Bachelor's Thesis

Stress and its impact on health

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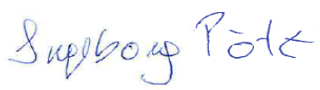

Graz, September 2012

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1. Introduction

The primary aim of this bachelor's thesis is to give the reader a better general understanding of this topic. In the following pages, firstly, I will examine and research the term stress, I will give a general overview and I will point out its historical perspective, as well as physical and psychological aspects. Secondly, I will look at stress regarding human health, there I will address how stress influences humans and I will mention different types of stress. In this part, I also want to examine if there is a coherence between stress and medically unexplained syndromes and with addiction. Another component will be stress as a positive factor.

The secondary aim was to investigate stress and gender. One of the things I want to do in this part is to examine gender differences. From this, a research question can be formed: if there are stress differences between men and women, do they react differently and is this stress related to their health?

Stress is gaining significant importance in post-modern society, primarily due to rising labour markets, people's increasing expectations from life and from modern society's response to growing social, economic and environmental conflicts. It is a commonly used term today, a complex phenomenon and is becoming more and more important in today's world. Furthermore, modern society leads to particular kinds of stress styles, which people suffer from and which causes damage and death. Because of this damage, it is important that people gain a better understanding of stress.

2. The historical perspective

In 1900, a huge increase in mental disorder was discussed and one of the causes or triggering factors was stress. Similarities between the situation in the 19th Century and today is an increase in mental health issues. Both eras describe their times as being characterised by major changes, for example increased information flows and heavy demands on the urban individual, which all happen in a rotating market economy. In both times, new diagnoses appeared that legitimised and identified the symptoms of stress and the internal discomfort in a culture strongly marked by achievement, competition and a high tempo. In this case, the unifying component seems to be the perception of an accelerated rate of change and an ever-growing flow of innovations which is in danger of

creating feelings of inadequacy – people not being able to keep up mentally, emotionally or physically.

The expectation that the individual is limitlessly adaptable, flexible and progress orientated, is modernity's identity. A concrete way to relate the perception of mental stress in the 19th Century is comparing two culturally and medically legitimised diagnoses that are considered to reflect abnormal fatigue.

The Western world underwent a dramatic social change during the last half of the 19th Century. New patterns of human contact were created by industrialisation, an expanding capital market and massive urbanisation. An altered living environment was represented by new technologies. New kinds of transportation, like street cars, trains and, later, the automobile, represented a new relationship between time and space and the individual. An uncontrolled stream of sensory stimulation was created by timetables, loudspeaker announcements, crowding and warning bells and by the disorder of the cities.

Various scientific theories on modern society's effects on the vulnerable individual were developed, which included a theory of social thermodynamics maintaining that the energy of an individual is limited, the theory of evolution and many civilisation theories that saw alienation and fragmentation as the inevitable price of progress.

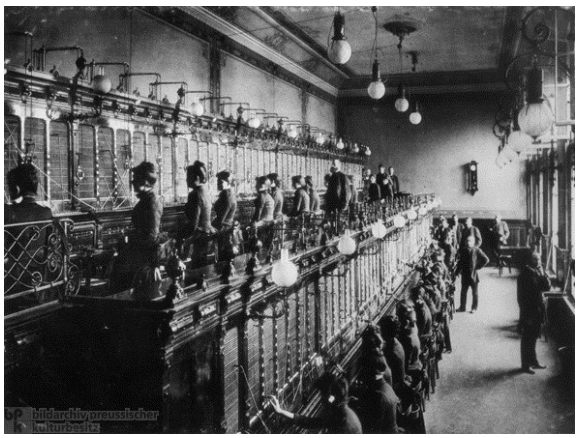

Figure 1: Industrialisation: workers using new technologies

Prominent sociologists, such as Émile Durkheim, Max Weber and Georg Simmel, pointed out the inner conflicts that emerged when old ways of life were replaced by new ones and the individual was denied his value basis, habitual security and felt lost in a changing world. A lot of people spoke of growing fatigue. The circumstances were described as

being serious. Doctors' consulting rooms were crowded by overworked and tortured patients. Their case histories could possibly, with few changes, be copied into a present-day scenario. For example, an increasing number of merchants over the last few years have reported anxiety, a strong feeling of pressure in their head and insomnia. Or young businessman who have been incapable of carrying out any intellectual work for months and suffer from agoraphobia and insomnia. The problem points to overload resulting from overwork and too little rest.

Life in the modern city places a huge amount of pressure on the individual. Art, industry, finance and science are dominated by competition and the struggle to be recognized. Everybody works to be successful and wants to get ahead but feels predominantly fatigue and dissatisfaction. To distract themselves, people increase entertainment and busy travel.

The result of this particular combination of overstrain is illness. Overstrain is primarily intellectual and mental, but it can also be initiated by long-term worry, disappointments and personal unhappiness. The body is drained by mental work. Overstrain is directly connected to a lifestyle which is characterised by the overuse of people's mental energy. This overstrain theory was central around the turn of the 19th Century. Fatigue plays an important role. A huge literary discussion of the relationship between fatigue, society and ill-health has been discussed (Arnetz, Ekman 2006, p. 3-6).

2.1. Stress: between nervous fatigue and chronic fatigue

After the First World War, the fatigue problem was transformed from an issue of high political and scientific concern into a technical one. During the 1940s and 1950s interest was focused on increased aeroplane traffic, beginnings of space research and military needs. Mental fatigue was related to exterior pressure and it was as an umbrella diagnosis at the time. A distinction was generally made between fatigue and constitutional neurasthenia. Feminine neurasthenia was defined in its own category. Nevertheless, the fatigue problem had no status in public discourse. In a society which is characterized by rationalisation, efficiency and auspiciously pounding machines within the framework of a collective welfare utopia, a concept that seems to be more suitable is that of stress. The word stress existed as early as the turn of the 19th century with the same meaning as it has today but without defining any physiological components (Arnetz, Ekman 2006, p. 11-12).

2.2. Modern Society in 2000

Approximately at the turn of the century in 2000, burn-out rose from relative anonymity to reach epidemic levels, and was viewed as a threat to the whole labour market. Old structures marked by security, stability and inertia seemed to be replaced by neurotic cults of change, short project jobs and extreme corporate cultures. Individuals were put under pressure to perform. As well as involvement, employers demanded competence and independence from their employees, including flexibility and accessibility. New knowledge was necessary because of new technologies.

All in all, fatigue related to stress was intensely discussed around the years 1900 and 2000. In 1900 it was called neurasthenia, and in recent times It has been given different diagnostic names as a symptom, such as chronic fatigue syndrome and burn-out. This differentiation is not just a medical one, but is also a matter of political and human responsibility (Arnetz, Ekman 2006, p.15-19).

3. What is stress

Hans Selye introduced a definition of stress based on changes in biological systems. He recognised stress by its physiological effects on mammals, and defined it to be "*a state manifested by a specific syndrome which consists of all the non-specifically induced changes within a biological system".* (Hoffmann, Parsons 1991, p.1)

Forces that are responsible for these changes are stressors. These stressors will be explained later on. Depending upon the severity and length of the stress, an animal passes through three phases:

- *"Alarm when the organism is not capable of resisting the stress*
- *Resistance when the body returns to normal functioning;*
- *Exhaustion when the resistance is lost."* (Hoffmann, Parsons 1991, p. 1).

