

Bachelor Degree Project



THE PHYSIOLOGICAL EFFECTS OF LONG-TERM UNEMPLOYMENT

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Abstract

The stress system is essential for humans and other organisms to survive. However, when stress is prolonged it can have pathological effects on the brain. To experience long-term unemployment is often stressful, for it has been shown to correlate with depression, low self-esteem, learned helplessness and self-destructive behavior. Long-term unemployment also seems to have physiological consequences, for it has been shown to correlate with cortisol dysregulation. The hippocampus is a highly adaptable part of the brain located in the temporal lobe and is long known for its sensitivity to cortisol dysregulation due to stress. The aim of this thesis is to study how long-term unemployment affects physical and psychological well-being, focusing in particular upon finding out whether it affects the hippocampus. The results suggest that that the kind of stress caused by long-term unemployment is similar to the stress affecting the hippocampus. It thus seems to be a reasonable hypothesis that long-term unemployment has a negative influence upon the brain, and the hippocampus in particular. However, there is an additional issue that one needs to take into account. For some studies have shown that people with poor mental health are more likely to be unemployed. If poor mental health is associated with physiological disorders (including a damaged hippocampus), this implies that not only can long-term unemployment (via stress) affect the hippocampus, but a damaged hippocampus (along with other physiological factors) can increase the probability to become unemployed. This means that the relationship between long-term unemployment and a damaged hippocampus need not be a one-way causal relationship.

Keywords: long-term unemployment, stress, hippocampus, cortisol, glucocorticoids

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1. Introduction

“Everyday is a struggle. The struggle is the unknown. You have worked your way up the ladder and you get to a point in life and a position in work where you’re comfortable... then all of sudden everything goes away. It is like being thrown into a hole and you are climbing to get up, but it is greased. There is no way of getting out”.

This is a citation taken from J. R. Childress when he got interviewed by the website “Business Insider” (Business Insider, 2012). He had been unemployed for ten months. He was searching for new jobs every day and he prayed that it would be the day his life makes a change and he makes a fortune. Even if he tried to keep going and help neighbors, exercise or doing something at the home, it was hard to fill the whole day.

The hopeless feeling of the 53-year-old North Carolina man is not unusual in his position and he shares it together with other people who are suffering the horrible situation in being unemployed. On the website “over fifty and out of work,” there are hundreds of similar stories as the story just told. Bill Davis says “I try to be optimistic. I try to believe that things are going to get better. After a couple of years, you start wondering...” and it follows up with stories from other people saying “My kids help. I'm not used to that. That's really difficult.”, “When I lost my job, it become very difficult to keep my house, and I eventually lost it.”, “It's a lot harder than you think. That's all I'll say. It's easy to say I'm going to reinvent myself, just go try it.”, “I don't feel any control at all. I feel like I'm just hanging out there in left field, just waiting to see what happens. It's all I can do” (Over Fifty and Out of Work, 2012).

In 2018, the unemployment rate in Sweden was 6.3%. Unemployment means that there are individuals who are able to work, but do not have any work. Unemployment is measured by investigating how many that are unemployed in relation to the total number of people who are able to work. People that count as the labor pool are between 15-74 years old, while most of the people outside these ages doesn't count in the statistics. The economic situation in Sweden but also in the world depends largely on how many people who are

unemployed in Sweden. During 2006 and 2007 the economy in Sweden was flourishing economy. The unemployment rate fell. During the autumn of 2008 the world was hit by a crisis and affected Sweden's economy negatively. This is the event that affected unemployment in Sweden the most since 2000. As most were 8.6% unemployed in Sweden (SCB, 2019).

As the stories above tell, it is an extremely heavy situation to be long-term unemployed. Some stories indicated the feeling of learned helplessness, a feeling that has shown to be correlated with unemployment. Learned helplessness is an apathetic state of powerlessness that is due to the individual being exposed to uncontrollable and unpredictable consequences (Baum, Fleming, & Reddy, 1986). When a person loses her job, she also loses a big source of income and with this also the satisfaction with life decreases.. However long-term unemployment does not only affect the psychological well-being but the chronic stress also negatively influences the person's physical well-being (Maier et al., 2006).

Stress is necessary for survival and being able to function normally during the day (Tsigos & Chrousos, 2002). However, when the physical or mental threat gets too high and prolonged, as it does in long-term unemployment, it negatively affects a person's well-being and daily behavior. Extended levels of high stress have an impact on the brain and will, in most cases, lead to such psychopathologies, as PTSD, anxiety disorder or clinical depression (Widiger & Clark, 2000). Long-term stress negatively affects the individual with feelings of hopelessness, memory deteriorates, and the individual has difficulty focusing on a particular task. The individual also has difficulty in anticipating their future and solving their personal problems (Watkins & Teasdale, 2001).

The relation between the brain part hippocampus and stress have for a long time been a popular research area. The hippocampus is a highly adaptable, sensitive part of the brain and vulnerable to damage from head trauma, seizures, and ischemia. It is an area in the brain

crucially involved in memory. One of its functions is to convert new short-term memories to long-term memories (Annese et al., 2014).

Because of its sensitive and flexible structure, the hippocampus could either decrease or increase depending on what the brain gets exposed to. When it comes to chronic stress it has shown to decrease and give extremely negative symptoms such as depression and low self-esteem (Bremner, 2001).

The research question of this thesis is: How does long-term unemployment affects physical and psychological well-being? In particular, does it affect the hippocampus? Much research has been done on how stress affects the hippocampus. In this thesis I will try to investigate if there are any possible relationships between the hippocampus and long-term unemployment. This thesis will make a literature review about unemployment and its effects on the hippocampus. I will try to figure out what consequences long-term unemployment has on an individual and on her hippocampus in particular.

First, the thesis will have a background section where stress, long-term unemployment, and the stress-effects on hippocampus will be explained. Then the method section will explain how I will go about it. The discussion section will discuss the information mentioned about the respective areas in the background and how they could correlate with each other. The conclusion will sum everything up, mention future research and limitations with the thesis.

I find it important to write this thesis is because I think it is interesting how much the environment, circumstances, and thoughts actually affect the brain, but also because there are many prejudices and little understanding about mental illness. The hippocampus is an interesting brain part because it is flexible and can either increase, through training for example (Erickson et al., 2011), or decrease because of stress (Bremner, 2001).

The view of mental illness has become more accepting in Sweden, according to my opinions, but people still have the tendencies to not have the understanding of those who suffer psychological disorders. Brain parts such as the hippocampus is proof on that long-term stress actually decreases the size of the brain and the person gets harder to handle negative circumstances, it is not just about the person being “weak”. Therefore, I can find the view on unemployed unfair since I experienced how unsympathetic people in my environment are against unemployed individuals. I hear a lot “it is just to seek a job, it is not so difficult”, “how can someone be so tired when he does nothing? ”. I think it's important that we gain an understanding of how the brain and hippocampus actually take damage of the stress. It is not always that the person is weak, it can also be a stress-induced hippocampus that makes the individual experience bad self-esteem and fatigue because of depression (Bremner, 2001).

2. Background

2.1 Stress

More than 80 years ago Selye (1936) discovered that the physiological response to stress, not only protected the body but also could damage it; he had discovered the stress system.

