



STRESS AND HEALTH

Lecture:4

Stress – definitions and terms. Physical responses to stress. Stress and the immune system. Life events and stress. Stress as a person-environment interaction. Stress and health. Stress in medicine. Managing stress.

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AGENDA

- What is stress: definitions, theories etc.
- Stress and health
- Stress in medicine
- Managing stress

Introduction and definitions

- Originating from mechanics, the word **stress** has become widely used to express:
 - Unfavorable/negative situation
 - A feeling of pressure/tension
 - Negative emotion
- Current psychological concepts consider **stress** as *occurring when demands are appraised as exceeding a person's resources to cope.*
- Stress has many components but the most important distinction is between:
 - **Stressor**
 - **Stress responses**

Introduction and definitions

- **Stressor**: event that triggers a **stress response**.
- **Based on their origin stressors** are subdivided to:
 - External (e.g. feeling stressed while studying for an exam)
 - Internal (e.g. conflicting desires - to study for exam or to help a good friend who needs you at the same time)
- **Based on their type and duration stressors** are sub-classified to:
 - Acute (e.g. death of a close friend)
 - Chronic (e.g. caring for a sick relative)
 - Daily hassles (e.g. problems during work)
 - Traumatic stressors (e.g. an assault)
 - Role strain (e.g. balancing home and work roles)

Introduction and definitions

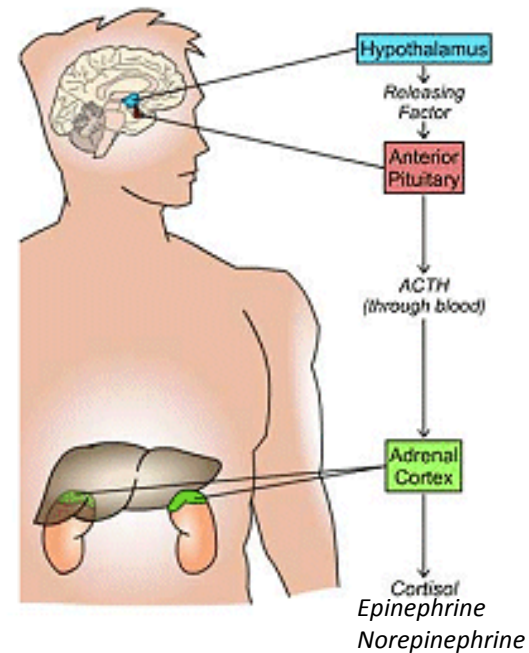
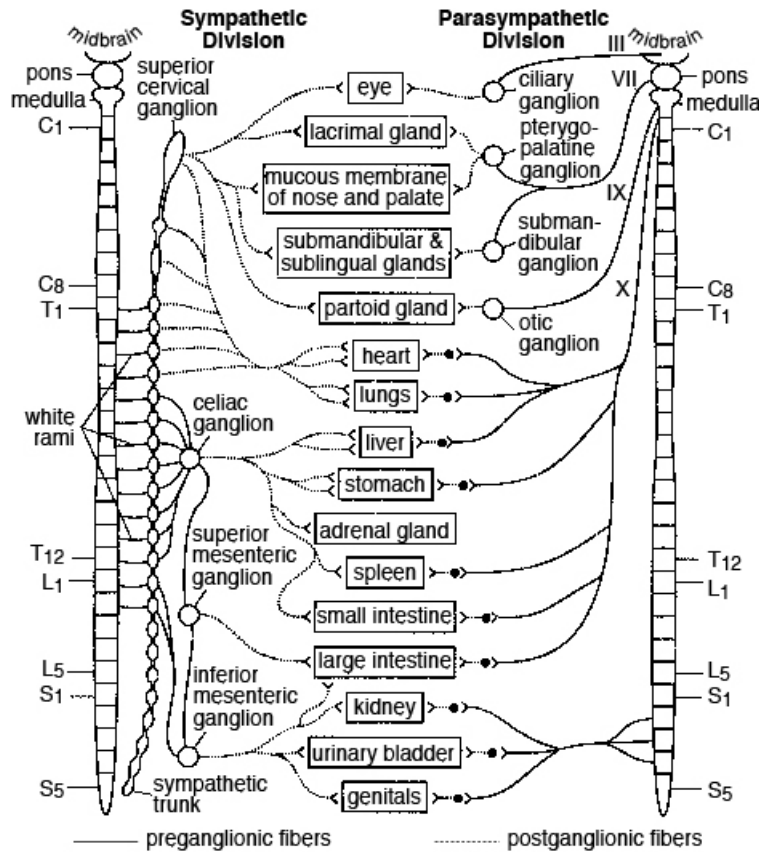
- **Stress responses:** the various ways to respond to a stressor. They are subdivided into:
 - Cognitive
 - Affective
 - Behavioral
 - Physiological
- The association between these responses is not obligatory. It is possible for a person to have a strong physiological response with little or no emotional one (the so called *repressive coping style* seen in some people*).