The sum of the non-specific reactions of the body resulting from long exposure to chronic stress are represented by these three phases (Hoffmann, Parsons 1991, p. 1).
Learning processes play a very important role in the definition of stress. Mr. A can perceive a situation as threatening when forced to make too many decisions. Mr. B,

however, can suffer from stress because he may not have the opportunity to make many choices (Birkenbihl 1987, p. 12).

Kenny Carlson, McGuigan and Sheppard (2000) claim that *"Stress is an inescapable but also necessary part of life."* Life has organised itself so that it can prosper and adapt in our environment and to maintain its identity in the face of internal as well as external demands. By doing this, humans and also other complex organisms sense and respond to environmental pressures and opportunities with synchronised physiological and behavioural activities. Moreover we remain healthy to the extent that we can preserve this organisation. Oscillations in physiology and behaviour play an important role in this balance between adaptability and stability (Kenny, Carlson, McGuigan, Sheppard 2000, p. 27).

There are basically two types of stress:

1. negative, life-destroying and harmful stress, distress, and
2. revitalising, positive and life-necessary stress, which is eustress (derived from the Greek "eu"= well).

The first one brings suffering; the last one brings joy into our lives. Distress brings disease, depression and all kinds of neuroses and eustress brings health, satisfaction, happiness and ecstasy (Birkenbihl 1987, p. 12). With eustress, the "pleasure areas" in the limbic system are stimulated. The brain produces or registers comfortable and positive feelings of mild satisfaction, intense pleasure or even feelings of ecstasy. Although eustress moments cost energy, they are life affirming. Therefore, an anti-stress program should not be oriented solely to restricting distress, it should deliberately and consciously strive to provide moments of eustress. There are four ways to achieve this goal:

- To perform eustress activities, for example, tasks you like in your work or hobbies.
- Look for eustress in family life, for example, going for a walk together or playing a board game together.
- Derive eustress from achievements
- Experience eustress through tenderness and eroticism (Birkenbihl 1987, p. 104).

The term stress has been applied to various environmental and internal physiologic events, as well as to an individual's reactions to an event. These different constructs must be carefully defined and distinguished.

Fluctuating hormonal patterns lead to different emotional reactions, and these are further affected by underlying personality characteristics. The various reactions have different effects on the functioning of the highly complex immune system, and these have various implications for subsequent health outcomes.

Measuring stress and stress reactions is complex and not well standardised. Moreover, clinical judgements of distress do not always match self-reports. For instance, it was found that subjects who deny distress but are clinically judged to be distressed, have divergent cardiovascular reaction patterns. It has been suggested from Glaser and Kiecolt-Glaser that people with "illusory mental health" are chronically stressed. These chronically stressed people could have altered immunity as a result of the stress (Glaser, Kiecolt-Glaser 1994, p. 224).

3.1. Stressors

Stressors are stressful events. Many factors may be important in characterising stressors and it has been suggested that physical stressors may perhaps directly alter physiologic systems. Other stressors might operate primarily through the central nervous system mechanism, involving emotional and cognitive processes (Glaser, Kiecolt-Glaser 1994, p. 225).

Glaser and Kiecolt-Glaser (1994, p. 225) mention two important dimensions for understanding consequences of stressors:

1. the acute-chronic and
2. the non-social dimension.

Chronic and acute stressors have diverse effects on the immune system and social stressors have more complex and possibly more powerful effects on the immune system than the non-social stressors.

Reactions to stress (which are sometimes referred to as distress) are supposed to be psychological correlates, linked to the impact of stressors on immune and endocrine, and function and health outcomes. Typical reactions are depression, anxiety, anger, fear and composite reactions such as feeling stressed. These reactions can differ along a severity continuum. Reactions to stressors can change in a complex style among individuals. Because adequate assessments of distress are often limited by theoretical considerations, studies are often designed using a definable stressor and are expected to have a relatively homogenous reaction: for example, the death of a spouse from cancer. Motivation, coping style, hardiness, self-esteem, focus of control, pessimism and optimism are likely to affect both the extent to which people attend to stressors and the manner in which people react to those stressors. These effects may be further modified by factors like the quality and amount of social support.

The association between distress and stressor is important. Acute stressful events may precipitate long-term distress reactions. Immune effects, for instance those following the death of a spouse, may persist for months and are possibly but not necessarily related to sustained distress responses. Furthermore, the acute stressor may have been preceded by distress reactions, probably as part of a series of stressors, such as with emotional reactions during the terminal illness of a spouse. Additionally, one stressor may cause multiple distress effects, like anger, fear or depression, each of which may influence the immune system additively, interactively or independently (Glaser, Kiecolt-Glaser 1994, p. 225-226).

3.2. The brain

For better understanding of the processes in the brain, I will briefly explain the anatomy of the brain and its functions.

The human brain stem existed about 450 million years ago, and it includes, among other things, the fight or flight mechanism. The cortex developed about 1.5 million years ago: in the shape of today's human brain, this is where cognitive processes happen. The cortex consists of the cerebral cortex, with its two hemispheres and the rhinencephalon (Birkenbihl 1987, p. 142.143).

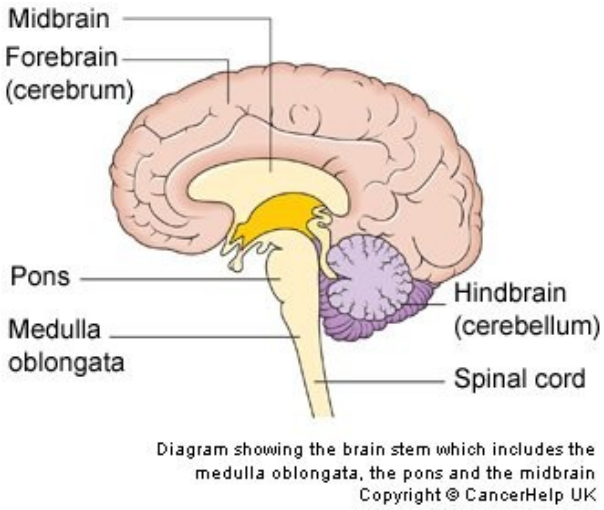

Figure 2: The brain stem

3.2.1. The fight or flight response = stress response

The perception of the stress stimulus activates certain brain pathways of the autonomic nervous system, especially the sympathetic nervous system and the hypophysis. The sympathetic nervous system shoots impulses into the adrenal medulla, which then secretes adrenaline and noradrenalin into the bloodstream. The hypophysis produces a hormone itself, which goes through the bloodstream at a later stage, travelling to the adrenal glands and leads to a release of corticoid hormones in the cortex. In a short time, these hormones are all over the body, where the different effects are generated.

The heartbeat is accelerated, the pulse is amplified, the muscles are better supplied with blood, fat and sugar reserves are mobilised, the rate of muscle reaction is increased, and blood clotting increases. At the same time, all processes that are not needed for the perceived danger are dampened (Birkenbihl 1987, p. 144).

3.3. Physiological response to stress

3.3.1. The transactional model of stress

The transactional model, which is described by Lazarus and Folkman, is a modern definition of stress. *"(…) potentially stressful events are appraised as either stressful or benign in the context of an individual's own values, beliefs, experiences, and coping resources"* (Kenny, Carlson, McGuigan, Sheppard 2000, p. 53).