In biological terms, stress can be described as when an organism, which is striving after homeostasis, gets affected by internal or external stimuli (Ljung & Friberg, 2004). The stress system is essential for humans and mild stress helps maintain body temperature, providing energy to perform better or focus at the moment (Minois, 2000). The stress system in humans has always been essential for survival. Earlier in time, when exposed to direct danger, such as wild animals, the focus changed quickly and the body became prepared for fight or flight. The stress system increases heart rate, increases attention, sends more blood flow to the brain and skeletal muscles, and the heart rate increases. Digestion is less prioritized function and reduces during stress (Ljung & Friberg, 2004).

The stressors affecting an organism could be either emotional or physical. It is of great importance how huge or prolonged the stressor is. When a stressor surpasses a certain threshold the organism's allostatic system activates and is the body's own attempt to go back to homeostasis after a stressful event. The stress response has a major role in this process and activates a response in the body which functionally corresponds to the stressor and will help the body to react. This innate response has evolved during the time to protect the organism during acute stress. The reactions and changes take place in the central nervous system (CNS), in tissues and various peripheral organs (parts of the body that responds to changes in the environment). CNS handles time-limited and acute adaptive functions such as focused attention, arousal, vigilance and the inhibition of less prioritized functions such as growth, eating, reproduction (Chrousos & Gold, 1992) and sleep (Chrousos, 2007).

The stress-related changes contribute to increased oxygenation and nutrition of the brain, heart, and skeletal muscles. All these organs are essential for the "fight or flight" reaction and for the central coordination of the stress response. The stress response, which includes as a homeostatic mechanism, works as an inverted U-shaped response curve. At the top and in the middle of the curve is the most optimal range and the effects get less and less optimal on either side of the curve. The suboptimal position is allostasis. If the stress-response gets to the less optimal range it could be harmful to an organism both short and long-term. This negative effects, such as excessive or defective reaction to fear, could make it harder for an organism to survive. Both the defective and excessive reactions make the organisms having increased risks for mortality and diseases (Chrousos, 2009).

The central areas of the brain that control stress are the hypothalamus (part of the limbic system and one of its function is to regulate activities of the autonomic nervous system) and the brainstem (continuous with the spinal cord and provides the main sensory and motor nerve supply to neck and face via the cranial nerves). The hypothalamic-pituitary-

adrenal (HPA) axis is the major stress system in the brain. It is a system consisting of the hypothalamus, the pituitary gland (a pea-shaped structure located below the thalamus) and the adrenal gland (a small organ on top of the kidney that produces a variety of hormones). The three components direct influence and feedback on each other. HPA axis is involved in the production of the stress hormone cortisol that is produced by the adrenal glands (Tsigos & Chrousos, 2002).

The stress system responds approximately as it did during earlier times in humans, but what stresses us has changed. The stress is often prolonged and cannot be resolved by flight or fight (Ljung & Friberg, 2004). It is not dangerous to be stressed for a shorter period, but to be stressed over a too long of a period is harmful and, as mentioned in the introduction, have shown negative effects such as anxiety disorder or clinical depression (Widiger & Clark, 2000).

2.2 Long-term unemployment

It can be extremely stressful to lose a job. Both psychological and physical health is affected. When it comes to psychological health problems all such as depression, frustration, anger, worry, anxiety, hostility, psychiatric disorders, suicide, lower satisfaction with life, (Hanisch, 1999) and mental stress has been shown (Brown et al., 2003). When it comes to suicide risk it is three times higher risk to commit suicide for unemployed men and two times higher risk for women than for employed men and women (Preti & Miotto, 1999). Empirical research has shown that people with more emotional distress characteristics (higher muscle tension, high somatic anxiety, high irritability, and high depression) are shown to be more sensitive to the tearing of HPA-axis carried by long-term unemployment (Grossi, Åhs, & Lundberg, 1998). The physical health problems have shown to be all from, cardiovascular, immunological, gastrointestinal and physical disease (Hanisch, 1999; McKee-Ryan, Song, Wanberg, & Kinicki, 2005).

Being short-term unemployed does have some negative symptoms on the well-being but it is the long-term unemployment that shows the greatest damage to well-being (Gordo, 2006). However, some studies such as the empirical research of Layard & Nickell (1986) showed that short-term unemployed (unemployed for a year or less) experience more of the increased pressure in the lost wage than people who had been unemployed for a longer time. Another study analyzed the individual health satisfaction (psychological and social aspects included) of short-term unemployment and how it changed over time. For men, short-term unemployment has a clear impact on health satisfaction, while for women it did not influence that much. To be unemployed for a longer time, in this case two years, showed negative effects on health satisfaction on both men and women. The individuals over 50 were significant the most negatively affected of unemployment (Gordo, 2006). However, the negative symptoms of unemployment seem to increase the longer the person had been unemployed (Herbig, Dragano, & Angerer, 2013). It has also shown a clear difference between long-term unemployed and short-term unemployed when it comes to reemployment. Short-term unemployed has proven to easier get a job again than the long-term unemployed (Jackman & Layard, 1991).

The depression that often comes with long-term unemployment could cause physical symptoms such as loss of sleep, sexual interests, and appetite. While the health gets lower and the depression gets higher; the self-medication increases (Linn, Sandifer, & Stein, 1985). Unemployed people have a higher risk to engage in unhealthy behavior such as tobacco consumption, alcohol, bad diet, lowered exercise, and this increases the risk for diseases or morality (Dooley, Fielding, & Levi, 1996; Hammarsström & Janlert, 2002). Self-medication is the individual's own attempt to solve physical and psychological problems, often with the help of fast solutions as different types of addictive drugs.

People who have been long-term unemployed has shown to have elevated cortisol levels in their hair compared to healthy controls. The use of hair for measuring cortisol is a good measurement because it is a relatively cheap and easy method. Together with these results, the unemployed also showed higher levels of psychosocial stress in the unemployed (Dettenborn, Tietze, Bruckner, & Kirschbaum, 2010). Another study showed that cortisol significantly increased during a twelve-month period for men. In women, cortisol increased the first six months but decreased later (Maier et al., 2006). It has been suggested that job loss is not as difficult for women as it is for men (Stephanson, 1991). The longer the persons had been unemployed, the more psychosomatic problems (when emotional stress damage and gives physical symptoms) occurred (Maier et al., 2006).

There was a longitudinal study, with fourteen years follow up on early unemployment and the effects later in adulthood. It was a study carried out in Sweden and showed that unemployment in young age had negative long-term effects on health behavior and health later in adulthood. The negative effects showed was smoking, psychological and somatic symptoms (Hammarström & Janlert, 2002). Another follow up longitudinal study from Sweden showed significantly result in the association between unemployment and mortality. This results remained even after possible confounding variables such as education, smoking, alcohol, long-lasting or serious illness, and personality factors were taken away. The result consisted twenty-four years after the beginning of unemployment (Nylen, Voss, & Floderus, 2001).