Furnham, A. et al. (2003) Repressive coping style and positive self-presentation, *British Journal of Health Psychology*, 8: 223-249

Physiological responses to stress

They are critical in explaining the link between stress and disease. Initial research (1950s) focused on **fight-flight** response which involves:

- the sympathetic branch of the autonomic nervous system as a fast, first wave response.
- the endocrine pathways of the **hypothalamic-pituitary-adrenal (HPA) axis** as a slower, second wave response.



The adrenal medulla produces stress hormones such as *adrenaline* (epinephrine) and *noradrenaline* (norepinephrine). They cause stimulation of the heart and lungs and the diversion of energy away from unnecessary functions such as saliva production, digestion and reproduction.

Physiological responses to stress

- Upon HPA activation, cortisol secretion starts from the adrenal cortex. Cortisol is a critical stress hormone with physiological activities such as:
 - Increase in blood sugar levels and metabolic rate
 - Influencing regulation of blood pressure
 - Influencing immune system and inflammatory response
- The HPA axis works as a negative feedback loop so the presence of *cortisol* in the blood stream triggers the hypothalamus to stop producing CRF and its levels in blood return to normal in 40-60 min.
- In prolonged periods of stress the HPA axis can become dysregulated resulting in chronically elevated levels of cortisol. In the long term this will have negative effect such as accumulation of abdominal fat and wasting of bone and muscle tissue.

Physiological responses to stress

- *H. Selye* (1956) proposed that physical responses to stress can be understood as a **general adaptation syndrome** with three stages:
 1. **Alarm**: an immediate physical response to stress that prepares us for *fight-flight*.
 2. **Resistance**: our body attempts to resolve the stress and return to normal, but if the stressor continues, we will remain in a physiologically active state.
 3. **Exhaustion**: if the stressor continues indefinitely, the physical strain on our body will lead to exhaustion, illness, or death.
- Research supports to some extent the *general adaptation syndrome* but our understanding of the physiological responses to stress has developed substantially since the time of *Selye*.

Selye, H. (1956) *The Stress of Life*. New York: McGraw-Hill

Physiological responses to stress

- We now know that physiological responses to stress will vary according to the characteristics of the situation such as:
 - *If it is new*: stronger physiological stress responses will occur in situations that are novel*
 - *If it is predictable*: unpredictable events can lead to greater physiological stress**
 - *If it is controllable*: lack of control is associated with greater stress and a more negative impact on health***
- The latter has led to the view that it is important to empower patients and encourage them to have as much control as possible. Though this is usually true, in situations which are essentially uncontrollable encouraging someone to strive for control might result in more strain on the person.

*Schedlowski, M. & Tewes, U. (1992) Physiological arousal and perception of bodily state during parachute jumping, *Psychophysiology*, 29: 95-103

Evans, G.W. et al. (2002) The morning rush hour: Predictability and commuter stress, *Environment and Behavior*, 34: 521-530

Walker, J. (2001) *Control and the psychology of health*. Buckingham: Open University Press

Physiological responses to stress

- Individual stress response variations exist and some individuals will be more physiologically responsive than others. According to twin studies, ***stress responsivity*** may be at least partly genetically determined*
- Individuals also vary in their pattern of physical responses to stress. One person may have high blood pressure responses to stress and another person may show a stronger inflammatory response.