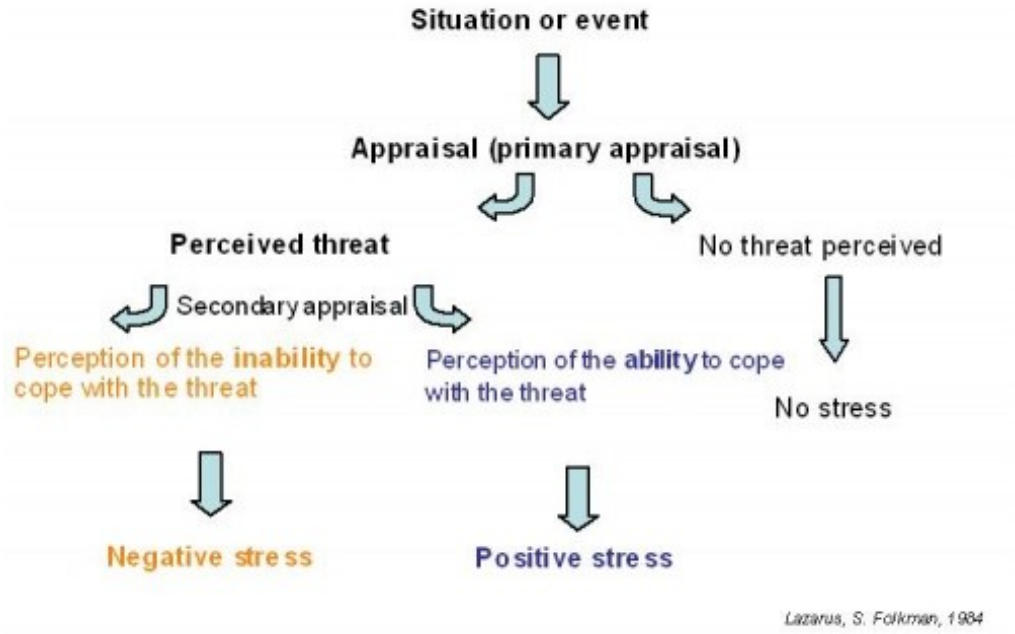

Figure 3: The Transactional Model of Stress

With this general model in mind, this section describes fundamental concepts and some recent developments in the biology and physiology of stress. It is an immense topic, so I will focus on the autonomic nervous system, the endocrine system and the immune system. Firstly, it is good to understand the stress response as one that has evolved in humans in a highly social context. The human perception of rejection or acceptance in our social interactions determines a good deal of what we mean by stress in an everyday context (Kenny, Carlson, McGuigan, Sheppard 2000, p. 53).

3.3.2. The Autonomic Nervous System

Our nervous system is divided in the central nervous system (CNS), which consists of the somatic/sensory system, and the autonomic nervous system (ANS). This autonomic nervous system has two branches, the sympathetic and the parasympathetic. It functions in the visceral and other organ systems in the body. In a lot of systems it acts as the sole regulatory pathway, though in others it shares regulatory functions with other systems. Moreover, it is activated mainly by centres in the spinal cord, the brain stem and the hypothalamus. These centres are important, but the cerebral cortex can also exert an influence. There is a relationship between late developing brain centres, like the orbitofrontal cortex, and the down regulation of the ANS (Kenny, Carlson, McGuigan, Sheppard 2000, p. 54).

The Sympathetic Branch

The sympathetic system has long been considered the “stress nervous system” because it seems to mobilise resources in the body for emergency situations like “fight or flight”, as I described above. Despite the fact that this description is generally correct, it has been shown to be too simplistic in various ways.

The name itself hints at the fact that the system works like an orchestra, with all the parts in “sympathy” with each other, creating, as a result, a unified mass action response to physiological trauma, perceived threats or other types of deregulation. This thought is based partly on the anatomy of the system.

The sympathetic nerves originate between the spinal column T1 and L2 and travel to paravertebral sympathetic chains. From there, they go to target organs: to the bronchi, heart, gut, adrenal medulla, kidneys and other sites. This system is unique in that there is a characteristic preganglionic fiber to the chain and a postganglionic fiber to the target organ (Kenny, Carlson, McGuigan, Sheppard 2000, p. 54-55).

The Parasympathetic System (PNS)

The PNS is characterised as facilitation, restoration and maintenance of the organism. It is balanced by the mammalian vagus that regulates more social functions, for instance facial muscle flexibility, swallowing, vocal functions and it also controls the respiratory modulation of the heart. The PNS is often ignored in stress studies but may be of great relevance in facial EMG studies and also in understanding how social hierarchies can be stimuli for a stress response. A lot of observers have described the respiratory sinus arrhythmia system as withdrawing during stress.

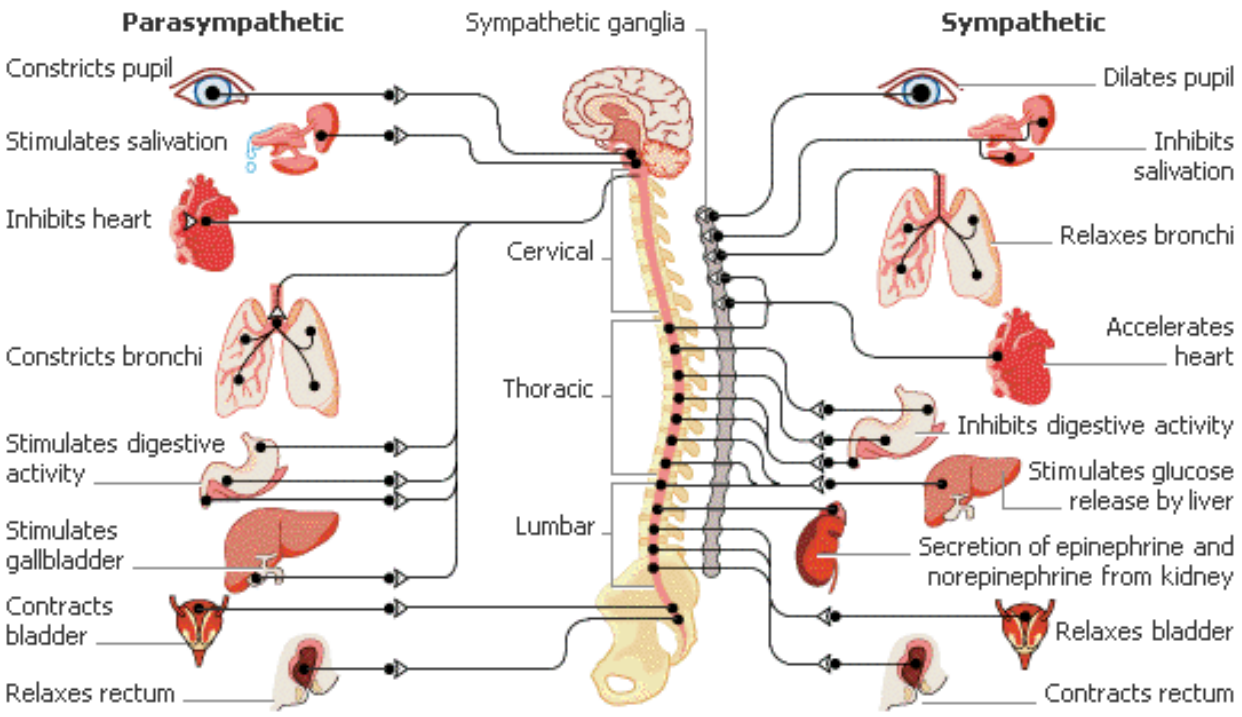

Figure 4: Sympathetic and Parasympathetic. Divisions of the Nervous System

All in all, the SNS and the PNS preserve an adequate frequency rate to keep the target organ at a mid range value. Inhibition and Excitation can be used for regulation. Beyond this, these two systems interact in numerous organ systems to further complicate the figure. It is emphasized that the ANS is a complex system. During stress, the two branches can be thought to be in conflict with the vegetative vagus, which is trying to shut down the cardiovascular system, while the smart vagus withdraws vagal tone as an adaptation to novelty in the environment, while dealing with the need to sustain metabolic output and continuous social communication.