The financial loss that often occurs with unemployment has shown to be a contributing factor to the health problems in unemployment. Men who experience a continued financial loss are more irritable, explosive and tense. The bad behavior influences the children and the same mood was predicted in the children later in life (Elder, Caspi, & Van Nguyen, 1986). Financial loss in unemployment may also influence relationship status. Poor and unemployed

men are more likely to divorce and less likely to get married than employed men who are economically stable and employed (McLoyd, 1990). Further, the financial strain in unemployment has shown to be correlated with depression and the feeling of losing the control over oneself (not feeling able to search for jobs, control over feelings or lack of self-esteem) (Price, Choi, & Vinokur, 2002). With the financial loss, a reduction in social activities is often seen and social isolation increased. One study showed that poor people felt they could not afford to participate in communities or simple pleasures such as inviting friends over for dinner. There was a correlation between poverty and social isolation and the feelings of worthlessness and powerless came with this (Stewart et al., 2009). Another study showed that economic loss was significantly related to lowered subjective well-being (Brief, Konovsky, Goodwin, & Link, 1995). Subjective well-being according to Diener & Ryan (2009): The level of subjective well-being that the individual experience against their subjective valued areas in life, lack of purpose, unstructured time and reduced social contact. More studies have certified the loss of social contact and also the experience of less social support (McKee-Ryan & Kinicki, 2002).

The experience of less social support has negative outcomes on mental health (Roberts, Pearson, Madeley, Hanford, & Magowan, 1997). The negative outcomes have shown to be associated with increased illness, avoidance coping (characterized by the effort to “escape” or avoid a stressful situation), psychosomatic symptoms, depression and emotional stress (McKee-Ryan & Kinicki, 2002). Other studies found that unemployed people who have the feeling of low social support showed significantly higher levels and more changes in cholesterol and affective responses than the unemployed who experienced to be more social supported (Gore, 1978). Good social support from family and friends has shown to be significantly related to higher self-esteem in the unemployed. Moreover, it has been shown

that those unemployed who have higher self-esteem have easier to cope with unemployment than unemployed with low self-esteem (Linn, Sandifer, & Stein, 1985).

There has been found a correlation between unemployment and learned helplessness. Empirical research measured the level of depression in unemployment with the Beck scale. The Beck scale is a measurement especially for measuring the level of depression. The conclusion was that long-term unemployment resulted in self-blame or also called learned helplessness. Learned helplessness occurs when the feeling of control over the situation and outcomes is lost (Feather & Davenport, 1981). Other studies certify this (Baum, Fleming, & Reddy, 1986).

One study examined the stressful effect on being unemployed. The long-term unemployed showed arousal in the form of high levels of catecholamine's in their urine (different catecholamines are e.g. epinephrine, dopamine, and norepinephrine). This indicates a major stress response of the sympathetic-adrenal medullary system (produces epinephrine and norepinephrine). The unemployed also showed to be worse on tasks and solved fewer puzzles during the experiment than the employed. The task required both persistence and concentration (Baum, Fleming, & Reddy, 1986).

Why long-term unemployment can be devastating for the person's well-being is because of the important psychological needs that disappear with the job (Jahoda, 1981) and there is a number of factors that come into play on the psychological and physiological effects of unemployment. These effects have been seen to affect e.g. the unemployed physical and psychological well-being, mental health, and life satisfaction. The life facet model of coping, of McKee-Ryan and Kinicki's (2002), mention and explain possible factors that affect the job loss. The factors below are from the life facet model.

2.2.1 Work-role centrality. This defines also as employment, work involvement, career commitment, and employment value. Work-role centrality is how much value the

person put into work or how much they identify themselves to the work they have. It is the belief that the work the person has is of the high importance of the individual's satisfaction and life (Kanungo, 1982). There are individuals that identify themselves with their work and sees it as a source to feel fulfillment and give their life a sense of purpose. This people has shown in many studies, to be the most negatively affected about job loss and showed a decrease in physical and psychological well-being (e.g. Kinicki, 1989).

2.2.2 Coping resources. Coping resources are resources that the individual has both internal and external and could help the individual's well-being when she loses her job. This coping resource has shown to decrease the stress in the facing of a job loss. According to McKee-Ryan & Kinicki (2002) there are three different coping mechanisms that are relevant when an individual is coping with the loss of a job.

The first one is personal resources. Personal resources are the internal resources that the individual could use to cope better with stressful events better, such as loss of a job. Individuals who can maintain a better mental and physical health during unemployment, are those who have a self-image of worth, e feeling of control over their life situations and other similar components. These components are included in core self-evaluation. Core self-evaluation is an assembly of personal traits and shows how the person perceives his or her self in comparison to others. The personal traits that are brought together to resemble core self-evaluation are emotional control (lover negative feelings and low neuroticism), self-esteem and locus of control. An individual's self-evaluation plays a big role in how an individual physical and psychological well-being are. It has been shown that people who are exposed to different types of stressful events have easier to cope with the stress if they have higher self-esteem, higher levels of optimism and locus of control. These individuals also have higher levels of mental health.

The second one is social resources. Social resources are external coping resources and include social support and social interaction. These resources contribute to psychological and physical well-being in two different ways. The first one is social networks. Social networks help individuals to feel good about themselves and their life. This influences an unemployed person to maintain a positive attitude on their life during unemployment. Social networks decrease stress and, in turn, the somatic consequences. The other social resource is negative social support. It is negative social support because of the absence of social support. This results in behavior in the individual that involve criticism, anger, dislike, and inhibit a person wanting to reach her goals.

The third one is financial resources. Financial resources are to which extent an unemployed person has enough accesses to household income, savings, and severance pay. It is one of the most important determinants for an unemployed person, because of the other resources that fall away because the financial resources are not sufficient. These resources could be all from hobbies, social interests, food, training, household, and resources for an individual to stay physically healthy such as health insurance.

Perceived financial strain is a concept that is related to financial resources. It is how the person perceives their financial strain and if they find it hard to meet expense and if they are worried about their financial situation. There is a negative correlation found between well-being and perceived financial strain (Vinokur & Schul, 2002).

2.2.3 Cognitive appraisal. Cognitive appraisals in this context have to do with how the person interprets the job loss, i.e. whether the person perceives job loss as threatening, challenging or harmful. To appreciate the situation stressful negatively influences a person's physical and psychological well-being. How a person perceives the unemployment situation depends on the individual's work-role centrality, human capital, coping resources, and the person's physical and psychological well-being. Also, how the person has a self-perception of

being the person responsible for the job loss and how easy they think it is to get a new job, is a kind of cognitive appraisal and an important factor for how the person feels during unemployment.

2.2.4 Coping strategies. Coping strategies are defined as what the individual does cognitively or behaviorally to cope with the internal and external demands, i.e demands that are either testing or exceed a person's personal resources. Coping strategies are activated after the personal cognitive appraisals of the situation. These strategies are in two different general groups. The first one is problem/control-focused coping and tries to get to the bottom of the stressful situation. The other one is emotion/symptom-focused coping and is the strategy that tries to control the emotions in a stressful situation. One type of problem/control-focused copings is to search for new jobs. To be highly active in searching for new jobs are associated with decreased psychological well-being (Wanberg, 1997). Active job searching implies many rejection and uncertainty.

