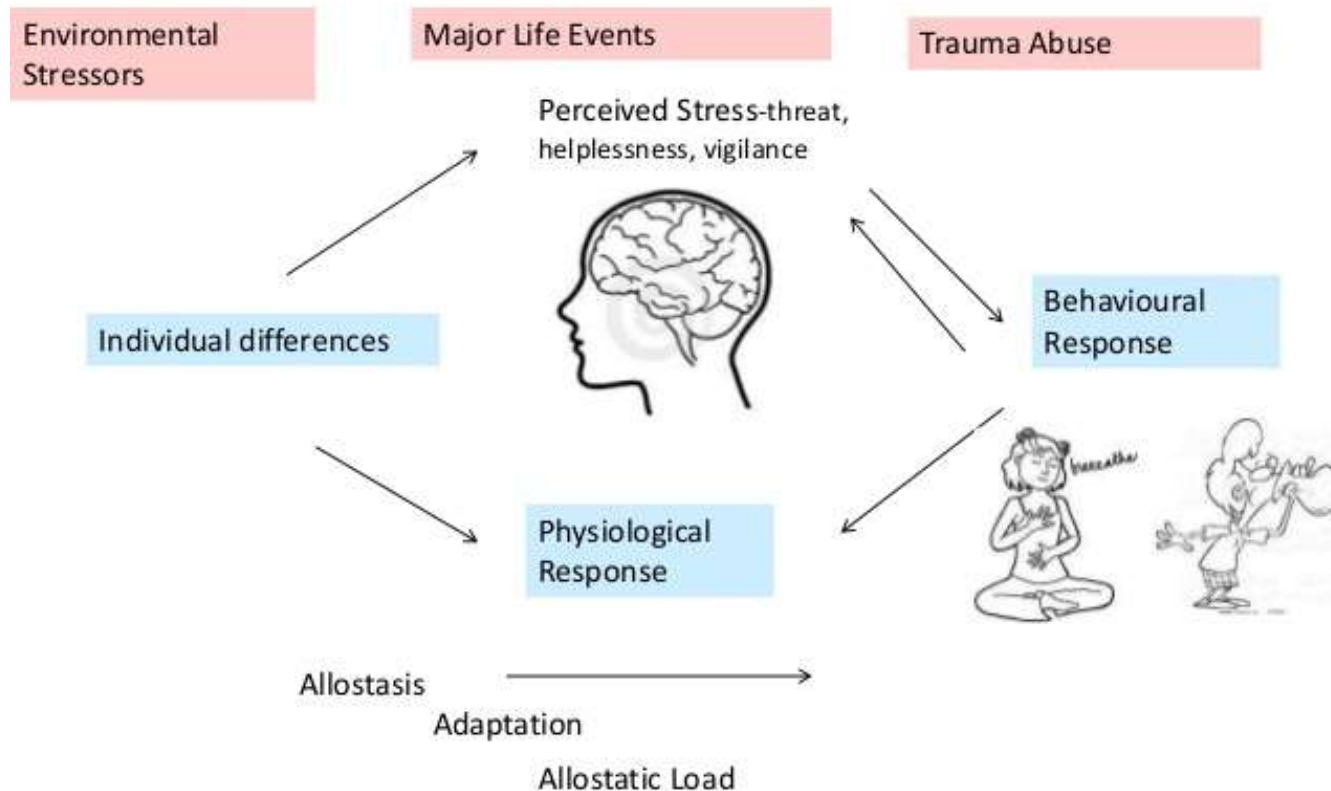


Rosalba Courtney 2013

10

Stress and Breathing

Stress and Excess Allostatic Load is an important source of dysfunctional breathing.



Rosalba Courtney 2013

Modified from McKewen 1998²³

- Diaphragmatic Breathing is controlled deep breathing (belly breathing).
- We normally breathe 14 – 16 times/min – under resting conditions.
- During heavy exercise, the ventilation rate can increase to 60 times/min (Seaward (1999:260 – 266)).