This model can be used to obtain more knowledge of the relationships among the branches and among particular classes of stressors and their distinct physiological pattern (Kenny, Carlson, McGuigan, Sheppard 2000, p. 59-61).

4. Evolutionary aspects of stress and genetic variation in stress response

Human health depends not only on the physicochemical environment but also on the psychosocial one. There are differences between nature and in the routes by which humans can impose threats to health. This is schematically illustrated in the figure below.

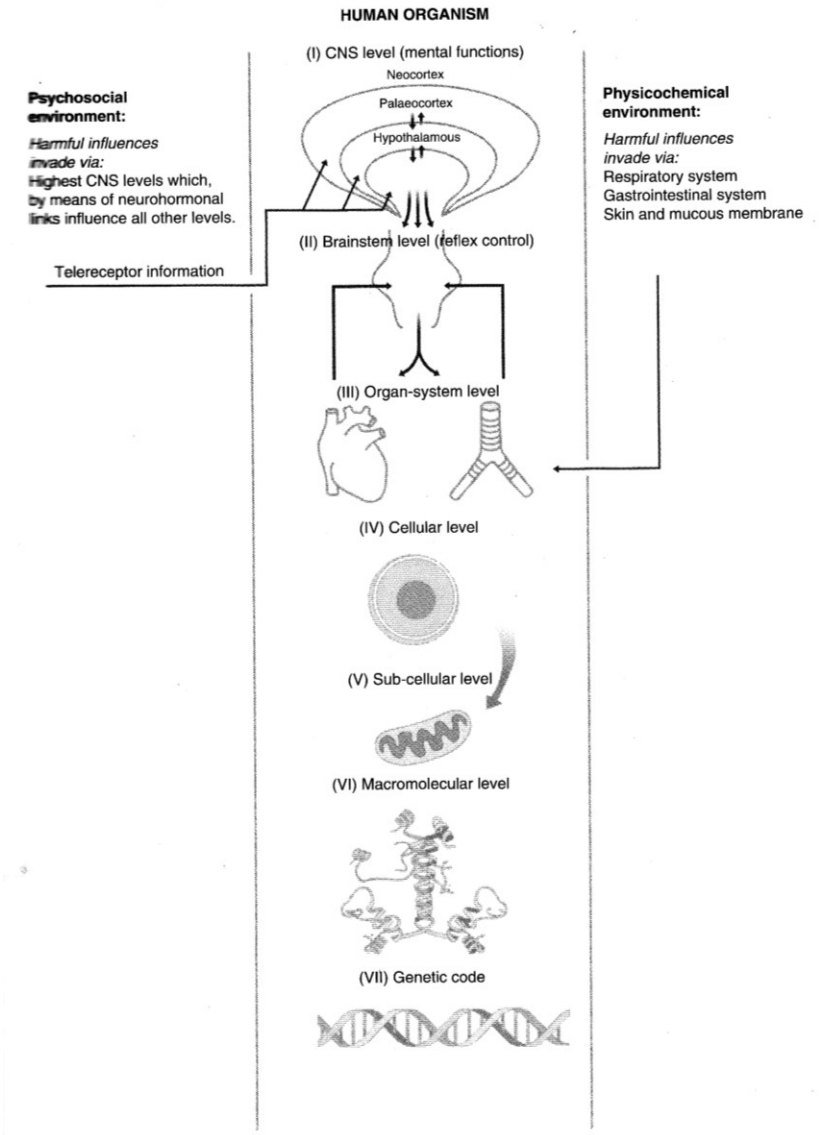

Figure 5: Human Organism

There are different “levels of control” that are common to all mammals but it’s also important at which of these levels these two types of environmental challenges initiate their effects. In this way, humans and other mammals are extremely alike, this includes the mechanisms used in coping with the fight or flight response.

“(…) noxious physiochemical-microbiological factors invade the organism by means of airways, gastrointestinal tract and/or skin, i.e., at the organ-system level (…). From there, they can reach all organ systems via the circulatory and lymphatic systems, or sometimes via nerve tracts, and harm their cellular-biochemical processes. For millennia, these types of health threats and disorders have been the major target for medical interventions, from the era of “witch doctors” to present day organ system specialists. One reason is the often

obvious links between cause and disorder, and particularly so as the time-lag between cause and effect usually is fairly short." (Arnetz, Ekman 2006, p. 20)

Knowledge has greatly increased concerning the functional organisations of the cerebral or actual triads of neuro-hormonal responses. They represent the importance of the mechanisms used by higher organisms to cope with the negative and positive challenges met with in a primitive existence. Once an emotion is induced, the corresponding autonomic-nervous and hormonal parts of the triads cannot be repressed and will therefore be fully stimulated.

From many studies performed in humans and animal species dealing with how higher organisms react to psychosocial challenges, various conclusions may be drawn. The regions of the brain which are responsible for reactions like these, for example – the limbic system and the hypothalamus, depend on the fine details similarly organised in all mammals, so human and mouse are equal in these respects. These regions of the brain contain a lot of neuron groups, from which a number of response patterns can be generated, helping to protect themselves and their species in a primitive existence. They are all organised to cope well with environmental stimuli of any type.

The triads of response were designed to cope with almost any type of challenge some hundred million years ago and are of great interest. Two of them are relevant in this context, the defeat reaction (DfR) and the defence reaction (DeR). DfR and DeR are most appropriate in primitive life's acute situations, for example, when flight, attack or withdrawal is the solution. In humans, the link of the DeR-DfR is suppressed for social reasons (Arnetz, Ekman 2006, p. 42-43).

5. Role of stress in human health

There are many well-known factors which have a negative effect on human health. A lot of people would be of the opinion that being a smoker or substantially overweight are key risk factors for the development of cardiovascular disease. They would also agree that it is possible to improve your future health by giving up smoking and losing weight. People also know that too much stress may facilitate the development of cardiovascular diseases and that it is important to identify and remove avoidable stressors in order to decrease the risk of developing such disorders.

Knowledge about positive and active health-promoting mechanisms is more tenuous. However, it has become clear that social support and good relationships are related to the prevention of numerous types of diseases, in particular cardiovascular diseases. Especially in men, close positive relations do have a true health-promoting effect. Also, positive relations, for example, having a cat or a dog, have been shown to be good for health, in particular for people's blood pressure and cardiovascular disease (Arnetz, Ekman 2006, p. 240).

5.1. How does support and closeness improve health?

It is well known that separation is related to stress and an increased risk for developing certain types of illness and disease. Separations not only lead to reduced well-being and sadness, they may also be followed by depression, anxiety and by an activation of the physiological stress systems. Warmth and touch are necessary ingredients in close and positive relationships of all types. If the brain interprets the surrounding world as good and supportive or if the organism is exposed to repeated sensory stimulation in positive and close relationships, the brain will be exposed to endogenous oxytocin. It is feasible that as a consequence of this exposure to oxytocin, secondary biochemical effects are induced, for example an increased amount of alpha 2-adrenoreceptors. Changes like these would make the organism less sensitive to stress and lead to stimulation of growth and restorative processes.

The decreased amount of interaction and closeness within families is a result of changes in lifestyle. The television, the computer and the microwave oven facilitate individual activities. Workload in the workplace and in people's homes steals time away from social interaction with other family members. In fact, two major changes have taken place in parallel in our society: the amount of stress has increased and at the same time, the natural input to the antistress systems has declined.