*Hewitt, J.K & Turner, J.R. (1995) Behavior genetic studies of cardiovascular responses to stress, in J.R. Turner et al.(eds) *Behavior Genetic Approaches in Behavioral Medicine*. New York: Plenum. pp 87-103

Physical responses to stress

- Babies of mothers with high levels of stress and anxiety during pregnancy are more responsive to stress, show more anxiety and fearfulness and are more likely to have cognitive and attentional problems.*
- The environment is also important in shaping responses to stress. Animal studies show that offspring of more nurturing mothers have reduced HPA axis responses through less CRF and enhanced negative feedback.**
- Thus, individual differences in stress responsivity is determined by *nature* and *nurture*.

*Talge, N.M. et al. (2007) Antenatal maternal stress and long-term effects on child neurodevelopment: How and why?, *Journal of Child Psychology and Psychiatry*, 48: 245-261

**Champagne, F & Meaney, M.J. (2001) Like mother, like daughter: Evidence for non-genomic transmission of parental behavior and stress responsivity, *Progress in Brain Research*, 133: 287-302

Physiological responses to stress

- Emerging evidence suggests that the ***fight-flight*** response may be more relevant to males, while females may be more likely to show ***tend-befriend*** responses, where they will turn to the group for safety and to protect their young.* Data from studies show that the biological mechanism involved in this difference might be hormonal - *oxytocin*.
- In summary physiological responses to stress will differ according to:
 - *Circumstances*
 - *Individual differences*
 - The *group* involved

Taylor, S.E. et al. (2000) Behavioral responses to stress in females: tend-and-befriend, not fight or flight, *Psychological Review*, 107: 411-429

Stress and the immune system

- Stress will have various effects on the immune system, depending on the demands of the situation.
- The *sympathetic nervous system* increases immune system activity, particularly large granular lymphocyte activity such as NK-cells (natural killers cells).
- However, the HPA axis suppresses some immune activity through the production of *cortisol*, which has an *anti-inflammatory effect* and reduces both the number of white blood cells (WBC) and the release of cytokines.

Stress and the immune system

- Different type of stressful events invoke different immune responses. Short stressors lead to an acute immune response such as the one described above to provide an immediate defense against injuries and the broad risk of infection. This response is rapid and the immune system will quickly return to baseline levels.
- Stressors lasting several days lead to increase in cytokine production and thus the body is more able to co-ordinate responses against infections.*
- Chronically stressful events will have a negative impact on almost all aspects of immune functioning, with poorer immune function overall. This makes a person more likely to get ill, particularly if they are already vulnerable (e.g. older people) or have a pre-existing disease.

The role of life events

- Life events are usually measured with a checklist of different types of stressful events (e.g. divorce, bereavement, marriage, or financial problems). Advantages of this approach are:
 - Distinguishes the stressor from the stress
 - Provides an objective measure of stress response.
- Disadvantages:
 - Fails to account for individual differences in events that are perceived as stressful - for example a muscle injury will potentially be much more stressful for a professional athlete than for an office worker.
 - Measurement of stress by checklists is likely to be affected by recall biases - people who are ill are much more likely to search for a cause of their illness and attribute it to stress in comparison to those that are healthy.

The role of life events

	Never	Almost never	Sometimes	Fairly often	Very often
1. In the last month, how often have you been upset because of something that happened unexpectedly?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. In the last month, how often have you felt that you were unable to control the important things in your life?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. In the last month, how often have you felt nervous and "stressed"?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. In the last month, how often have you felt confident about your ability to handle your personal problems?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. In the last month, how often have you felt that things were going your way?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. In the last month, how often have you found that you could not cope with all the things that you had to do?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. In the last month, how often have you been able to control irritations in your life?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. In the last month, how often have you felt that you were on top of things?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. In the last month how often have you been angered because of things that were outside of your control?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Scoring:	Never	Almos t never	Some- times	Fairly often	Very often
Questions 1, 2, 3, 6, 9, & 10	0	1	2	3	4
Questions 4, 5, 7, & 8	4	3	2	1	0