3. Steps to initiate Diaphragmatic Breathing:

1. Assume a comfortable position
2. Concentration
3. Visualization

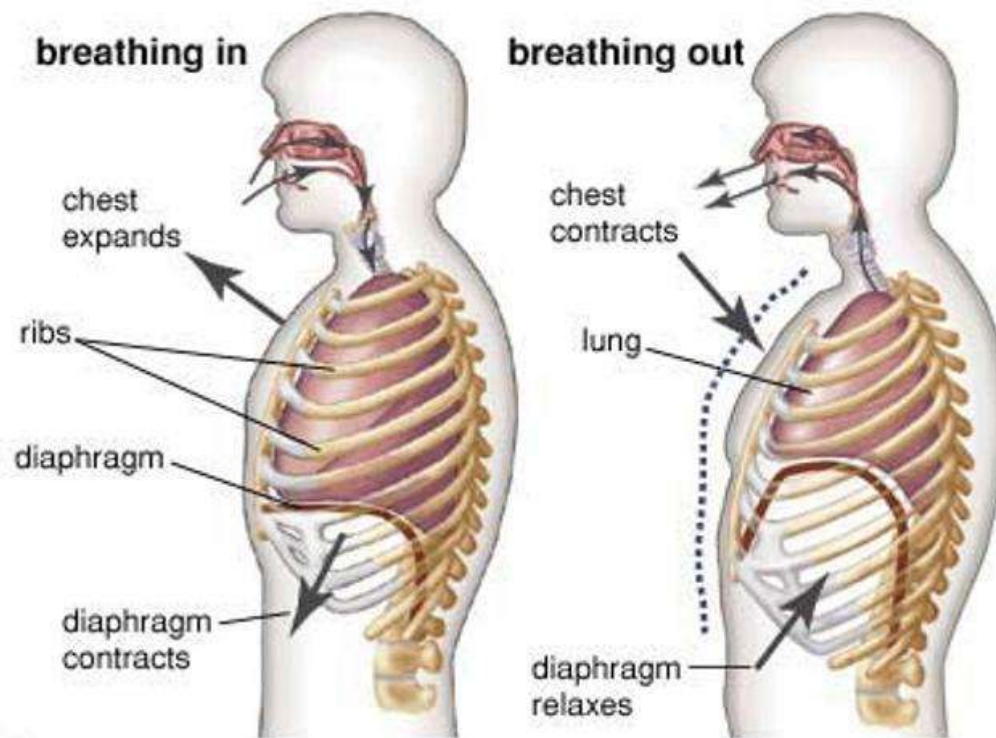


Lesson 1

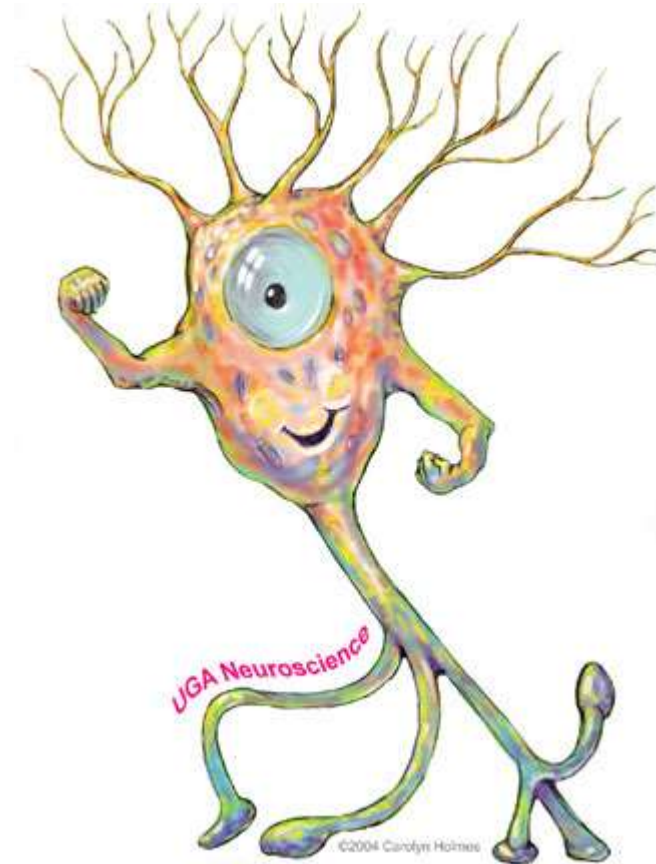


Close your eyes breathing as *slowly* as possible
Notice what is happening to you