This strong link between disease and illness on one hand and stress on the other hand has increased the demand for and development of therapies that reduce stress but also stimulate the antistress systems in the organism.
An expression of this need is the increased use of touch therapies. Investigations demonstrate that various types of massage, in particular those that focus on the effects of touch, not only release oxytocin but also exert positive effects on soul and body which are

in accord with the antistress pattern. This information may explain why a limited intervention consisting of ten minutes of touch given when the children were resting in day care, was shown to influence behaviour of the children. Within a few months of having this treatment, aggressive and restless boys became calmer and more socialized.
The same effect can most likely be achieved in response to numerous other types of therapies. Acupuncture, for example, has been shown to induce well-being, possibly as a consequence of the touch and care received during this treatment. Breathing therapies, mediation, relaxation and some types of “energy” treatments may also increase antistress effects.

It may also be that various types of psychological interventions or therapies simply as a supportive, caring and kind treatment influence the same type of mechanisms. This sort of positive influence does not only occur in these therapeutic situations but also in the workplace and in family life (Arnetz, Ekman 2006, p. 240-242).

5.2. Stress in the etiology of medically unexplained syndromes

Physical symptoms are normal parts of everyday life. Within one month, approximately 80% of people will experience at least one somatic symptom but only a minority will ask for medical advice from a general practitioner as a result. For those who do, an investigation typically reveals no organic cause in almost a third of the cases. These medically unexplained complaints are also a common phenomenon outside of primary care. About 54% of consultations for frequent attendees at specialist gastroenterology clinics have medically unexplained symptoms as a result. The corresponding figures for neurology, cardiology, rheumatology and orthopaedics are comparable. Even though a lot of patients experience only one or two discrete medically unexplained symptoms, for example fatigue, nausea, headaches, others indicate with more complex symptom clusters for which no pathophysiological cause can be found. Groups like these are often given labels such as chronic fatigue. These illnesses can often be difficult and frustrating to treat, but there is no question that they require treatment.

All of the syndromes mentioned are more commonly reported by women than by men. There is a tendency for emotional disorder to be unusually prevalent in each syndrome and each is categorised by difficulties in forming a therapeutic relationship between doctors and patients.

Treatment researches for medically unexplained illnesses show a degree of convergence. In most cases, reducing exposure to a putative toxic agent, like electromagnetic fields or exercise, is not effective in reducing the symptoms. As an alternative, many of the syndromes have been shown to respond well to psychological treatments and especially to cognitive behavioural therapy. What these processes are, is still uncertain but there have been some suggestions that stress may play in important role.

There is a link between psychosocial stress and medically unexplained syndromes. Possible mechanisms which may explain this association are CFS and ES. CFS is a severe and debilitating fatigue. It has often been present in the patient for at least six months, is inexplicable in terms of any recognised organic or psychiatric pathology, and it occurs with four or more other symptoms, such impaired memory/concentration, muscle pain, sore throat and headaches. ES is less well-defined but it includes patients who report medically unexplained symptoms which they believe to be caused or intensified by exposure to weak electromagnetic fields, like those emitted by computers, domestic appliances, overhead power lines or mobile phones (Arnetz, Ekman 2006, p. 292-294).

5.3. Stress and addiction

Human beings have used different substances to experience stimulation, satisfaction and euphoria since ancient times. These substances were discovered in nature and in this sense, they were natural products, but substances synthesised by man have also been introduced in more recent years.

Well-known examples of natural drugs are tobacco (nicotine), opium, ethanol and cocaine. These drugs have frequently been used in connection with a variety of rites and for the purpose of putting the mind into an ecstatic state. On the other hand, many substances have often just been used for opposite reasons, to reduce anxiety or to calm down. A substance which is for many reasons one of the most interesting is alcohol, partly because it has stimulatory and anxiolytic, sedative properties, generally depending on dose. And partly because alcohol abuse is, besides nicotine abuse, the most common type of substance abuse and has the most impact on human health and community (Arnetz, Ekman 2006, p. 384).

5.3.1. Alcohol, stress and nicotine

Nicotine and alcohol are often consumed in connection with stress. The majority of smokers are probably able to testify that, when stressed, for example in the face of difficult tasks, family problems or a heavy workload etc., they often increase their nicotine consumption.

Most alcohol users, perhaps heavy consumers, can probably report the same phenomenon of stress being proportional to their alcohol consumption. Under these circumstances, nearly every drug user finds that they use the substance in order to calm down, to relax or to focus and it has been indicated that ethanol intake during stress represents a type of self-medication. This might also be why some people use nicotine and alcohol on the completion of significant work or performances and for example, on Friday nights in large groups, after a heavy workload that week. It is possible that, for individuals who have a more controlled, limited substance intake, drug consumption also represents a form of reward for various achievements.

Stress correlates with not only the use of but also abuse or misuse of different dependency-provoking drugs. The risk of individuals lapsing into, for example alcohol and nicotine misuse, is increased when people feel stressed. Both ethanol-dependent individuals and smokers can probably accept these ideas.

There are quite a few statements on how stressful situations, for example significant losses, family problems or difficulties at work, have produced relapses into ethanol or nicotine misuse even after years of abstinence. A lot of people with alcohol problems can admit that they have relapsed at times when they have been feeling extraordinarily well and others who drink often over a certain period may even plan their relapses, for example, they may think about on what day they will start drinking again. Nevertheless, for several reasons it is very difficult, or even impossible, to perform prospective, controlled studies on the role of stress in human drug and alcohol consumption, not least because of the difficulties met when trying to standardise the stressors. There are huge individual differences in how stressors are perceived. Most of the studies which are available, are instead correlative and retrospective and may show some possible associations but they do not inform us about the underlying mechanism (Arnetz, Ekman 2006, p. 384-385).

Figure 6: Nicotine and Alcohol

As mentioned before, for men and women, cigarette smoking has long been associated with environmental stress and smoking assisted people in coping. It has been suggested that there are gender differences in smoking rates. There is a higher rate of smokers among female compared to male professionals. This fact may reflect a higher level of stress experienced by women. The reason for this greater level may be due to smoking being seen as a style of coping with stress.

Studies in job-related stress pointed out that workers with tasks involving high demands and low control over aspects of the work situation have the most risk for stress-related illness. It has also been found that a work environment that is characterised by high demands and low controls has been found to be notably associated with the smoking status of women but not for men.

As a result, a gender difference between job stress and cigarette smoking has been observed. Also, higher smoking rates among single mothers than among those living with partners were observed. There may be differences in the relationship between diverse job stress factors and smoking in working women and homemakers. Homemakers who did not report time pressure were significantly less likely to be smokers (Frankenhaeuser, Lundberg, Chesney 1991, p. 145-147).

Stress creates a negative state of mood, this model as a behaviour for coping with stress can be seen in the figure below.

"*(…) this model suggests that environmental stresses provoke negative mood states such as depression, anxiety, and anger in the person undergoing the stress. The stress and negative mood state elicit coping responses. One such coping method is smoking a cigarette."* (Frankenhaeuser, Lundberg, Chesney 1991, p. 149)

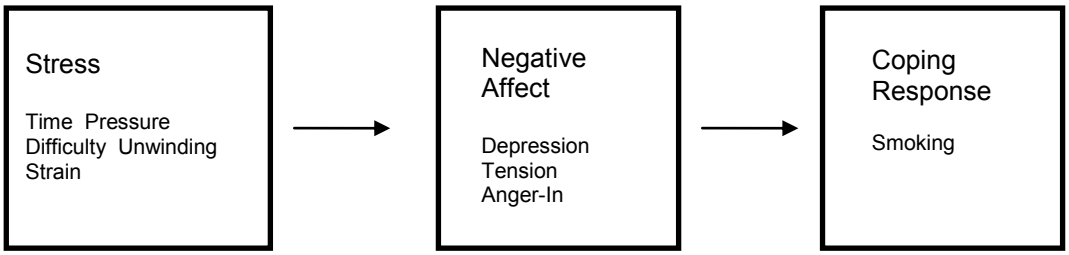

Figure 7: Model of environmental stress, negative affect, and smoking as a coping response

The quoted speakers carried the study out in 1991, so recent studies may show some different results.