2.2.5 Time structure. To what extent a person still has a time structure during unemployment, has shown to be another coping resource that influences an individual's physical and psychological health. Having a good time structure is influenced by how the person engages in meaningful activities, has routines and how they approach time during a day. A person's life situation also influences time structure, such as taking care of children or other activities which requires time structure. Jahoda's (1982) theory, the deprivation theory of unemployment, says that there is a positive relationship between well-being and time structure. She notes that if an unemployed person engages in as many daily routines and meaningful activities that a job normally involves, then the unemployed person's well-being will be fostered.

2.2.6 Human capital and demographics. Human capital is a person's potential and the knowledge that she has. This could be talents, education and job experience. If an

unemployed person has a big human capital with, for example, high education, this person maybe has optimistic expectations about getting a new good job and this decreases the stress over being unemployed.

There are other variables included in job loss research: e.g., gender, race, marital status and length of unemployment. These variables influence persons differently depending on the individual's well-being, coping strategies and probability of reemployment among other factors (McKee-Ryan, Song, Wanberg, & Kinicki, 2005)

Reemployment has shown to have a positive effect on health satisfaction, independently on the duration of unemployment (Gordo, 2006).

Some studies have shown that if a person is unhappy on her workplace and experiences too much pressure, unemployment could be associated with an increase in a person's health (Ezzy, 1993).

2.3 The hippocampus and stress

The highly adaptable and sensitive brain part hippocampus is a medial temporal lobe structure and, as mentioned earlier, crucially involved in memory. It is involved in declarative- (memory that the individual consciously could recall), contextual- (time, place, feelings or other traits related to the feeling) and spatial memory (the ability to remember a surrounding) (McEwen, 2001).

The hippocampus is also involved in neuroendocrine regulation (which is regulation of hormones) and contextual fear conditioning. Fear conditioning is a form of learning and takes place when a normal stimuli causes an expression of fear in the individual. The organism has learned to associate negative and external stimuli (e.g. electrical shock) with a neutral stimuli (e.g. a room) (Lee, Ogle, & Sapolsky, 2002). Hippocampus is also concerned with the perception of chronic pain and nociceptors (pain receptors) (McEwen, 2001) and it both processes and adjusts the nociceptive stimuli (Covey, Ignatowski, Knight, & Spengler, 2000).

The neurotransmitters that modulate stress creates pathological effects in the brain if the stress gets prolonged. These neurotransmitters are adrenal steroid hormones and include glucocorticoid (GC) cortisol, epinephrine (adrenaline) and norepinephrine. When it comes to temporary stress, all these hormones have an essential role in humans (Sapolsky, 1996). GC, for example, is extremely important for handling acute physical and psychological stress. The hormones increase the cardiovascular signal and divide energy to the working muscles. The cardiovascular signal consists of heart, blood vessels, and blood that transports through the blood vessels. This system transports oxygen, nutrition, hormones, and cell waste in the body. During stress, GC also inhibit unessential mechanisms such as growth, reproduction, digestion, and the immune response that otherwise would sharpen thinking (cognition) (Sapolsky, 1999).

The hippocampus has an abundance of receptors for the stress hormone GC which is secreted during chronic stress and synchronized to the diurnal rhythm (the biological clock that synchronizes with the day/night cycle) (McEwen, 2006). Cortisol is the primary GC in humans (Goosens & Sapolsky, 2007). Also, when GC is at a normal stress range, which is some sort of stimulation during the day, it increases cognition. During a day, all events do not become a memory. The GC levels increase synaptic plasticity which makes the hippocampus able to expand. It is an adaptive mechanism and focus more on emotional events. However, when GC levels get dysregulated because of prolonged and major stress, GC, along with the other adrenal steroids has harmful effects on the brain and the hippocampus (Lee, Ogle, & Sapolsky, 2002).

Studies measuring hippocampus, and how it gets affected of stress, are often made on animals because the same studies would be unethical to carry out on humans. It requires highly intrusive measures that generally kill the subjects. Therefore, research on rodents showed that prolonged secretion on GC had especially harmful effects on the hippocampus.

Stress for some days endangered the hippocampal neurons. The neurons got challenged and had a harder time to survive ischemia (lack of acid in the brain) or seizures. During repeated neurological insults, the glutamate and calcium regulation got poor and the steroids worsened the regulation further (Sapolsky, 1996). For the most part, the hippocampus uses glutamate as a neurotransmitter. It is known as the most excitatory neurotransmitter (it increases the probability of the cells to produce an action potential). Glutamate accumulates in the synapses (the connections between two neurons) during learning and binding the glutamate receptors. NMDA (N-methyl-D-aspartate), which is a glutamate receptor, activates due to the binding and make it possible for free cytosolic calcium (the calcium can now work as a second messenger to another neuron). In turn, the mobilization of calcium activates the long-term changes in synaptic excitability which forms memory (Lee, Ogle, & Sapolsky, 2002). After a week with a prolonged secretion of GC, the hippocampus dendrites (projection of a neuron that receives signals from other neurons) got injured because of the GC. The hippocampus starts losing neurons permanently if the secretions continued for more than over a month period (Sapolsky, 1996).

Studies that have been able to be carried out on humans have found evidence for GC-induced damage in humans. In one study they examined patients with recurrent major depression and found abnormally high amounts of GC. When they just checking the patients that had suffered recurrent major depression the results showed significant results on magnetic resonance imaging (MRI) and showed a reduction in the volume on both the left (15%) and the right (12%) hippocampus compared to healthy individuals. There was no change in the volume of the overall brain when compared to controls. The participants with a history of depression had been free from it in months and the GC level was back to normal (Sheline, Wang, Gado, Csernansky, & Vannier, 1996). Additional studies have been made on individuals suffering PTSD. The study was carried out on Vietnam's veterans with PTSD and

they showed significant reductions in the right hippocampus (8%) and almost a significant reduction in the left (Bremner et al., 1995). There are other researchers that have examined Vietnam veterans and found significant reductions on right (22%) and left (26%) hippocampus (Gurvits et al., 1996).

Further, the prolonged secretion of GC impairs the passage that makes it possible for nerve impulses to travel in the brain (dendrites), and inhibit the process in making new neurons (neurogenesis, and is the lifelong process of new neuron formation). Neurons have problems surviving and this increases the risk for neurotoxicity seizures (when a biological, physical, chemical agent produces a harmful effect on the function or structure of the nervous system) in the brain. This results in the inhibition of natural enzymes to execute their necessary functions, such as cellular respiration (metabolic poison) and reduced oxygen supply to the brain (hypoxia-ischemia) and blood sugar become low (Lee, Ogle, & Sapolsky, 2002). Other studies also show pretty clearly that clinical levels of stress damage the hippocampus and hinder or block neurogenesis and affecting the hippocampus' critical role in the laying down of long-term memories, without which learning cannot occur. (Gould & Tanapat, 1999).

Cortisol dysregulation are also correlated with bad task performance. A study showed that people with cortisol dysregulation correlated with executive dysfunction (harder to choose and make a conclusion about what behavior is most useful in a chosen goal/task) (Egeland et al., 2005).