- Alternative measures of stress such as PERCEIVED STRESS SCALE* focus on *appraisal* and *stress responses*. This approach detects significant life events more accurately but mixes together *stressors*, *stress responses*, and *coping responses*
- There is plenty of evidence to show that more life events are associated with various illnesses and even death**

*Cohen, S. et al. (1983) A global measure of perceived stress. *Journal of Health and Social Behavior*, 24: 385-396

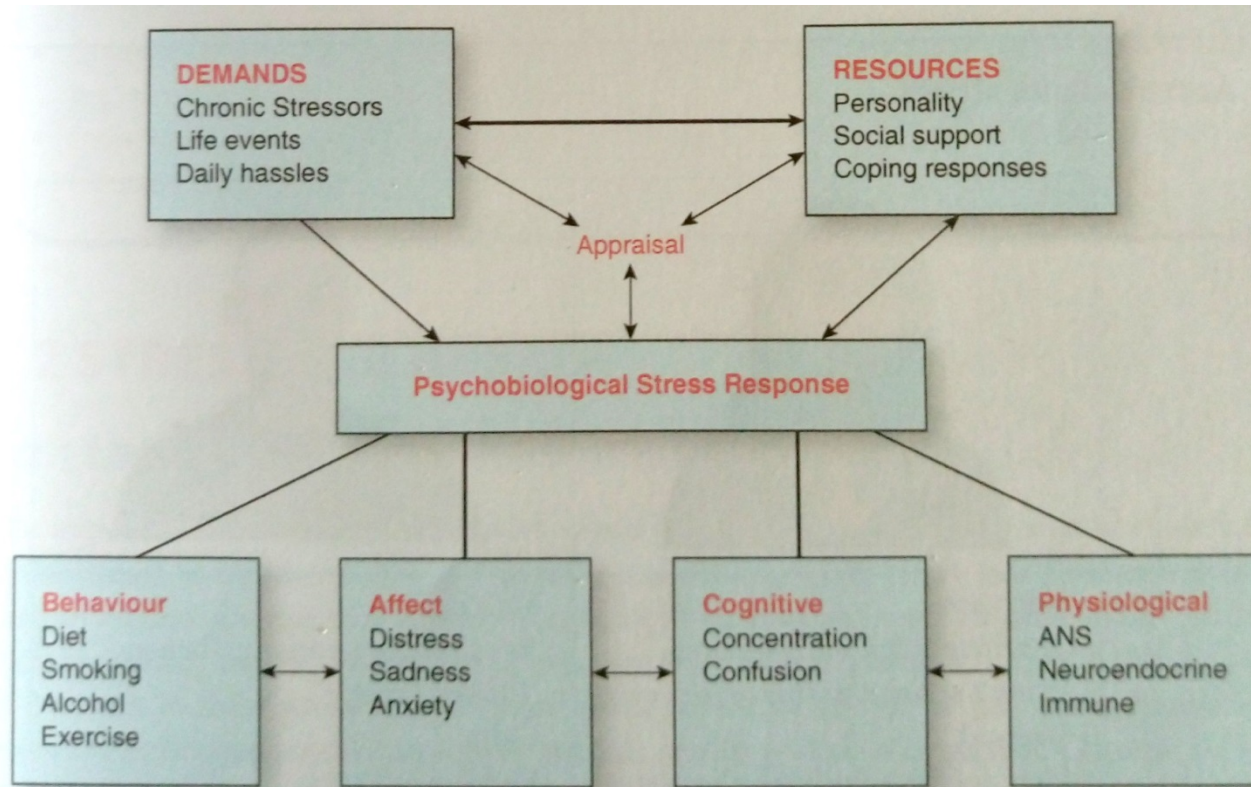
**Subramanian, S.W. et al. (2008) Widowhood and mortality among the elderly: the modifying role of neighborhood concentration of widowed individuals. *Social Science and Medicine*, 66: 873-884

