Bachelor Degree Project

The Problem of Claustrophobia

with Proposed Solutions

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The Problem of Claustrophobia in Magnetic Resonance Imaging with Proposed Solutions

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I hereby certify that all material in this final year project which is not my own work has been identified and that no work is included for which a degree has already been conferred on me.

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Abstract

Claustrophobia is huge problem which affects a lot of people in their everyday life, not to mention the financial and scientific difficulties with prematurely terminated MRI-sessions, due to claustrophobia. In this essay there will be a further introduction of phobias in general and also a deeper presentation of claustrophobia in order to reach a better understanding of the nature of this disorder and how it affect people's daily life compared to the effect of a single claustrophobic reaction, when it is caused by the experience of a confined space. The objective of this essay is to investigate several treatment options, to find the most effective way of treating the condition in an attempt to diminish the personal and societal issues.

Keywords: Claustrophobia, Phobia, Claustrophobic reactions, Treatments for claustrophobia.

Table of Content

Introduction

An early but proper description of claustrophobia is a morbid fear of enclosed or confined areas which can result in a panic attack or anxiety hysteria (Lewin, 1935). This essay aims to look deeper into the sub-category of the phobia phenomenon called claustrophobia and investigate what major effects it can cause when a person is experiencing these reactions off drastic unreasonable fear. The essay will also propose and investigate possible solutions for reducing the experience of claustrophobia in those who suffers from it.

The main category of phobia are divided into five different sub-categories, these categories tries to encompass all kinds of phobias, yet are distinct from each other in several important ways. They are animal phobia (e.g. fear of snakes or spiders), natural environment phobia (e.g. fear of heights), blood-injection-injury phobia (e.g. fear of injection or dental phobia) and situational phobia (e.g. claustrophobia, fear of enclosed spaces). As previously mentioned situational phobia, which contains claustrophobia, is the one of the five categories that will be more closely examined later. The fifth category of phobia-types, which are called “other phobias”, are any phobias that do not match the requirements needed to be placed in the above categories (American Psychiatric Association, 2000).

A typical example of a problem caused by claustrophobia is found in MRI (magnetic resonance imaging)-studies, which are an ideal confined environment that can provoke claustrophobic reactions in people that previously never suffered from similar symptoms. This creates a time-wasting and financially difficult situation for medical sciences, which daily makes use of examinations and preforms research with the aid of MRI-equipment, since a lot of sessions cannot be completed due to the interruptions in the form of claustrophobic reactions, which in turn has the possibility to develop into the disorder of claustrophobia (Thorpe, Salkovskis, & Dittner, 2008). The technique within an MRI-machine is rather advanced and therefore also very costly. These kinds of examinations are getting more popular in the manner that they are a safe way of analyzing not only the brain structure, but also the functioning of ongoing neural processes. The fact that MRIs are getting more readily available in more places to greater extent indicates that the number of MRI sessions across the world is increasing at an extraordinary rate. In the year of 2011 the number of MRI-procedures performed each year where estimated up to 80 million, each procedure valued at the cost of €500. This is a turnover of €40 billion for the year of 2011 and this number is increasing every year as the MRI-technique is expanding. Studies show that 2-2,5% of those who undergo MRI-sessions suffer from claustrophobia, which leads to premature

termination of the examination. This means that the sum of money wasted each year because of prematurely terminated MRI-sessions ads up to €1 billion, which is important money for the health care system and can be used in much more efficient ways than for incomplete MRI-procedures (Enders et al., 2011).

The problem of claustrophobia in the field of MRI-research is of course not the only problem caused by claustrophobia, however it is a very substantial problem that clearly demonstrates the impact this disorder has on something as important as the progress neuro-scientific field of research. To be able to save the research of MRI from the loss of reliable scientific results, as well as financial expenses, there will have to be a greater understanding of what a phobia, or more specifically claustrophobia, is so the solution that is best suited for this problem could be found.