5.3.2. The biological underpinnings:

If there is some kind of connection between stress and substance misuse, the relationship should also be understood from a biological point of view. Environmental stress can direct behaviour towards, for example out of control alcohol intake. According to our present understanding, all thoughts, sensations, decisions and behaviours are products of the activity of millions of neurons and other cells in the brain. These components are also used to modify behaviour from that of an abstinent alcoholic to that of a relapsing one. When ethanol is consumed by itself, it will contribute to behavioural change and possibly also to an escalating loss of control. How alcohol and stress act in combination to influence neurobiological processes that produce behaviours associated with substance dependence is an extremely complicated issue (Arnetz, Ekman 2006, p. 385-386).

6. Stress and Gender

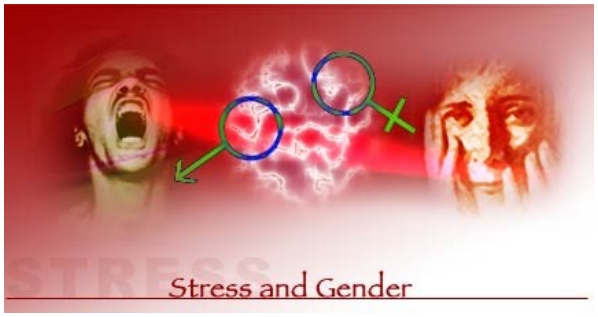

Figure 8: Stress and Gender

Females may be more sensitive to social stress than males and they are more bothered by the psychiatric disorders associated with stress, for example, major depression. In women

the risk of developing depression in response to stressful life events is about three times higher than in men.
There is a difference between men and women in the endocrine and the physiologic response to and the subjective experience of acute stress. The response also varies with the menstrual cycle. There are also a number of studies that indicate the association between drug use and stress is stronger in women than in men. For example, after morphine, women seem to experience a stronger sense of “coasting” and “heaviness”. Furthermore, women are more sensitive to cocaine and nicotine than men.

In summary, there appears to be complex gender differences in regard to stress and drugs. This may depend on the drug, the dose of the drug, the type of stress one is exposed to and the variables studied. Despite the fact that these facts indicate that females are at a greater risk of drug misuse than males, drug misuse is more common among men than women. This indicates that there are a number of other factors besides stress contributing to the risk of developing drug abuse (Arnetz, Ekman 2006, p. 398).

6.1. Positive emotion

The importance of encouraging emotions in daily life and the cultivation of positive emotions have emphasised the recent positive psychology movement.

D. Childre is the founder of the Institute of HeartMath, he designed practical, heart-based, positive emotion-focused tools and techniques to facilitate the self-regulation of emotions. These interventions focus on the area around the heart, where many people subjectively feel positive emotions, and on self-induction of emotional state, like appreciation. Because appreciation is one of the most concrete and easiest of the positive emotions for individuals to self induce and sustain for longer periods (Arnetz, Ekman 2006, p. 347).

It is important for both individual and societal health that strategies for reducing and transforming stress are made available to all people. In this point, an essential key is addressing the internal emotional source of stress. The use of positive emotion-based interventions to address stress has been shown to be very useful. Although, we now know more about how emotions are generated by specific psychological processes, we are not closer to a more complete understanding of human behaviour and function. Nevertheless, tools based on scientific knowledge can be used to regulate and intentionally change

individual's inner states. It is possible to be proactive in wilfully generating positive emotional states to affect a happier, healthier and more functional life than to remain at the mercy of emotions and individual and societal consequences (Arnetz, Ekman 2006, p. 362-364).

6.2. Coping and social support

Spielberger and Sarasin claim that *"Stress calls forth efforts to reach an acceptable or satisfying resolution to the problem that creates the stress. Coping refers to how people deal with difficulties in an attempt to overcome them. It is a complex process that involves personality characteristics, personal relationships, and situational parameters."*
(Spielberger, Sarason 1996, p.13)

When a specified event occurs, discussions of coping often start. If we put the focus on events when they happen, we ignore the fact that many factors play a role. Researches have found out that the question of why some people experience certain types of difficulties while other people do not, has had little attention devoted to it. Personality characteristics and social relationships play a role in the way people construct their environments. Life events are not randomly assigned to specific people. People's social networks and the individuals play important roles in how they respond to and experience stressful life events. The personal characteristics of the important actors in them and coping through appraisal of situations are influenced by the perceived social support. It has been found that people who perceived high support attributed less negative and more positive. More positive and accurate appraisals of self and others may be fostered by perceived social support and this may enable people to develop better coping strategies for dealing with particular situations.

Perceived social support influences coping, which could lead people to develop effective personal coping skills, to structure situations so that stressful life events are relatively unlikely to occur and to obtain and seek assistance when it is needed (Spielberger, Sarason 1996, p.13-15).

As is described in the next chapter, stress provokes high levels of anxiety with its many physiological and psychological concomitants. Studies have shown that interpersonal support reduces the likelihood of anxiety and exaggerated cardiovascular responsiveness,

for example when a friend accompanies a student participating in laboratory tasks. Subjects who were accompanied by a friend showed reduced heart-rate reactivity. Other studies indicated reduced anxiety and panic in panic victims when they had social support (Spielberger, Sarason 1996, p.18-19).

6.3. Stress/anxiety and love

Passion can be stimulated by a variety of associated emotions. Many theorists, like Sigmund Freud, have proposed that it is specifically when people are not at their best, when they are afraid and anxious, when their self-esteem has been shattered, when their lives are turbulent and stressful, that these people are particularly vulnerable to falling head-over-heals in love. Primarily, early attachments of infants, when they clasp tightly to their mother's side when danger threatens them and go their own way when it is all safe, are thought to be the primary prototype of love. Also, anxiety and passionate love are closely related neuroanatomically and chemically. It has been demonstrated that both adults and children are inclined to seek romantic ties when they are under stress and anxious. Studies showed that both teenagers and children were especially vulnerable to passionate love in times of anxieties. A close link between stress, fear and sexual attraction has been discovered.

"Passionate love is a turbulent emotion, with close links to joy, sadness, fear, and anger. Social psychologists have amassed evidence as to the consequences this complex of emotions has for mental and physical health. The sparse existing evidence suggests that the consequences of passion may depend, in part, on whether one's passionate feelings are requited (and thus a source of joy and fulfilment) or unrequited (and thus associated with emptiness, anxiety, and despair)." (Spielberger, Sarason 1996, p.36)

6.3.1. Immune System and love

As Spielberger and Sarason (1996, p. 36) have mentioned, love depends on requited or unrequited consequences. It is therefore believed that love is good for people. For example, the famous poet Elizabeth Barret was a sickly invalid and frail woman. When she fell in love, her health improved quickly. Another study revealed that students who were in love and knew they were loved in return, were at their best. These college students were relaxed, happy, self-confident and unusually healthy; for example, they did not have sore

throats or colds. And it was found that their natural killer cell activity was unusually low and their immune systems were at full strength. Students who suffered from the stress of unrequited love were at risk. They felt depressed and tense and were vulnerable to colds and sore throats. Many of them drank alcohol and their natural killer cell activity was increased, which is a sign of the immune system to fighting off disease. Unrequited love is stressful and unhealthy for lovers and even worse for the beloved people (Spielberger, Sarason 1996, p.36.37).