Stress as a person-environment interaction

- ***Interactional explanations*** of stress posit that the response to stress depends on the interaction between a person and his/her environment - stress occurs when a person appraises the demands of a situation as being greater than their ability to cope with them.*
- ***Appraisal processes*** are central and explain the great variation in how people respond to stressful circumstances. Those who appraise an event as *challenging* will have smaller cortisol responses than those who appraise it as *stressful*.
- Three processes of appraisal are outlined:
 - **Primary appraisal:** the demands of the situation are evaluated as benign, challenging, or stressful/threatening.
 - **Secondary appraisal:** a person evaluates their resources and the ability to cope.
 - **Reappraisal:** a person reconsiders the situation once they have tried to cope with it. It may be seen as less or more stressful than originally thought, depending on the effect of their coping responses.

*Lazarus, R.S & Folkman, S (1984) *Stress, Appraisal and Coping*. New York: Springer

Stress as a person-environment interaction



- Appraisal processes are central and explain the variation in people's responses to stress.
- Stress can be conceptualized as a dynamic process with constant interplay between appraisal, coping and reappraisal.

Stress and health

- The impact of stress on physical health varies between illnesses. Evidence show that stress increases the morbidity of:
 - Episodes of infectious illnesses (like colds)
 - Cardiovascular disease
 - Wound healing (slower it)
- Additionally, stress worsens auto-immune conditions such as:
 - Asthma
 - Rheumatoid arthritis
 - Inflammatory bowel disease
 - HIV/AIDS
- It is well known that chronic or severe stress can lead to a number of mental health problems including:
 - Anxiety
 - Depression
 - Stress burnout
 - Post-traumatic brain disorder (PTSD)

Stress and health

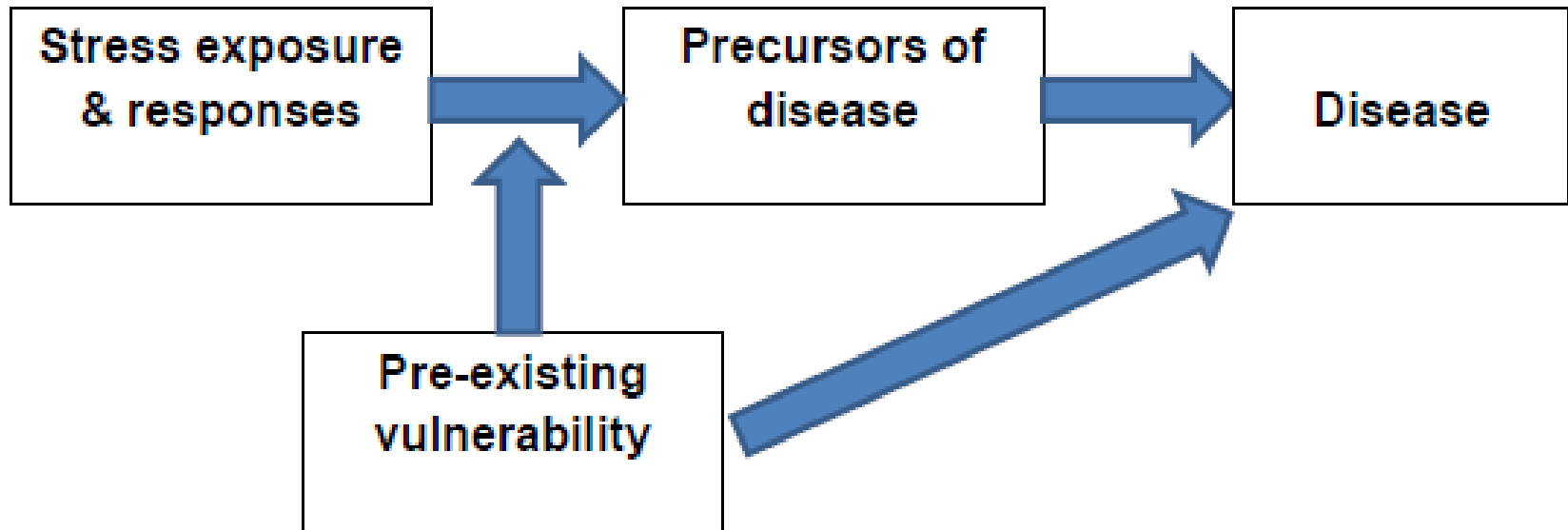
- It is difficult to establish the definitive pathways between stress and health.
- The first issue here is *why is that if we put two people in the same circumstances, one person becomes stressed and the other not? Or that one person develops heart disease and another remains healthy?*
- It is believed that differences between individuals are explained by differences in appraisal, but the effects of stress are also moderated by other factors, such as *situational characteristics, coping responses, and social support.*