It is not self-evident that single reactions alone are responsible for interrupted MRI-Sessions. It is not known how many there are who suffers from the disorder of claustrophobia, but the main difference between the disorder of claustrophobia and the pre-mature termination of MRI-sessions due to claustrophobic reactions is the fifth point found in the DSM-IV: The awareness of this unreasonable fear affects the person’s daily life with concern of a phobic reaction (American Psychiatric Association, 2000). The only thing that allows the disorder of claustrophobia to be

recognized is the awareness and concern of a similar previously experienced claustrophobic reaction. This means that everyone who has not yet experienced the discomfort of claustrophobic reaction must be categorized as unknown regarding their disposition for the claustrophobic disorder. This means that even if a participant who goes through the process of an MRI-scan, and who does not at the moment suffer from the claustrophobic disorder, could still experience a claustrophobic reaction, which itself increases the risk of developing the claustrophobic disorder from the trauma of this initial claustrophobic reaction (Thorpe, Salkovskis, & Dittner, 2008; Faugloire et al, 2006).

The aim of this essay, which is created from peer-reviewed literature of scientific original studies and review articles, will be to focus in on the effects of claustrophobia and possible solutions for decreasing claustrophobic fear. Phobias will be discussed in general, including the difference between a phobia and a healthy fear, the possible origins of phobias and the neurological mechanisms of general phobias. Furthermore the focus of the essay will be on claustrophobia and the psychologically typical ways of reasoning around confined spaces when suffering from claustrophobia, before discussing the different cognitions and components of claustrophobia. Lastly the essay will examine a variety of

methods dealing with claustrophobia and each method will be discussed and evaluated.

Phobia

Regular fear is something that is completely normal, a trait that is developed within us in order to stay away from danger. This trait is also highly adaptive so that we are able at an early stage to recognize new threats and dangerous situations. Fear is something that makes us do something that we normally wouldn't do, although since we are afraid we change our actual behavior for the sake of avoiding what makes us afraid. An example of this is when you are about to cross the street and you look both ways before you cross the it so you will be sure not to get hit by a car (Gullone, 2000).

So what is it that distinguishes healthy fear from the fears exhibited in phobias and what is actually a phobic fear, or most importantly what more precisely a phobia is? In order for a fear to be called phobia there are according to the DSM-IV some requirements that must be fulfilled. 1) The person must be troubled with an exaggerated or unreasonable anxiety towards a specific object or situation. 2) Direct contact with the object or situation provokes an almost immediate situational panic reaction. 3) The person must be aware of that the anxiety is unreasonable. 4) The person is always trying to avoid circumstances with encountering of the

exaggerated feared object or place, or during encountering shows an intense anxiety or distress. 5) The awareness of this unreasonable fear affects the person's daily life with concern of a phobic reaction. 6) Lastly these criteria are for the duration of at least six months before it can be called a phobia. A person who meets these requirements is then classified as suffering from the disorder of a phobia (American Psychiatric Association, 2000).

The five main phobic subcategories are according to the DSM-IV (American Psychiatric Association, 2000) similarly prevalent compared to each other. The first category is Animal phobia, fear of animals or insects, which is mostly triggered in young children. The most common animals are snakes or spiders but all kinds of animal phobias are included in this category (American Psychiatric Association, 2000).

The second category of phobia is environmental phobia, which are phobias of the natural environment such as heights and which is also associated with certain weather situation. Exaggerated fear of water is also included in this category. Environmental phobias are also most commonly developed by young children (American Psychiatric Association, 2000).

The third category of phobia is blood-injection-injury which is the phobia of a person who reacts with fear to the immediate sight of blood or injury. This fear is also

triggered by injections or invasive medical procedures. This category is known for having the strongest hereditary traits (American Psychiatric Association, 2000).