Moreover, cortisol dysregulation is correlated with low self-esteem and learned helplessness (Pruessner et al., 2005). Learned helplessness occurs when she does not feel capable to take care of herself or her family, but also the general feeling of losing the control (Baum, Fleming, & Reddy, 1986). When an individual perceives events as uncontrollable there are often three problems that occur and they are, cognitive, motivational and emotional.

Cognitive: If an individual succeeds with something that facilitates the situation they have hard to see it. Motivational: The motivation to react for future trying challenges are wane. Emotional: The emotional balance gets disrupted and this increases the risk for anxiety and depression (Maier & Seligman, 1976). A person who sees their successes and failures as internal sees it as it depending on herself and her skills. A person who sees it as external sees there failures and successes as it happens by chance or luck and is under their control. The external people have shown to have harder to handle unexpected events (Hiroto, 1974).

The hippocampus norepinephrine has shown to be higher in rats conditioned to learned helplessness (Petty, Chae, Kramer, Jordan, & Wilson, 1994). The norepinephrine system stems from the nucleus locus coeruleus. This system has long been hypothesized to be involved in mediating behavior linked to arousal, alertness, and stress (Koob, 1999). The stress in learned helplessness seems to increase norepinephrine release in the hippocampus and make it sensitive. Norepinephrine is a neurotransmitter in the hippocampus that seems to help prevent learned helplessness, but this hypersensitivity that is created of the stress seems to instead increase learned helplessness (Petty et al., 1994).

The changes, due to high GC, are correlated with posttraumatic stress disorder (PTSD) and is a psychiatric disorder people could suffer from because of traumatic experiences. A patient suffering from PTSD often shows symptoms of uncontrollable and automatic flashbacks of the traumatic event and panic attacks triggered by unconscious associations with the traumatic event (Bremner, 2001).

As mentioned above, the hippocampus is a highly adaptable part. The capacity in the hippocampus for dynamic changes are seen in London taxi drivers. They have shown smaller dorsal hippocampus and larger ventral hippocampus. The volume is related to the length of working as a taxi driver. This study may be additional proof that a healthy adult hippocampus is capable of plastic change because of the environmental demands (Maguire et al., 2000).

Major depression and long term depression also influence structural changes in the brain but especially decreases the size of the hippocampus (Lee, Ogle, & Sapolsky, 2002). This injury makes it harder for the body to adjust to stressful situations (McEwen, 2006) and the hippocampus decreases the longer a person has been depressed, and the changes remain even a long time after the depression (Lee, Ogle, & Sapolsky, 2002). Also, the structural changes in the hippocampus could lead to that the patient has problems with short-term memory and verbal memory (memory of words and other components in language) (Bremner, 2001).

Depression could also occur if the brain gets exposed to stress while the hippocampus is under development. One study showed that women that got exposed to trauma before they were twelve had a higher risk for depression than the women that got exposed to trauma between twelve and eighteen. They instead developed PTSD more frequently (Maercker, Michael, Fehm, Becker, & Margraf, 2004). Another study showed that recurrent sexual abuse early in childhood was associated with a decreased hippocampal volume (Teicher, Tomoda, & Andersen, 2006).

GC also contribute to brain aging. To be older imply changes in the body and the system gradually decline. This decline causes physical, chemical, biological, and psychological changes. The brain is no exception from getting affected. The hippocampus is also vulnerable for normal aging and pathological changes with aging.

They found the possible relation between GC and peripheral signs of aging because of a patient suffering from Cushing syndrome (a disease characterized by excessive levels of GC). This patient showed similar symptoms as older people usually do. Symptoms such as hypertension (high blood pressure), heart disease, osteoporosis (a disease characterized by low bone mass and worsening of bone tissue), type II diabetes, loss of muscle and depression (Goosens & Sapolsky, 2007). Cushing's disease also shows problems with the laying down of

memories dependent on the hippocampus. The extent of memory impairment predicts the extent of GC hypersecretion (Sapolsky, 1999).

Depression is a disease that shows high levels of GC cortisol and accelerates the brains aging. Other factors that are stressful and can increase the cortisol are caregiving and chronic pain, which also accelerate the aging. People with genetically smaller hippocampus has also shown to be more vulnerable to stress and the cortisol dysregulation (Goosens & Sapolsky, 2007). Studies have shown that healthy older individuals have often higher cortisol levels than younger individuals. Showing that heightened levels of plasma glucocorticoids over years in older adults have a negative correlation with memory and hippocampal volume (Lupien, McEwen, Gunnar & Heim, 2009). Studies have also shown that elderly people that have been exposed to the most frequently traumas and have the biggest increase of GC concentration, also has the biggest problems with autobiographical memory (future thinking and spatial navigation) that the hippocampus handle (Sapolsky, 1999).

2.3.1 Allostasis. Allostasis is the adaptive response that turns on and turns of the allostatic system (includes the autonomic nervous system and neuroendocrine system). It is the body's attempt to go back to stability (homoeostasis) after it has been exposed to a psychological or physical change. Allostasis protects the body by responding to internal and external stress, with the help of hypothalamic-pituitary-adrenal (HPA) axis, autonomic nervous system, and immune system. A consequence with this response is that repeated activations of the allostatic system lead to allostatic load, which is a wear and tear (McEwen, 2001).

There are four different allostatic loads. The first one is a sustained challenge such as chronic stress. The second one is having a hard time habituate to a challenge situation. The third one is having difficulties go back to a normal state after the challenge is gone. The fourth is having difficulties too, in the right amount, react to the challenge.

There are two types of chronic stress that make changes in the hippocampus, which emphasize the role of allostatic load and will be summarized below. The first one was the cumulative effects of stress in rats. The rats showed a large elevation of GC in the blood when putted in a restraint stressful situation. After some days in the restraint stress, the HPA response progressively habituates to the stress. This is characterized by the initial peak of corticosterone (reminds of cortisol) that turns of earlier and earlier after some days. Despite this evident change, the rats did not start to show dendrite remodeling until the 21 days of restraint stress. This time they also showed impairments of hippocampal-dependent learning. They also showed suppression of neurogenesis in the dentate gyrus (a part of the hippocampus, and thought to contribute to the laying down of new episodic memory). Repeated restraint stress in 21 days showed conditioned fear and aggressive behavior towards other cage rats. Repeated exposure to restraint stress showed behavioral consequences due to increased fear and aggressiveness. This occurred despite the HPA response habituation to the same stressor (Magarin & McEwen, 1995).

The second one is psychosocial stress. Psychosocial stress is an incredible heavy experience. It is the mental interpretation (cognitive appraisal) of what happens and the feeling of not having the right resources to cope with the situation. Five male rats were put together with two female rats. They created a hierarchy in who dominates, and the rats low in the hierarchy died during the weeks they lived together. The rats lowest in the hierarchy and that survived, showed very low levels of testosterone and an impaired HPA response on the restraint stress. They also showed a dendrite remodeling. The remodeling was on the hippocampal pyramidal (multipolar neuron) neuron CA3, which usually appears after restraint stress in rats. The study also showed that chronic stress reduced neurogenesis after 28 days in the dentate gyrus (a part of the hippocampus) (Blanchard et al., 1998).