Love is a bittersweet emotion and tightly linked to a variety of other emotions. As described before, these complex emotions have physical and mental health consequences. Couples who have broken up are unusually vulnerable to various stress-induced mental and physical illnesses. Passionate, unrequited or terminated love can be extraordinarily stressful and may have serious health consequences (Spielberger, Sarason 1996, p.41-42).

6.4. Sexual function and stress

In their overview, Kenny, Carlson, McGuigan and Sheppard (2000, p. 139) point out that a wide range of physical and psychological problems have been associated with stress and that there is a difficulty with the stress concept as it can be defined as either stimulus or a response. For example, going to a job interview may be defined as a stressful event, but whether the event generates a stress reaction and the effect of it, may depend on various moderating factors. The individual's perceived competence to deal with the event, the way in which the individual assesses the event and the importance of the event for the person are all factors which influence the extent of the response.

In terms of sexual function, the nature of the stress reaction could depend in part on the type of stressor. It is likely that stress which results from daily troubles and major life events has a different impact from social stress which develops from problems in personal relationships. Carlson, McGuigan and Sheppard have shown that stress from every day life events leads to lowered levels of testosterone and increased blood levels of corticoids. Other studies have demonstrated that socially dominant men have higher levels of testosterone. However, these results may not directly tell us anything about the association between sexual function and stress. There is an even greater lack of information on the effect of stress on sexual function in women. A review of the literature

has indicated that stress and anxiety influence the sexual function of both men and women. But the nature of this relationship shows a discrepancy between females and males and is different for sexually disfunctional and functional respondents (Kenny, Carlson, McGuigan, Sheppard 2000, p. 139-147).

6.4.1. The effects of stress on the sexual response of men

Anxiety and stress boost the physiological and subjective sexual response of sexually males. Increased general physiological arousal due to anxiety or stress leads to raised sexual physiological arousal. This enhancement is associated with a subjective sense of increased sexual arousal. With these findings it may be demonstrated that there is a strong positive interaction between anxiety/ stress, physiological sexual response and the cognitive labelling of the heightened sense of arousal. The same process operates among sexually disfunctional males.

The heightened state of general arousal is not only interpreted in a positive manner, there is also an association with negative emotions, like anger, guilt or disgust, which reduce physiological sexual arousal and interfere with the subjective experience of sexual arousal. In order to boost sexual function among disfunctional men, it is important to lower stress and/ or anxiety so that these associations do not occur. Once males experience confidence in their sexual performance, sexual response will be improved by these males reinterpreting their response to anxiety and stress. Then a positive cognitive labelling that arises will facilitate a positive physiological response. Therefore, in the treatment of sexually disfunctional males, it is important to modify the way in which stress and/or anxiety is perceived, as well as lowering the levels of stress and/or anxiety in the lives of these men (Kenny, Carlson, McGuigan, Sheppard 2000, p. 147-148).

6.4.2. The effects of stress on the sexual response of women

Both sexually disfunctional and functional females appear to respond in a similar manner to stress and anxiety, even though the results from studies are certainly not very convincing and far from consistent. Women seem to respond positively at a physiological level to the increased arousal due to stress and/or anxiety and they experience a generally negative subjective sexual response to stress and/or anxiety. An explanation of these findings is that women undergo ambivalent feelings about their sexual responding.

In an anxiety-provoking or stressful situation, the negative aspects of theses feelings are heightened which leads these females to experience negative emotions in association with their increased levels of arousal, and so lowered subjective sexual response.

An important point is that women learn to feel comfortable with themselves as sexual beings, so that these ambivalent feelings about their sexual response can be resolved. In this manner, stress and/or anxiety can facilitate rather than obstruct their sexual feelings and arousals. This information demonstrates the complexity of the relationship between stress and/or anxiety and stressful situations (Kenny, Carlson, McGuigan, Sheppard 2000, p. 148).

6.5. Stress and caffeine

There is a high possibility of the simultaneous exposure to drugs and everyday life experiences, including psychosocial stress, considering current population patterns. Certainly, caffeine consumption appears to rise during periods of increased stress.

Figure 9: Caffeine

In the sixteenth and seventeenth centuries, European colonialisation resulted in the introduction of tea and coffee to many parts of the world in which caffeine foods and beverages had been unavailable previously. Global consumption increased steadily with increased availability, so that caffeine is the most widely consumed psychoactive substance in the world nowadays. Caffeine goes beyond most social barriers, including gender, culture, age and geography. More than 80% of the world's population consumes the drug daily and the consumption trends continue to increase. The major dietary source of caffeine is coffee. Tea is generally lower in caffeine content than coffee but it is consumed more widely. Some medications, chocolate-flavoured drinks and chocolate also contain caffeine. In developed countries, caffeine intake is about two to six cups coffee or tea per day (Kenny, Carlson, McGuigan, Sheppard 2000, p. 335-336).

“Caffeine use far exceeds use of any other psychoactive substance and typical patterns of use mean that psychosocial stress is often experienced against a background of pharmacologically active levels of the drug. This combination of caffeine and stress has implications for both somatic health and psychosocial well-being.” (Kenny, Carlson, McGuigan, Sheppard 2000, p. 349).

Recent studies have indicated that life-long daily use of caffeine possibly contributes to the development of cardiovascular diseases, probably being responsible for 10% of premature deaths from coronary heart diseases and 20% from strokes, and that these cardiovascular effects of the substance are additive to those drugs which are caused by psychosocial stress. Clinical case studies have indicated that the intake of large amounts of caffeine during a period of extreme psychosocial stress can contribute to the occurrence of psychotic episodes. But there is little evidence that consumption of caffeine is capable of inducing a clinical syndrome of anxiety, the findings rather suggest that caffeine might intensify existing disorders, mainly, panic disorders. Caffeine taken before bedtime reliably raises sleep onset latency and it remains unclear to what extent typical patterns of caffeine use contribute to sleeping problems in the general population.

Last of all, evidence indicates that habitual caffeine consumption has a several possibly adverse somatic and psychosocial effects and that in some cases the substance may intensify the effects of psychosocial stress (Kenny, Carlson, McGuigan, Sheppard 2000, p. 349-350).

6.6. Personality - a risk factor in cancer and coronary heart disease

For many decades, medical orthodoxy believed in the existence of a powerful relation between personality and specific diseases, for example cancer. Humans who are described as repressing emotions and find it difficult to cope with stress, give up easily and develop feelings of hopelessness and helplessness were called the cancer-prone personalities.

Serious study started in the 1950s to demonstrate that the anecdotal evidence of past centuries had a hard backing of truth. Old theories in relation to cancer and coronary heart disease were verified.

There is evidence for the interaction between smoking and stress and coronary heart disease and lung cancer. While stress and smoking have a small contribution to make towards mortality, when compared with the no stress/ no smoking people, it is the synergistic interaction that creates much of the most horrifying rise in mortality. This fact points out the inadequacy of univariate analysis in blaming so many deaths on a single cause, like smoking. So personality-stress-coping is clearly relevant to cancer (Kenny, Carlson, McGuigan, Sheppard, 2000, p.291-313).