The fourth category is situational phobia, which is based on situational stimuli including the phobia of confined spaces and also dental phobia and fear of flying is a part of situational phobias. These kinds of immense fears are most commonly developed in childhood, but there is also a risk at around the age of 25 to develop this particular subcategory of phobia (American Psychiatric Association, 2000).

The fifth category includes all of the other phobias that are not included in the four previously presented above. It includes for example the phobia of vomiting, getting sick or fear of clowns (American Psychiatric Association, 2000). This category contains a very broad spectrum of different phobias that are dissimilar each other in ways which makes it difficult to compare and categorize them as a group. The only things the phobias in the fifth category have in common are that they don't match any one of the previous four categories. The fifth category therefore functions as a complementary category of the remaining types of phobias.

It is quite peculiar that the most common types of phobias are not the ones caused by, in everyday life, more common sources of danger, such as violence, traffic accidents or fires, all of which are more common than risks of spider-

bites and falling accidents. Minenka & Öhman (2002) proposed that we have not yet had any reason to develop such phobias. According to the theory of biological preparedness, our ancestor's way of living in the midst of poisonous spider-bites and risks of falling was some of the most dangerous threats in their environment. Even though our society has changed the conditions of danger, our current phobias have not adapted as fast because of the slow rate of random mutations compared to the fast developing sources of danger. The evolutionary perspective proposes that species are developed through a very slow random mutation-process, which makes adaptations necessary for survival, yet so slow that humans have not had enough time to develop such instinctive fears as phobias against modern dangers such as traffic accidents. There have also been discussions of whether phobias are acquirable due to learning from traumatic experiences through classical conditioning, which is highly possible, though it would seem non-sufficient if the only way to acquire a snake-phobia were to get bitten by a snake. It has also been proposed that phobias could be acquired through vicarious conditioning as a complement to classical conditioning. This would mean that phobia could also be developed by imitating other close relatives that have a phobia, so that phobias are transferred in species through social heritage (Minenka & Öhman, 2002).

Even though these theories of phobia reaches way back, it has been discovered that phobias are psychologically reversible. Phobic disorders are often compared with panic disorders and post-traumatic stress disorder among others; all these disorders share the fundamental factor of being based on fear. Fear has under some time been associated with the amygdala in the brain. Fear engages on a subcortical network of structures that is centered around the amygdala. This is causing the amygdala to activate and the fear response to be directed to the fear stimulus. The subcortical system then works with the prefrontal cortex to modulate the emotional response in order to interact with social and environmental circumstances (Öhman, 2005). These subcortical pathways are much faster than cortical activation and can reach the amygdala making a fight- or flight response within a thousandth of a second. In comparison, the same responses in the cortical regions need about a second to be initialized. The subcortical pathway is faster but much more imprecise and might be overruled by the second cortical pathway if the first one should have interpreted stimulus inaccurately. For example, if you got scared because you thought saw a snake, the fight- and flight response might be overruled by higher cognitive functions revealing that it only was a snake-like stick on the ground. It is proposed by scientific studies that phobic disorders are the result of some dysfunction in the amygdala or related structures in the brain (Winerman, 2005).

In a study with fMRI testing it was shown that hyper-function in the amygdala due to phobic reaction normalizes after exposure therapy compared with pre-treatment at earlier stages in the same study. As classical conditioning has been used frequently it seems that through habituation the blood flow to the left amygdala reduces, which results in a lower fear response than shown in earlier fear-testing. Although this test was made in spider phobic subjects, similar results are likely to be found in the other categories of phobias as well (Goosens, Sunaert, Peeters, Greiz, & Schruers, 2007).

There are however some differences between the categories of phobia. Animal phobia and blood-injection-injury phobia both call for distressful experiences reported from subjective analysis, but what separates them is that animal phobia seems to provoke a pure feeling of fear, when blood-injection-injury seem to result in a reaction more reminiscent of disgust and repulsion. Blood-injection-injury phobia also creates different physiological reactions. Instead of indicating a sympathetic activation, as in animal phobia which regularly results in a heightened state of arousal that leads to a fight or flight behavior, blood-injection-injury phobic people shows a biphasic response pattern. This means that a person with blood-injection-injury-phobia is more likely to faint than panic, due to the lower levels of arousal. (Merckelbach, de Jong, Muris, & van den Haut, 1996).