In a study on humans exposed to psychosocial stress, there was a correlation between high levels of cortisol and having low self-esteem and locus of control. Therefore, people with these traits showed higher cortisol stress response when they were exposed to psychosocial stress. To perceive a situation stressful for a longer time generates more cortisol; which in turn has harmful effects on the brain and the hippocampus (Pruessner et al., 2005).

3. Method

My plan was to identify articles and collect data using such databases as Web of Science and Scopus and such search terms as "stress"+"hippocampus", "long-term unemployment", "cortisol"+"behavior", and "cortisol"+"hippocampus".

I would start out by reading the literature on long-term unemployment and stress, then familiarize myself with the literature on the hippocampus and stress before attempting to draw connections between the two kinds of literatures. I expect to find a relationship between long-term unemployment and a stress-induced hippocampus because unemployment is an incredibly stressful experience to be exposed to. There are some limitations to put in mind when I write the thesis. I have a lack of experience in certain areas I will write about, which risks something to be misinterpreted or rule out other relevant information. The other limitation is that I will focus on specifically the stress-related consequences when it comes to unemployment, which means that I will not get the whole picture.

4. Results

GC is one of the extremely important adrenal steroids hormone for handling acute physical stress. It activates the needed mechanisms in the stressful situation and inhibits the unessential in the body. The highly adaptable hippocampus has an abundance of GC receptors. When there is a dysregulation of GC for a longer time, it has harmful effects on the brain and the hippocampus. The effects of this are correlated with symptoms such as depression, restraint stress, PTSD, low self-esteem, learned helplessness, and psychosocial stress.

Similar symptoms are shown in long-term unemployment. There is also shown that dysregulation of cortisol (the most important GC in humans) is correlated and showed in long-term unemployed. To lose the job and remain in unemployment for a longer time is extremely stressful because of the involuntary loss of things that disappear with a job, such as income, time-structure and work-role centrality e.g. There are possible to draw a relationship to the long-term unemployment physical and psychological well-being to a stress impaired hippocampus, but the feedback cycle found shows that they affect each other.

5. Discussion

As this paper has mentioned, stress is the phenomenon that affects the individual the most when they become long-term unemployed. There seem to be similar symptoms on individuals stress affected and injured hippocampus as the symptoms on individuals that have been unemployed for a longer time. Therefore, it is possible to make a connection and claim that it is harmful to the hippocampus to be unemployed?

As mentioned on page 10, unemployed people have shown to have self-harm behavior and this turns out in unhealthy food, use of alcohol and nicotine. In my opinion, a possible explanation to this behavior could be because of the perceived stress in being unemployed and the loss of financial income which contributes to depression and self-medication in form of e.g. nicotine and unhealthy food. The drugs in themselves have negative effects, such as high intake of sugar in rats showed to reduce hippocampal neurogenesis (Van der Borgh et al., 2011). In humans, the effects of the highly produced food could, in turn, give effects such as metabolic dysfunction, diabetes, lipid problems (problems with the type of fats that are carried in the bloodstream, also called high cholesterol), hypertension (high blood pressure) and cardiovascular diseases on humans (Lustig, Schmidt, & Brindis, 2012). So not only does the stress in itself impair digestion, also poor food further degrades the body's ability to absorb and process important nutrients. It is not difficult to imagine that a person who does not get

enough nutrients will soon become a tired, irritated and finally lifeless person. Also, in some countries such as the USA, carbohydrates such as white bread and sugary yogurt is often cheaper than healthy food. This, in turn, makes unemployed with a lowered income choose unhealthy food instead of the healthier because it is cheaper. In the USA they also talk about the “food desert” and means that it is lack of higher quality supermarkets in neighborhoods where a majority of the people living there are poor and of low income. These supermarkets lack healthy food because the people living close to the store does not afford it, which makes it hard to find healthy food if someone lives in these neighborhoods. There are therefore possible to think that unemployed people in the USA, and other countries with the same problem, choose to buy high carbohydrate food because of it cheaper and their neighborhoods they are living in does not have a big healthy range in the stores (Walker, Keane, & Burke, 2010). Maybe the unhealthy food could also be an explanation for diabetes that has shown to be correlated in unemployed.

Page 20 discusses the high prolonged stress and how it gives abnormal levels of GC in the hippocampus and how the effect of this shows negative symptoms such as low blood sugar. The low blood sugar could also be an explanation for the unhealthy diet in long-term unemployed because the low blood sugar contributes to cravings after fast carbs such as sugar, white bread, and pasta. Stress also causes bad sleep and this, in turn, causes low blood sugar, which could be the reason to seek for fast energy in the white bread or sugar. Further, the hippocampus has many nicotinic acetylcholine receptors (respond to drugs such as nicotine). It is one of the brain areas that contribute to addiction through cravings and drug-seeking behavior; drugs such as nicotine, alcohol, etc. (Gould, 2006).

As mentioned already in the introduction, long-term unemployed have shown to have lower self-esteem and more learned helplessness than employed people. Learned helplessness is possible because an individual can be put in unemployment unexpectedly. Unemployment

could cause a loss in financial income resulting in stress over incoming bills, necessary future expenses, for example, in the home, and the loss of a self-image as a working and supporting person. Has the person been long-term unemployed for a long time it is possible to imagine that the self-esteem decreases. The person has probably experienced more and more job rejections, stop with activities that cost money such as training and social activities with friends, and the loss of time-structure. The low self-esteem and the hopelessness in long-term unemployment could be a contributing factor to learned helplessness and the feeling of not having the ability to change the situation.

High levels of cortisol have also been correlated with low self-esteem and learned helplessness as page 20 mention. It has also shown high levels of hippocampal norepinephrine (one of the other adrenal steroids hormones) in rats conditioned to learned helplessness. Normally, it seems that norepinephrine prevents learned helplessness but seems to make the hippocampus super sensitive during stress and instead contributes to learned helplessness. One can hypothesize that a healthy person that gets unemployed, has at the beginning of their unemployment still the strength to search for new jobs. The short-term unemployed maybe feel the stress in being unemployed and gets motivated to search for new jobs. But the longer time the more increases the stress in being unemployed because of all the mentioned negative side effects of not having a job or an income. They become long-term stressed. It is possible that the long-term stress has created high levels of norepinephrine a longer time which has caused damage effects on the hippocampus and this is shown in bad self-esteem, depression and learned helplessness. The harming effects could contribute then to that the individual does not experience the same power over their life and quit the search for jobs. Learned helplessness has destroyed the motivation to do something about the situation. Therefore, another explanation to learned helplessness could also be because of the harming effects of stress in unemployed. The high levels of hippocampal norepinephrine during stress could

maybe be the contributing factor to learned helplessness in unemployed. Further, the risk for low self-esteem and learned helplessness, as a factor of a stress-affected hippocampus, could be an explanation for the decreased social support that unemployed often experiences. Low self-esteem and learned helplessness could lead to self-blame and thoughts such as that it is not worth getting in touch with friends, not being funny enough or that the lack of money makes people do not want to hang out. Another explanation could be because of financial problems. Long-term unemployed get problems to afford social activities such as inviting friends over dinner, sports, go on vacation or continue in societies. The social life decreases and social support together with this.