Stress and health

- The second issue is that it is usually not possible to say whether an illness is:
 - Entirely due to stress
 - Entirely due to other factors
- Illnesses usually have multiple causes, ranging from the genetic and biological to the environmental. The role of stress will vary widely in different illnesses depending as well on the particular individual, circumstances etc.
- A third issue is that the effect of stress on health can be due to behavioral, emotional, or physiological responses. For example people who are stressed besides having physiological symptoms are also more likely to smoke, drink alcohol, and have a poorer diet.*

Wardle, J et al. (2000), Stress, dietary restraint and food intake, *Journal of Psychosomatic Research*, 48: 195-202

Stress and health



According to **vulnerability-stress model** stress will contribute to the development of disease through an interaction with person's physical vulnerability, psychosocial vulnerability, environment, coping responses, etc.

Factors that modify the effects of stress

- Moderators of the effect of stress on health include:
 - Personality
 - Coping methods used by the particular individual
 - Available social support
 - Practicing of physical exercise
- **Personality** – the dimensions of personality that have most effect on the response to stress are those involving negative emotions such as neuroticism.
- Neuroticism is a personality trait involving high symptoms of *anxiety, depression, hostility, and emotional instability*.

Factors that modify the effects of stress

- People high in neuroticism will generally report more pain and symptoms. There is also a consistent association between neuroticism and a range of health problems*:
 - Arthritis and musculoskeletal pain
 - Diabetes
 - Asthma
 - Coronary artery disease and other CVDs
 - Headaches (including migraine)
 - Kidney or liver disease
 - Ulcers
 - Chronic fatigue
 - Gastrointestinal diseases (colitis, irritable bowel syndrome, gastroesophageal reflux disease)

*Friedman, H.S. & Booth-Kewley, S. (1987) The “disease-prone” personality: A meta-analytic view of the construct, *American Psychologist*, 43: 539-555

*Goodwin, R.D. et al. (2006) Neuroticism and physical disorders among adults in the community: Results from the national comorbidity survey, *Journal of Behavioral Medicine*, 29: 229-238

*Turk Charles, S. et al. (2008) Physical health 25 years later: The predictive ability of neuroticism, *Health Psychology*, 27: 369-378

Factors that modify the effects of stress

- **Coping** – defined as any attempt to cope with a stressor irrespective of whether it is successful or not, it partially determines our physiological and emotional responses to stress.
- The various coping strategies may be best conceptualized as falling into two big categories:
 - Emotion-focused strategies: they concentrate on reducing distress (e.g. not thinking about it; eliciting emotional support).
 - Problem-focused strategies: concentrate on dealing with the problem (e.g. information seeking; problem solving).

Factors that modify the effects of stress

- A useful approach for medical practice is between:
 - **Approach coping strategies:** try to deal with situations pro-actively (shares some overlap with problem-focused strategies)
 - **Avoidant coping strategies:** try to avoid the problem (e.g. *denial*; not wanting to talk about it – *repression*)
- A person who is predominantly and **avoidant coper** may find it very difficult to discuss their illness, the side effects of treatment, or any potential complications.
- On the contrary, an **approach coper** will want to know everything about his/her disease and treatment (may come to consultations with extensive information gathered from internet or elsewhere).