Situational phobias also seem to provoke a fear response but not only a fear in components of restriction and suffocation, but also a fear of oneself losing control when being too afraid. This component of claustrophobia, that the expectation of danger is as stressful as the danger itself, is what separates the situational phobias from animal and blood-injection-injury phobias. Thus the component fear of losing control of oneself becomes an indirect fear, since it is dependent of the fear components of restriction and suffocation. If those fears would be adjusted then so would the fear of losing control. This fact of situational phobias is quite important with several emotional aspects and different types of fears, for it makes the explanation of agoraphobia (mainly defined as a fear of crowded places) and claustrophobia much more comprehensive than the other types of phobia. It is however clear that there is an obvious distinction between these phobias and that they are not part of the same homogenous class (Merckelbach et al., 1996).

Claustrophobia

People suffering from claustrophobia are not afraid of enclosed spaces per se, but are specifically more afraid of what might happen in a confined area. Confined areas are most often exemplified as small or locked rooms, cellars, tunnels or other similar environments that restrains or prevent movement. People who display fear reactions to one of these

situations are very likely to display the same kind of reaction in the same way to all similar situations (Radomsky et al., 2001). Why it is so common that people are afraid of confined spaces has been speculated and claustrophobia reactions resemble the reactions seen in animals, which are prevented from escaping by a confined area. This is a possible way that claustrophobia might be explained as a vestigial fear that prevents escape when a person feels threatened (Radomsky et al., 2001).

A common example of a typical way of reasoning by a person who suffers from claustrophobia, is the one in which a woman, who has clear symptoms of claustrophobia, is asked what the probability would be that a small elevator, which she had entered, would get stuck between two floors? The woman then answers that it would be a risk of about 10%. The woman is then asked what the probability would be for the elevator to get stuck on the 10th time, given that she had already taken the elevator nine times without it getting stuck. To this the woman gave the answer 100%. This example indicates clearly that not only do the woman exaggerate the probability of getting trapped in a claustrophobic situation, but also estimates the probability of getting trapped as increasing after successful attempts without getting trapped. This behavior of claustrophobic patients, to overestimate the probabilities of experiencing claustrophobic situations, might

be understood with the so called "rules-of-thumb". The first rule is availability: This means that claustrophobics have easier access to memories of traumatic experiences of claustrophobic situations. The second rule is simulation: That people who are suffering from claustrophobia might be more inclined to vividly imagine scenarios that include a claustrophobic situation. The third rule is representativity: The tendency of people suffering from claustrophobia to overestimate the actual number of negative outcomes of claustrophobic situations compared to the relative harmlessness of the situations shown in statistics (Öst & Csaltos, 2000).

It might not always be as simple as it seems to differentiate claustrophobia from the common discomfort that can be experienced in an enclosed or restraining environment. However, when the situation has become so demanding towards the patient that he or she can’t think rational, or prevent oneself from panicking, it is the very definition of a claustrophobic reaction. Even though it is only one temporary reaction toward a specific instance, it has been argued that there is a fair possibility for this single traumatic situation to be capable, not only to trigger pre-existing claustrophobia, but to onset the very disorder of claustrophobia itself (Thorpe, Salkovskis & Dittner, 2008; American Psychiatric Association, 2000,).