On page 10 the thesis talks about that people over 50 are most negatively affected by job loss. One can think that that people in their middle age experience more financial responsibility and pressure to make carriers. Younger people may not feel, at the same extent, this pressure at the beginning of their carrier. Older people are closer to retirement and do not feel the carrier pressure anymore or financial responsibility because their family is old enough to take care of themselves. Maybe the stress in the perceived pressure that middle age people experience along with the aging brain, could also be a contributing factor to why unemployment is harder to handle. The longer one is alive, the more possibilities there are for things to break and not get fixed or completely get fixed in the brain. There are errors creeping in and tend to accumulate.

There is a correlation between getting older and heightened levels of cortisol as mention on page 23. This makes the brain ages and reduces the hippocampus, resulting in negative effects such as depression and the impaired ability for the hippocampus to lay down memories. Also, after a while, the prolonged perceived stress in middle-aged creates long-term depression and this influence structural changes in the hippocampus and accelerate the

aging brain. Is it that middle-aged people are an easy target for unemployment, because of their supporting and carrier pressure along with their aging brain?

Unemployment is often showed to affect men more than women as discussed on page 11. Already in short-term unemployment, the men showed a bigger decrease in health satisfaction than women. Expectations for a job career are different for men and women in different countries. Men are often expected to have a job career and support the family with an income. Women can take other alternative positions such as housewife. This depends of course which country it is about and it can differ a lot between a country that are equal to a less equal country.

Page 9 mention that the risk of suicide is bigger for unemployed men than for women. The statistics for suicide are generally higher in men. Why suicide statistics are higher in unemployed men could have its explanation due to the fact that men are more affected by unemployment because of the above-mentioned explanation. Another contributing explanation could be that men don't talk as much about their feelings as women do and do not feel the same emotional support. Men often socialize through activities such as sport, business, hobbies, and politics. For a man to talk about emotions and feelings of hopelessness can be a way of showing that one is vulnerable and this can be considered a weakness. To show weaknesses gives advantage for others. Women have easier to feel supported in this kind of social connection (Brown, & Gilligan, 1993).

The typical picture of men being the supporter of the family and make carrier and women should be home and take care of the family is a stereotypical picture of heterosexual couples. Equal countries as Sweden fighting against this "picture". In Sweden they strive for equality and both men and women should take as much responsibility in the home such as maternity and cooking. Men encouraged to dare taking more women-dominated jobs and women encourage to take more man-dominated jobs. In equal countries, education is a matter

of course for both sexes and these countries strive for all individuals, both men and, women, to make carrier and get an independent life. Women in Sweden are not as dependent on the men as they were before. It would be interesting in future research to look closer on how women in equal countries get affected by job loss versus women in countries that don't have similar rights as men, gets affected. My hypothesis would be that women in equal countries are affected more negatively about job loss because they also experience the expectations about being supportive and make a carrier. These women don't have in the same extent other alternative roles such as housewives. Also, women in equal countries maybe experience that they should prove that they are as good as the men in making carrier and it hurts harder to be unemployed because this could be an "evidence" that this is not the case. The stress for women could, therefore, be similar as it is for men, which will also affect the hippocampus more for women that live in equal countries.

Psychosocial stress is chronic stress that contributes to structural changes in the hippocampus and has been shown in long-term unemployed, as mention on page 24. The body has been stressed for a longer time and ended up in allostatic load. Chronic stress makes the person perceive the situation as impossible to get out and not have enough resources to handle the situation. The hopeless situation maybe stems from the feeling of being poor and inferior when the job has disappeared. With psychosocial stress comes also a lack of self-esteem and learned helplessness. As mentioned earlier, studies have shown that short-term unemployed have easier to find a job then long-term unemployed. The negative effects of psychosocial stress could be the reason why it is mentally harder for long-term unemployed to find a new job. They are dealing with more learned helplessness and lack of self-esteem than short-term unemployed. But also the negative changes in the hippocampus because of chronic stress, makes it harder for long-term unemployed because they are not as physical and psychologically healthy as the people who have been unemployed for a shorter time.

The stress harm the hippocampus which in turn makes it harder to cope with stress, a typical feedback cycle.

There is also a risk of selection bias in short- and long-term unemployment research. It is maybe not the length of unemployment that affects the chances of getting a new job, but more the differences between the participants in the two different groups during the experiment. The participants who have been unemployed for a longer time could be people who already before suffered depression and this has also put them in the unemployed situation from the beginning. The participants that have been short-term unemployed have maybe lost their job because of changing circumstances on the work, but still has the traits to search for a new job and has the attitude that they will get a new job, which in turn increases the chances for a new job. This could also be an explanation of why short-term unemployed experience more health satisfaction than long-term unemployed. Further, it is also more tempting for an employer to hire someone that has been unemployed for a shorter time. This is because short-term unemployed may just have been unlucky when they lost their job, not yet been damaged by the unemployment and still have the self-esteem and motivation to give a good impression on an interview. It may be easy, as an employer, to be skeptical of a person who has remained in unemployment for a long time.

There is a big chance for long-term unemployed to experience the cumulative effects of restraint stress, because of the long-standing challenging situation. As page 24 mention, rats that were put in restraint stress showed suppression in the dentate gyrus in the hippocampus (thought to be critical for laying down memories). This also showed on behavior such as aggressiveness and fear; symptoms also showed in the long-term unemployed. If I would speculate, the long-term stress in being unemployed could then maybe influence the dentate gyrus as it did in rats and therefore show the same behavior such as fear and aggressiveness. Long-term stress contributes to allostatic load and this, in turn,

make it harder for a person to react in the right amount to a stressful event, either too aggressively or too fearfully. With this I think that it could be hard for a person that has been unemployed for a longer time to handle the stressful situation they are in, it can also be hard to handle new stressful situations such as search for jobs, go to work interview, meet new people, start a new activity or take an important call. It is also no wonder that the relations of the unemployed have shown to be more deteriorating than the relations for the employed. This could be because their stress makes it harder for them to handle adversity in their relationship. The setbacks are harder on the relationship and the stressed person can overreact by becoming too outgoing or by not reacting at all. It is an exposed position in being unemployed and it is not strange if the person feels pressed and responds with aggressiveness or fear. The mental stress or danger experienced makes the body prepared for fight or flight in stressful situations.

Further, when I have looked through the literature, I have come to the conclusion that there are many behaviors and symptoms seen in a stress-damaged hippocampus and a long-term unemployed that is negative for a relationship. Therefore, there is no wonder that the studies, mentioned on page 12, have shown that there is a bigger risk for poorer and unemployed men to divorce and have a smaller chance to get married. The negative symptoms that I think about are specifically the aggressiveness and the fear named above, but also the decreased sex drive, the use of self-medication and depression. It can be frustrating and trying to be related to someone that suffers anxiety and fear. The anxiety, fear and lowered self-esteem could lead to social anxiety because the unemployed experience shame over their situation and think it's hard to be around people who can judge and ask questions. The lowered self-esteem and learned helplessness could also contribute to that the person starts feeling dependent on their partner and she can also overreact on things that the partner says or does. These behaviors could end up that the partner to the unemployed starts doing things on her own and feel heavy

for the responsibility for the other person. Further, sex is often something that many values as an important part of a relationship and interprets attraction and love. When the unemployed partner has lost the sex drive and is not able to satisfy their partner in that way, this could create the feelings of being unloved in their partner. Infidelity seems to often depend on the feeling of being unloved and the partner end up trying to search for love on their own. If a partner also starts with self-medication such as unhealthy food, drugs or other addictive things, this could be hard to handle for someone related. These “drugs” often costs a lot of money and the person gets unhappy and the personality changes. The money that is used maybe does not exist or maybe it is the money earned from the working partner.