Factors that modify the effects of stress

- Coping strategies associated with reduced mortality in healthy people and better outcomes in people with chronic illness are those which:
 - *Enable person to feel more in control*
 - *Increase positive affective states* (e.g. emotional well-being, positive mood, joy and happiness)
 - *Increase positive personality dispositions* (hopefulness, optimism and humor)
 - *Decrease negative mood*
- It is simplification to say that one coping style is better than other. Avoidant coping strategies are very good for reducing anxiety and distress in the short term. Before an operation this can be helpful because it keeps anxiety levels down and once the operation is over the stress of this is gone. For someone with a chronic illness however, avoidance can lead to a lack of adherence to treatment regimens and thus increase illness problems.

Factors that modify the effects of stress – social support

- **Social relationships** are vital to our quality of life and health. Negative relationships involving abuse or conflict are among most potent stressors. Traumatic events that involve personal harm from others (e.g. rape, assault, torture) are more likely to cause post-traumatic stress disorder (PTSD) than a natural disaster for example.
- **Social relationships** also shape the way we respond to stress. *Attachment theory* proposes that babies are born with an instinct to turn to their parents or caregivers when they are stressed or feel in danger. Children with disturbed attachment (e.g. abandoned or abused) are more likely to develop insecure and chaotic responses to stress.
- Parents constantly continue to shape children's responses to stress. Parents and children exposed to the same stressor show very similar responses. Increasing evidence shows that anxious parents raise anxious children through having controlling parenting styles. Conversely, children who feel supported by their parents cope better with stressful events by using more active coping and positive reappraisal.

Factors that modify the effects of stress – social support

- For adults, **social support** can dramatically reduce the impact of stress. People who have a lot of social support are less likely to get stressed, and if this happens, they are more likely to cope with it successfully.
- **Social support** also has a direct effect on health. Many studies have reported a relationship between:
 - Social support and disease progression (negative correlation)
 - Social support and recovery from illness (positive correlation)
 - Social support and mortality (negative correlation).
- **Social support** is therefore a critical factor in both stress and health.

Factors that modify the effects of stress – physical activity

- Physically active people are at lower risk of obesity, CVD, breast cancer, and diabetes and live longer.
- Besides, physically active people are less likely to smoke, more likely to have a healthy diet and more likely to have social support.
- Using exercise as a method of coping with stress has positive effect on health. Evidence shows that exercise reduce anxiety, depression, and is associated with increased self-esteem and self-confidence.
- Exercise intervention programs have been used in a wide range of conditions including *CVDs, depression, learning disabilities, dementia, arthritis, back pain, Parkinson's disease, cancer, and schizophrenia.*

Stress in medicine

- Medicine is an inherently stressful profession: it involves dealing with health crises and making life and death decisions. As already mentioned, stress is associated with a range of negative psychological states including anxiety, depression, PTSD and burnout.
- **Stress burnout** is experienced by approximately 20% of adults and has three main symptoms:
 - *Emotional exhaustion*: feelings of physical exhaustion, being depleted, worn out.
 - *Depersonalization*: having an unfeeling, impersonal approach to co-workers or patients, cynicism, and a lack of engagement with the job or people.
 - *Reduced personal accomplishment*: poor sense of effectiveness, involvement, commitment and engagement and a poor belief in one's ability to change or improve work patterns or environments.
- **Burnout** leads to high job dissatisfaction, absenteeism, and staff turnover. Symptoms of exhaustion are associated with other physical symptoms (headaches, gastrointestinal disorders, hypertension, colds or flu, sleep disturbances etc.)

Stress in medicine

- The workplace is critical to whether people develop burnout and this is particularly relevant for healthcare professionals. Nearly 30 % of hospital consultants in the UK report burnout and psychological problems (feeling overloaded, poorly managed, poorly resourced, and having problems outside work). Burnout is more common in consultants who feel poorly trained in their communication and management skills.
- Areas such as intensive or palliative care (e.g. oncology) tend to have higher rates of burnout.
- Medical students also face many stressors: constant evaluation by exams, staff and patients; dealing with death, suffering, and difficult ethical issues etc.
- Students who are likely to report more stress and burnout are those who are:
 - Disorganized/havr poor time managemen
 - feel overwhelmed
 - who are unsure of the demands of different tasks So are students who are self-critical,
 - Neurotic and perfectionists.
- Learning positive ways to manage stress is therefore extremely important for healthcare professionals.