Components and Cognitions

The elevator example previously discussed corresponds well to the scales of claustrophobia. Öst (2006) tried to create a scale for the measuring of claustrophobia by means of self-reports, even though it was hard to create a scale that could adequately measure both of the existing components of claustrophobia. This was because there were very little overlap between the two already existing components scales, which separately measured fear of restriction and fear of suffocation. The theory that claustrophobia is divided into two different fears, suggests then that claustrophobia might not only be a fear of what could happened if one for example got trapped in an elevator, but also a fear of having a claustrophobic reaction when being trapped in an elevator (Öst, 2006). Those are not the only two fears however. Later studies have suggested that, complementary to fear of restriction and suffocation, there is also a third fear, the fear of losing control that enables the claustrophobic behavior (Öst, 2006). These three components can themselves be divided into several cognitive components, which are referred to as cognitions. These cognitions seem to play crucial parts in claustrophobia and their biological constituents are being studied continuously through MRI-research. Due to the complexity of the disorder there are several cognitive components that need to be identified. A recent study by

Thorpe, Salkovskis and Dittner (2008), distinguished the different cognitions to separate the fears that are primarily perceived by patients undergoing MRI-scans. From the testing of six potential fears, three tests were granted significant results. Those were fear of suffocation (e.g. being unable to breath in the scanner), Fear of coming to harm by the machine (e.g. something will go wrong with the device making to it cause harm to the person inside the scanner), and fear of losing control (e.g. the person loses the control over his or her actions). The other potential fears that did not yield any significant results in this particular study were fear of being trapped inside the scanner, fear of coming to harm independently of the machine (e.g. having a stroke or a heart attack during the scan) or making a fool of oneself (e.g. doing something that will spoil scan, making the patient look like a fool).

Claustrophobia in Cognitive Neuroscience

There have been discussions on the topic of claustrophobia in the relation it has to "near space" (Lourenco, Longo, & Pathman, 2011). Near space is commonly defined as the area surrounding the body, approximately a couple of decimeters around the body of every person. Within the near space, our neurological receptors are constantly working on registering everything that happens. The range of the near space is quite varying and differs between

individuals. Their actually exist a connection between the range of a persons near space and her susceptibility to claustrophobic symptoms. Claustrophobic people are believed to have a larger near space, which is forcing them to subconsciously and continuously process a larger part of their surroundings. This activity requires the brain to process a higher amount of information and this has been argued to become overwhelming in limited spaces, creating an uncomfortable subjective experience, also known as claustrophobia. Also, the same research were made with participants who suffered from fear of heights, which showed the same result, however this was reversed, in the way that fear of heights is a phobia within the acrophobia-type. Acrophobia actually means fear of distance in general, even though it most often expresses itself in the form of fear of heights, due to risk of getting hurt while falling. From this one could draw the conclusion that claustrophobia and acrophobia are representing opposite sides of the same continuum of neurological mechanisms. However, there is only a correlational link between claustrophobic fear and the size of near space and as such do not allow strong conclusions to be made between their causality. Despite this they seem in some way to be connected, which allows for the possibility that claustrophobia is, at least partly, a result of some underlying distortion in the representation of near space. Suggestions have also been made that persons who suffer from a

unusually large near space does not necessary suffer from claustrophobia, but runs a risk of developing a permanent claustrophobia through experiencing a traumatic event in a claustrophbic environment (Lourenco, Longo, & Pathman, 2011).

There have been limited amounts of neuroscientific research in the field of claustrophobia. A reason for that could be that there is a huge problem of finding volunteering claustrophobic participants, which is one of the problems that is addressed in this essay, along with the fact that phobias in general are very subjective conditions that doesn't show clearly identifiable symptoms of a typical disorder. A study by Etkin and Wager (2007) made a differentiated between post-traumatic stress disorder (PTSD), social anxiety disorder and specific phobias, in which they found a major difference between PTSD and the other disorders. What separated PTSD from the other disorders was that it was indicating hyperactivity in the amygdala, insula, ventromedial prefrontal cortex, rostral and dorsal anterior cingulate cortex and thalamus. The latter mentioned areas are known for dealing with experience and regulating emotions. This contrasted with social anxiety disorder and specific phobias, which only showed hyperactivity in amygdala and the insula. Another thing found in the study was that there were no significant differences in the brain imaging between the social anxiety disorder and the specific phobias. This result indicates that in comparison to PTSD