Kenny, Carlson, McGuigan and Sheppard (2000, p.313) claim that there cannot be any doubt that psychosocial factors, like stress, personality and coping, are closely related to physical disease and physical health. More specific types of personality are related to specific diseases, for example cancer and it may be possible that even more specific relations exist between different types of personality and different types of cancer, but there is not yet enough evidence for this claim. As the interaction between psychosocial and physical factors, these relations are very important. The possibilities of intervention through psychological treatment reducing the psychosocial risk factors and thus preserving life through prevention are also very important.

7. Men's and women's experiences of stress

Glaser and Kiecolt-Glaser (1994, p. 234) have found that divorced or separated men are more distressed and lonely and report significantly more recent illness than married men. They also had higher antibody titers to herpes viruses, while not differing much on quantitative measures.

There is an association of poorer marital quality with greater distress and poorer immune status among married men. Among these men, those who had separated within the past year who had initiated the separation were less distressed and reported better health, than the non-initiators. Astonishingly, during the second year, a substantial reversal in self-reported illness occurred: the initiators of separations or divorces were more likely to become ill than non-initiators.
"It may be that initiators, who feel more in control of the situation initially, show less stress during the first year, but may have a relative deterioration in coping capacity as more negative consequences of the separation become apparent." (Glaser, Kiecolt-Glaser 1994, p. 234)

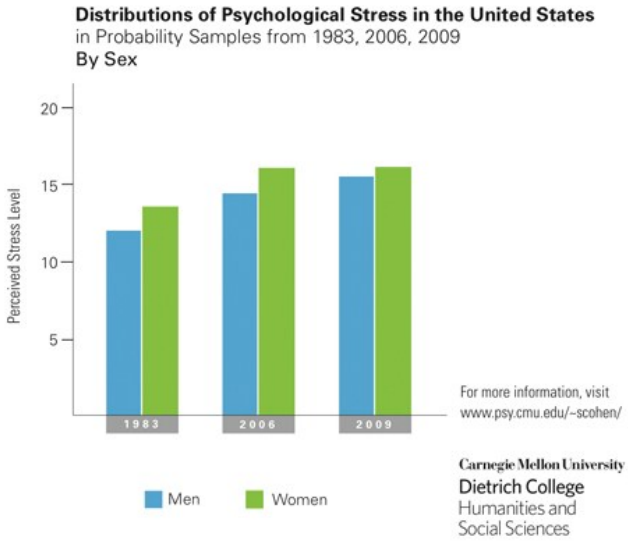

Figure 10: Distributions of Psychological Stress in the United States

8. Studies about stress and gender

The study of Adeloka (2010, p. 886) examined gender differences in the experience of work burn-out among university staff. Researches pointed out that the consequences of burn-out are potentially serious for staff and students. Work burn-out is stated to be correlated with various self-reported measures of personal distress, for instance depression, tension, fatigue, anxiety and apathy.

In the introduction, Adeloka (2010, p. 887) argues that in the 1970s the first cases of burn-out were diagnosed in the nursing profession where women hold the sway.
"Later studies had indicated that the condition leading to burn-out as a consequence of stress arising from intensive emotional involvement at work poses a particular threat to those people working in Health care, Social services and education; all fields which predominantly employ women."(Adeloka 2010, p. 887)

Nevertheless, recent studies have confirmed that the increasing pace of work and the growing lack of job security have made burn-out a common risk to the well being and health of both women and men in all occupations. It was discovered in the survey that the total number of burn-out cases was slightly higher among women than in men. It has been also found that women are better equipped for human relationships and for sharing their negative emotions, while males tend to suppress their emotional impulses in order to live up to their roles, thus making them more disposed to adopt cynical attitudes as a means for coping with stress. In addition, exhaustion affects women when they carry a double

workload, for example housework, childcare and a job. The study also shows that both sexes differ significantly in the ways they cope with stress. Females take sick leave more often and were significantly more active in seeking outside help for their problems, while males thought more and more about retiring. So it can be said that women have a wider range of relationships and that they use these networks to build up their strengths. Research has also demonstrated that family life with all its responsibilities is not just a burden; it's also a rewarding source that strengthens people's emotional well-being, skills and human contacts.

The study has shown that men who share family responsibilities and housework with their wives and also support their career development are less susceptible to burn-out than those men who do not. This may explain why females cope better with burn-out than males in the long run (Adeloka 2010, p. 887-889).

In this study, the quoted speaker carried out the study in Nigeria among University staff, in the African Journal of Business Management. He is probably just talking about Africa and in other societies, for example in Europe, the study may have a different result.

In the Meško et al (2012, p.4127-4132) study about stress symptoms and stress-coping strategies, it is pointed out that jobs are less secure, work demands are greater and therefore stress management is fundamental to the success of any business. A lower degree of employment security, higher job requirements and changed lifestyles impose a serious burden on individuals. Workplace stressors that cause problems are unfavourable working conditions, leadership style, harassment, workplace violence as well as physical stressors like noise, dust, inappropriate temperature environment and a lot more. Occupational stress occurs commonly as a result of inappropriate information policy or leadership styles, lack of competence or inappropriate work standardisation and hierarchy. All these factors may culminate in unbearable stress and it may give rise to symptoms such as anxiety, insomnia, fatigue, or even serious illnesses like angina pectoris, high blood pressure or myocardial infarction.

In this research it is also pointed out that the World Health Organisation is monitoring this increase in problems regarding stress with great concern. Organisations will need to put a lot of effort into stress-preventing activities in the workplace, especially as many organisations are not aware of the magnitude of this stress problem and its negative

consequences. Moreover, organisations will have to apply specific measures and allocate funds to covering the costs of preventing occupational stress consequences.

9. Conclusion and summary

The goal of this bachelor paper was twofold. The primary aim was to give the reader a general understanding of the topic stress. Stress is becoming more and more important in today's world; for this reason I examined the term stress, I gave a general overview, pointed out the historical perspective and talked about physical and psychological aspects regarding stress.

Then I did research about stress regarding human health, I addressed how stress influences humans and I mentioned different stress types, these types are distress and eustress. In this part, I recognised that stress plays an extremely important role in human health and that there is a coherence between stress and medically unexplained syndromes and with addiction. However, I observed that stress can also be a positive factor, for example as eustress.

The secondary aim was to investigate stress and gender. I examined whether there are gender differences about stress, whether the genders react differently and whether this stress is related to their health.

Finally, a conclusion about stress can be drawn. Stress is increasing and it is related to post-modern society. Our modern society suffers from stress and it is extremely important for people to face stress. I learnt that there is a close link between stress, fear and sexual attraction and that there is a link between psychosocial stress and medically unexplained syndromes. I found out that people's social networks and the individuals within them play important roles in how they respond to and experience stressful life events. According to Spielberger and Sarason (1996, p. 13-15), stress can be reduced by social support; this support helps people to develop effective personal coping skills, to structure situations so that stressful life events are relatively unlikely to occur and to obtain and seek assistance when it is needed.

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Figures:

Figure 1: Industrialization: labour workers using new technologies
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Figure 2: The brain stem
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Figure 3: The Transactional Model of Stress
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Figure 4: Sympathetic and Parasympathetic. Divisions of the Nervous System
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Figure 5: The human organism

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Figure 6: Nicotine and Alcohol

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Figure 7: Model of environmental stress, negative affect, and smoking as a coping response

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Figure 8: Stress and Gender

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Figure 9: Caffeine

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Figure 6: Distributions of Psychological Stress in the United States

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Figure 7: Symptoms are always reduced with social support

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