The breathing movements



The role of breathing for your entire body



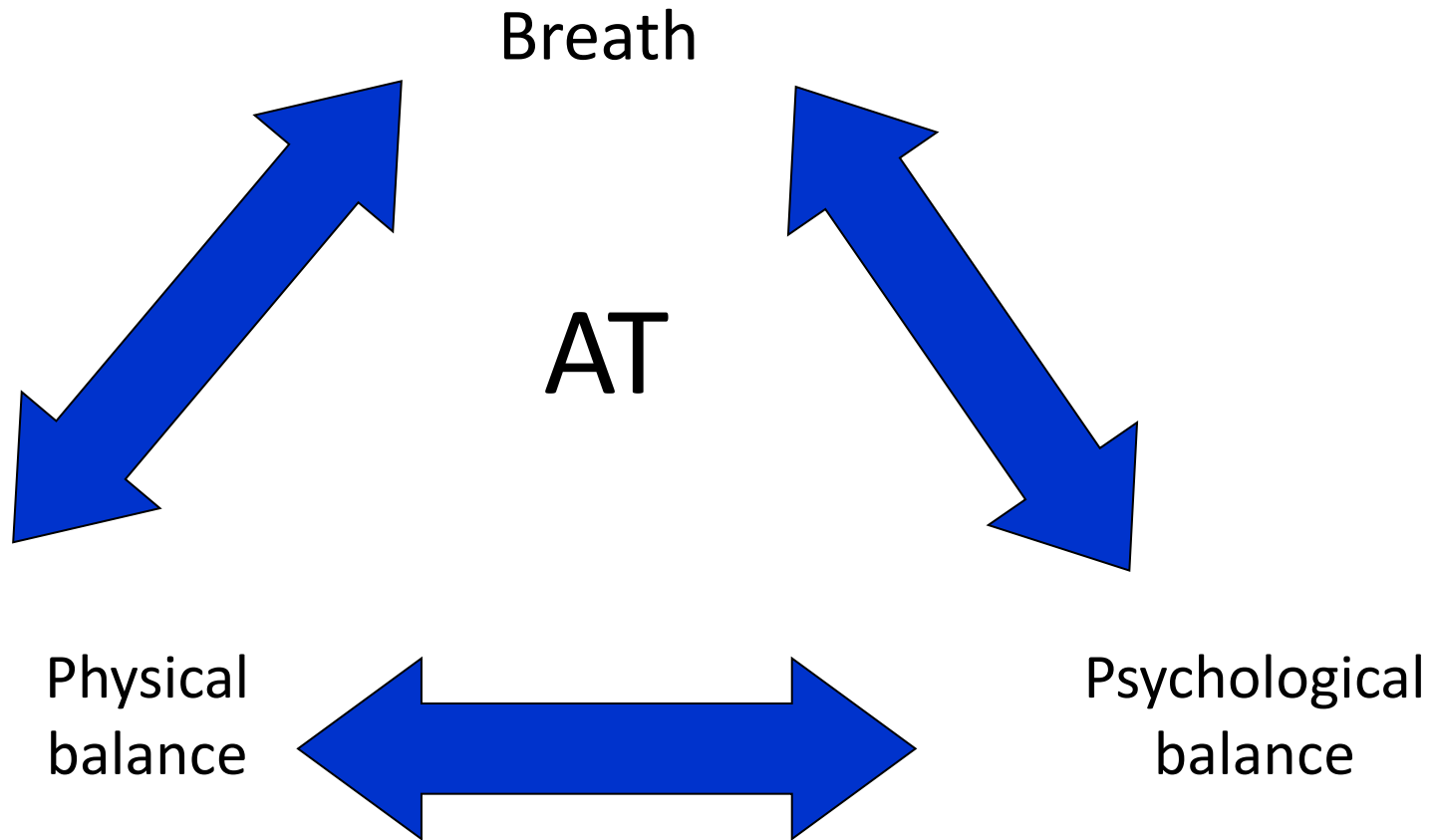
**Our breath is connected to our
autonomic nervous system**

Lesson 2



Close your eyes and observe your breathing.
Attention is on your nose. Notice how you breath in and out

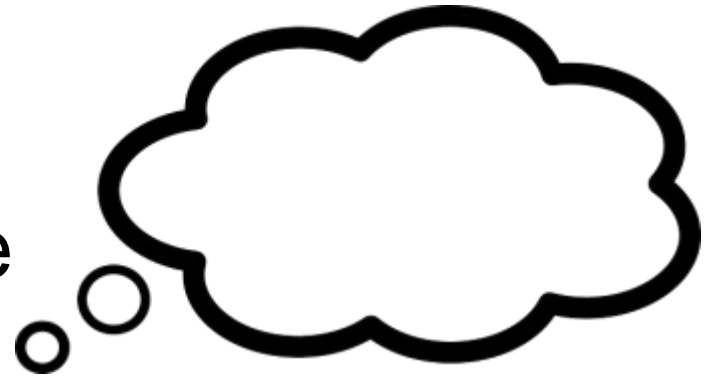
Awareness training (AT)



How

- You can't stop thinking
- You can't control your mind
- Let the thoughts come – and go

- **Stop**
- **Observe**
- **Aksept**
- **Let go**



SOAL

Lesson 3



Close your eyes and direct your attention to your breathing center in the stomach
(breathing anchor).
Notice how your stomach move.

- The skill of **Mental imagery** involves the creation of:
 - Images, scenes or impressions by engaging the body's physical senses of
 - **Sight, sound, smell, feel and taste** for an overall pleasureable desired effect.

Mental imagery as an relaxation technique



- Mental training – changing cognitive style
- Emotional/passive coping patterns vs active problem solving



- Behavioral change: health and lifestyle change
 - Physical exercise and stress
 - Food / diet and stress
 - Sleep and stress
 - Social support and stress
 - Positive thinking and stress