phobias are vaguely connected to early experiences and emotional responses, but act more in the subconscious mind as something that is similar to reflexive behavior. However, social anxiety disorder and specific phobias show a tendency of increased hyperactivity in the amygdala and the insula than in PTSD. The insula, which is interconnected with the amygdala and hypothalamus, is responsible for regulating the autonomic nervous system and shows activity when processing a variety of negative emotions. This has been shown to be the case in social anxiety, specific phobias, PTSD and normal fear conditioning as well. It is therefore likely that hyperactivity in the insula reflect increased activation of the network responsible for fear-generating responses to symptom-provoking stimuli (Etkin & Wager, 2007).

It is also worth mentioning that studies which are only directed towards subtype phobias in general are ambiguous and not able to capture the substantial character of each sub-type of all the different phobias. In order to be able to evaluate different phobias better, it is of greater interest whether the neural mechanisms are able to reveal any differences between subtypes of phobias (Caseras et al., 2010), so that there could be more reliable ways of establishing treatments for several kinds of phobias.

Available Treatments for Claustrophobia

There are a lot of different treatments for the disorder of claustrophobia. Some of them aim for the permanent recovery from the lasting fear which haunts the effected person's everyday life, and some of the treatments aim to temporarily decrease the risk and uncomfortable subjective experience of an anxiety reaction, or a panic attack (Choy, Fyer, & Lipsitz, 2007).

For this section I have chosen some of the most unconventional means to cure the disorder or at least reduce the effects and risks of claustrophobic reactions for a short time. First, however, I will introduce the most common conventional method, cognitive behavioral therapy, after which I will present the unconventional methods for comparative reasons. Cognitive behavioral therapy is perhaps the most common method for curing claustrophobia, but it is also possible to use this therapy to for example prepare for a series of MRI-sessions. The more unconventional methods, which are going to be compared with cognitive behavioral therapy, are hypnosis through neuro-linguistic programming and team training, after which I will look into a comparably undeveloped theory about virtual simulation and the final treatment which I will be discussing are sedations, a common example which is the intranasal midazolam spray.

Cognitive behavioral therapy

Cognitive behavioral therapy is recognized as an effective way to treat panic disorders compared to behavioral therapy. Behavioral therapy does not consider the cognitive parts of the patients condition, yet behavioral cognitive therapy and cognitive therapy do consider the psychological result of perception, learning and reasoning. Since panic disorders and claustrophobia have pathological cognitive similarities, cognitive behavioral therapy and cognitive therapy have a good chance in beeing effective against claustrophobia as well (Öst, Alm, Brandberg, & Breitholtz, 2001). Fear conditioning has through imaging studies been related with a neural network that includes the areas that are associated with fear such as the amygdala, hippocami, insula, anterior cingulate cortex and medial frontal gurys. Together these areas are refferred to as the fear network. The activation of the prefrontal cortex and this “fear network”, under conditioned fear stimuli, was hypothesized to be modified under the treatment of cognitive behaviroal therapy, whereas the cognitive behaviroal therapy will be most expected to act on negative conditions aquired through any panic disorder. The reduction of the activation in prefrontal cortex and the “fear network” are a probable result of improvement which could show two possible result patterns: An increased activation in the prefrontal lobe, which would indicate

compensation or reappraisal processes, and a decrease, which would indicate a reduction of negative cognitions (Kircher et al., 2012).

It seems, according to imaging research, that the amygdala and the insula are strongly related to negative emotional responses. On the other hand, the dorsal and rostral anterior cingulate cortex and the ventromedial prefrontal cortex have been associated with experience and regulation of emotions. It has been suggested that anxiety disorders are predominantly reflected by changed information processing in the anterior insula. It is possible that a reduction of activity in the amygdala and insula reflects weaker varieties of negative emotional responses. The medial frontal and anterior cingulate activation may then further reflect a reduced influence on anxiety responses, after undergoing treatment of cognitive behaviroal therapy (Kircher et al., 2012).