Why there was a difference in the experienced pressure of wage (page 10) between short-term unemployed and long-term unemployed and why there was less experienced pressure from long-term unemployed could have different explanations. It is possible that those who have been unemployed for a long time have been used to lowered financial income and adjusted to a life with less outlays. There is a risk that the persons who have been unemployed for a shorter period of time are still used to a life with more outlays, e.g. vacations, entertainments, gym, more expensive food, finer clothes, better utensils and so on.

The environment may play a big role in how unemployment is perceived and the level of stress depends, among other things, on how negatively the hippocampus gets influenced. Some factors could be more difficult to affect, but the environment could also depend largely on how the individual is and which environment they have put themselves in. If a person does not feel good mentally, they may have difficulties deciding what is good for them. Such person may have put them in a bad relationship, moved to a bad apartment and surrounds themselves with bad people. It is harder for a person to control how the unemployment rate is in the country and how the support for unemployed people is in the country, for example. If the environment is bad the stress level may be high from the beginning and this could mean

that unemployment gets harder for his persons to handle. It can be hard to determine if it is the stress in the unemployment that affects hippocampus or if it is stressful people with an already tired hippocampus that get into unemployment.

When I looked through the literature I saw a possible feedback cycle between unemployment and injured hippocampus. A person with a decreased hippocampus, because of earlier trauma or stress, may have harder to handle stress, suffer from depression (and so on) and this, in turn, could predict unemployment. In one study by Kokko, Pulkkinen & Puustinen (2000), their result showed a significant relationship between the individuals' characteristics in childhood and long-term unemployment in adulthood. Other studies have shown that people who are unemployed often have other problems and that depression is a predictor for unemployment later in life (McKee-Ryan, Song, Wanberg, & Kinicki, 2005).

The possible feedback cycle makes it hard to determine what influences what, and it seems more as everything influences everything. Different factors such as behavior in the individual play a role in how the environment, the brain, and body is.

A person could have genetically harder to handle stress because of, for example, a smaller hippocampus, and a person could also have easier to suffer from depression, anxiety and, low self-esteem. These difficulties could make it harder to hold on to a job and get out of unemployment. As mentioned earlier, people could also have had traumatic experiences and suffer from PTSD or have been exposed to trauma before they were twelve and suffer depression because the hippocampus was not properly developed. It is possible to imagine that even these people have more difficulty in maintaining a job or getting out of unemployment. With depression, as a result of a decreased hippocampus, comes the feelings of hopelessness and the difficulties in handling a stressful situation.

With that said, the poorer mental health predicts unemployment, and unemployment worsens poor health (Weber & Schaller, 1999).

5.1 Future research

In the future there should be more research on both men and women on how they interpret unemployment, today most of the studies are on men. There should also be more research in equal countries to see if the unemployment affects men and women differently as compared to less equal countries because the different roles between the sexes are not that clear in equal countries. Future research should also do more studies that originate from healthy individuals that lose their job and see how their well-being after time changes. This will then measure the actual effects of unemployment, this is easiest done with longitudinal studies. There would also be interesting of future research focused on the hippocampus and unemployment and see if there are specific changes in the hippocampus due to unemployment. More research should also focus on the typical problems that a stress-affected hippocampus causes such as bad memory, bad task performance, and problems with short-term memory and see if there are any correlations with unemployment.

If I would have the money and the time it would be interesting to do a longitudinal study on unemployment and see how the hippocampus changes during time. At the beginning of the unemployment, they should fill in forms on their physical and psychological well-being and make a brain image to see the size of their hippocampus. When the unemployed has been long-term unemployed for a time, they fill in the physical and psychological tests and there is a new brain imaging taken on their hippocampus to see if there are any changes.

6. Conclusion.

How does long-term unemployed psychological and physical well-being affect especially the hippocampus?

Stress is a physiological phenomenon and necessary for survival and for being able to function normally during a day. But long-term stress due to something that occurs external or

internal could instead harm a person and contribute with psychological disorders such as, depression, PTSD and anxiety disorder. The hippocampus is a flexible part located in the temporal lobe structure and especially sensitive to prolonged stress and abnormal levels of cortisol that comes with it. An injured hippocampus has shown to give negative effects such as depression, losing of neurons permanently, low blood sugar, metabolic poison, low self-esteem, learned helplessness and harder to handle stressful situations.

To lose the job is something which is perceived as a stressful event because of the important factors that involuntary disappears. Because of the stress, it is, therefore, possible to see similar symptoms in those who have been unemployed a long time and the symptoms of a hippocampus that has been affected by stress. If it is a coincidence or if it is a correlation is the future research job to figure out.

With the help of this review, I hope that people become more understanding for individuals that end up in a long-term unemployed situation and how hard it can to get out. More resources could be put on unemployed people. The psychological help they get could handle more about their experiences, feelings, and health than how to search for a new job the fastest way.

6.1 Limitations

This thesis is a review and I have compiled and tried to describe the facts found about long-term unemployment, stress and the effects on the hippocampus. It has not been possible to find all the existing material about these subjects because the existing research in these topics is huge. I had to gain an estimation of the information I found and therefore it may be some information missing.

There are many studies in the literature about the relationship between unemployment and well-being that are affected by selection bias. Selection bias occurs when the groups in a study are not properly randomized and the result could not resemble the human population.

If the results in a study show that unemployed people have lower well-being than the working group, there could not be a conclusion that unemployment affected well-being. Instead, it could be that people with low well-being are at greater risk to be unemployed or that people with high well-being easier find a new job (McKee-Ryan, Song, Wanberg, & Kinicki, 2005).

Aggregate-level (data combined from several measures) studies have found positive relationships between unemployment and mortality, mental health problems, suicide, and heavy drinking. These studies are critical because there are not any generalization to an individual level. For example, it is hard to know if it is the unemployment that causes heavy drinking.

Longitudinal studies could also have some problems because of the length of time. People who do not experience any health decline could drop out of the study, or the well-being of the subjects could increase or decrease during the experiment depending on whether the months go towards lighter or darker times. Many studies found are made on men which means that some results do not always represent the whole population.

Some studies about hippocampus and stress, as described in the text, are on animals. It is unethical to expose a person to the same stress as to animals (absolutely debatable). This may cause some results coming from animals can be difficult to relate to humans because our hippocampus doesn't work in the same way and it might have responded differently.

It is always a risk for interpreting the information written by another scientist wrong. I do not have English as my native language, therefore I may have misunderstood what the other scientist has described, or I have not succeeded in describing a phenomenon correctly. Some studies I have chosen is from the 80s, it can be a risk to take old articles because new facts may have refuted the old results. There is also a risk that I have been referring to the same author several times, a scientist could have consciously or unconsciously interpreted results from their point of view.

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