Managing stress

- There are six main approaches to stress management:
 - Relaxation
 - Physical fitness
 - Cognitive restructuring
 - Meditation
 - Assertiveness training
 - Stress inoculation
- *Stress inoculation* interventions are based on exposing people to potentially stressful situations so they become inoculated against them (e.g. - paramedic training with rehearsals/"mock ups" of major traffic accidents).

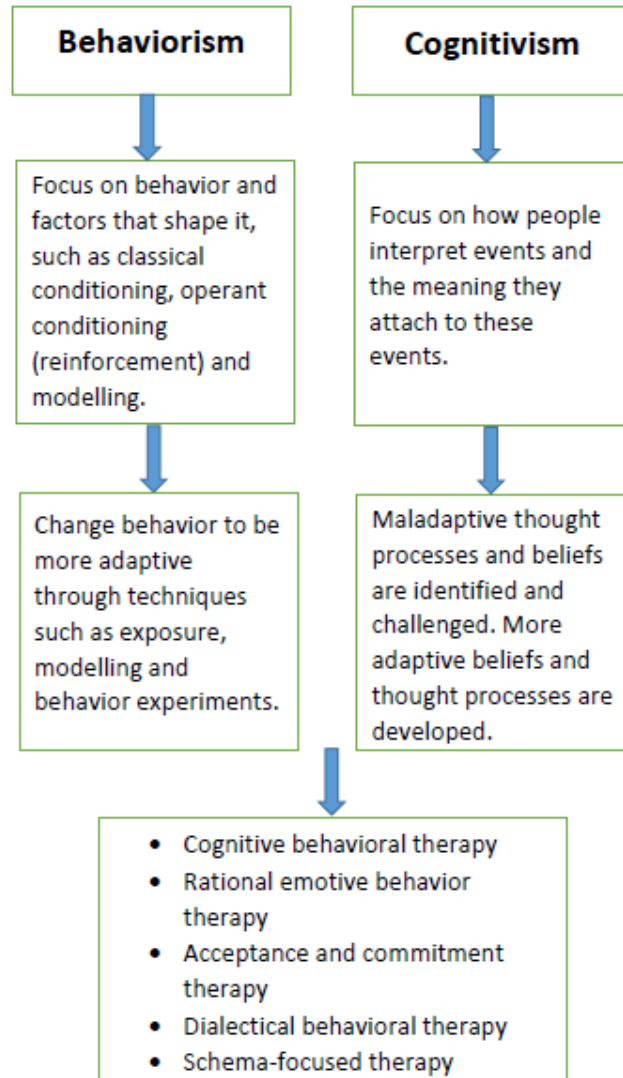
Managing stress

- *Cognitive-behavioral techniques*, such as *cognitive restructuring*, have the largest and most enduring effect on reducing stress, better communication skills with patients and greater satisfaction of the latter with the medical service provided to them.
- *Cognitive-behavioral stress management* programs focus on appraisals and coping responses to help people manage their stress better. These can be very useful to assist people coping with illness.
- However, evidence suggests that the results of cognitive stress management in patients with CVD, cancer and chronic headache are mixed (reduction of depression and improvement of self-esteem, but mixed effect on morbidity and mortality).

Managing stress

- Cognitive behavioral therapy (CBT) is founded on *behaviorism* and *cognitivism*. Behaviorism (the first wave in CBT) focuses on people behavior and how it is learned and shaped by events. *Behaviorism* describes the processes through which people behavior is shaped, including *classical conditioning*, *operant conditioning* (shaping behavior by rewards or punishments) and *modelling*.
- Behavioral therapy involves *changing maladaptive behavioral responses* and substituting these with new responses.
- *Cognitivism* (the second and currently dominant wave of CBT) views *thought as being central to how we feel and behave*. According to *cognitivism appraisal and personal meaning of events* are central in the development and maintenance of psychopathology, including the stress related one.

Managing stress



THANKS😊