In a study three different types of cognitive behavioral therapy were compared with each other by comparing three groups of test subjects. The first group were only exposed to one MRI-session. The second group met on five occasions and were exposed to five individual MRI-sessions. The third group had five sessions of cognitive therapy before testing the level of anxiety within an MRI-session. The results indicated three different conclusions. The first

conclusion is that cognitive behavioral therapy is significantly more effective against claustrophobia than no treatment at all, due to significantly increased improvement in the treatment group in six of nine measures. The second conclusion drawn from this comparison is that there were no significant differences between the group with only one MRI-session and the group that had five sessions (Öst et al., 2001).

In acute treatment of all phobias, cognitive behavioral therapy has quite recently been recognized as an effective tool to help the patients evaluate their actual fears to a reasonable level. For examlpe, with cognitive behavioral therapy a claustrophobic person makes a more realistic conclusion of the possibility that an elevetor would get stuck in between two floors. In vivo treatment combined with cognitive behavioral therapy resulted in a 79% improvement compared to the control group which had an improvement of 18%. Cognitive behavioral therapy has also indicated positive results in the long-term treatment of claustrophobia. 93% of the patients had maintained the same resistance to claustrophobia at a 13.6 month follow-up, compared to other phobias. For example, in the long-term treatment of flying phobia only half of the effectiveness was shown, compared to claustrophobic patients (Choy et al., 2007). It has also been said that cognitive behavioral therapy

is probably one of the most effective treatments for claustrophobia so far (Choy et al., 2007).

Hypnosis

Neuro-linguistic programming (NLP) is a not very widely used treatment against anxiety disorders, such as phobias, and is quite similar to regular hypnosis. The idea NLP is based on is that people carries certain traumatic experiences, which trigger phobic reactions when they are subjectivley associating the current situation with their traumatic experience. The task for NLP is to rearrange the associations of for example, confounded places to something positive, or at least to something which does not trigger the traumatic memory as easily. The way the NLP technique works is by transferring linguistically emotional anchors, which are associations between the sensory information recieved and emotional states subjectively related to the sensory information, for example, if someone tells you that you look happy, it triggers a visual picture of a happy person in your mind. It is also mentioned in this particular study, that the certain “phobia cure” which is based on a visual/kinaesthetic synaesthesia where a visual input works as an anchor that triggers a kinaesthetic phobic reaction. In this phobia cure, the parts of the visual/kinesthetic synastesia are dissasociated from each other, so that the visual input does no longer create a phobic reaction. This method has three

steps, the first step is to create a safe anchor for the patient to go back to if feeling insecure. The second step is for the patient, to in her mind, dissociate herself from the actual traumatic event by visualizing herself as seen on a movie screen shortly before the traumatic event. The last step is then to initiate yet another dissociation by seeing herself in the cinama while floating further and further away from the traumatic event. This particular method has, according to earlier studies, been able to cure phobias within an hour, which means that it is applicable in both long-term claustrophobic disorder and for reducing claustrophobic fear in the short term (Karunaratne, 2010).

Lang, Ward and Laser (2010) studied a number of participants who went through team training in self-hypnotic relaxation techniques for MRI-sessions. The reults were overall good, the non-completition rate in the MRI sessions went from 2.3% down to 1.2%. Unfortunatley though, these results were found alongside several other features, in order to reduce the non-completion rate in MRI-researches, so the positive results of the hypnotic parts are unconfirmable of this study. Despite this the team training was well appreciated by the participant and also showed that rapid hypnotic techniques was more cost-efficient compared to other techniques (Lang, Ward, & Laser, 2010).

In comparison to cognitive behavioral therapy, hypnotic treatments are very fast, and they don't require a special continuous program for slow-progress. Hypnotic methods are by this argument very cost-efficient and also quite exciting for a lot of people, since they don't fully understand the method, and just perceives it to be similar to some sort of magic. There are however some people that are resistant to hypnosis due to sceptiscism. To bypass this problem, the so called Milton Model are beeing used. The Milton Model attempts to reach the persons unconscious mind by using metaphors and contradictions, to be able to utilise the persons resistace in a positive manner (Karunaratne, 2010). The scientific foundation of NLP has been heavily criticized, in many areas. One area of critique is that the lingustic anchors are exaggerated. Beeing told that you *look* very happy today, may indeed create a picture of someone being happy, but other phrases with visually associated terms may not necesarrily create the same result, for example, I see what you mean, does not instantly have to create a picture of someone seeing what a persons means (Micheal Heap, 2008).

Virtual simulation

One of the most recent methods to treat claustrophobia is to give the patients a chance to face their own fears in a safe environment. The way the virtual simulation works is by providing the patient with a

computerized virtual reality, which the patient or the test leader can manipulate the virtual environment, which over time should desensitize the patient to their phobia, giving the patient a chance to fight her phobia in increments. In a case study of a 43-year old female, who went through eight virtual reality-sessions. The result of the treatment was that the woman became able to undergo a computerized tomography scan, which was previously impossible. The theoretical reasons for this result are that in a virtual reality you are able to exceed the limitations of the real world. Because of this technology the patient is able to confront their phobia smaller steps compared to what would be possible in the real world (Botella et al., 1998).

However, even if this method allows the patient to overcome their phobias more easily, other studies indicate that there is minimal improvement for enduring claustrophobic situations, in the long-term, as a result of repeated encounters of the phobia. The most successful method are to have some evaluative cognitive therapy between the virtual siulation sessions (Öst et al., 2001). This combination of cognitive therapy and virtual reality sessions will result in a sort of cognitive behavioral therapy, since it also produces a desensitization, making the fear stimuli less effective for each time the patient is exposed to it. The studie also mentions that there have been relatively few studies on

virtual reality, and therefore the method has low reliability and its long-term effects are unknown. The only way to make virtual reality a viable method is to conduct more research and produce more studies in the area (Botella et al., 1998).

Sedation

In patients who suffer from a fear of entering confined places, sedation has been used as an alternative for reducing the number of premature terminations of MRI-sessions. Unfortnuately the common sedation cause problems to the effectiveness of the scan. A sedated patient must be surveiled the whole time, while they are inside the scanner, and the effects of the sedations can last much longer than the scan itself, which cause unwanted gaps between sessions (Hollenhorst et al., 2001).

There are, however, alternative sedatives, such as midzolam spray, which is often used due to its short duration of about 20-40 minutes. Midzolam spray is most effectively administered through the intranasal route to bypass the portal system and does not underlie the high hepatic first-pass elimination. Still, the midzolam spray can also be taken orally or rectally for a reduced sedative effect. Midzolam spray also has a positive effect on general anxiety reactions, and therefore is used for dental and endoscopic procedures. In testing of midzolam spray versus placebo, the spray group was

found to have lesser premature MRI-scan terminations; none out of 27 patients in the claustrophobic group compared to four out of 27 patients in the placebo group. Another result, which was presented in the same studie, was that the quality of MRI-pictures significantly improved, from good to excellent quality, in the claustrophobia group. The placebo group did not show the same significant improvement (Hollenhorst et al., 2001).

The problem with sedations, though, when used in fMRI-sessions, is that the participant are sometimes asked to do certain tasks while beeing scanned. In such an event the results of the fMRI-sessions may be altered since the patient is under the effect of a sedative. As mentioned previously, the use of sedations requires additional observation and can also cause serious side effects, even when the sedation is only used in small dozes (Lang et al., 2010).

Discussion

From what has been discussed in this essay so far, it is evident that exposing a patient, who suffers from claustrophobia, to MRI sessions as medical investigations, treatments or scientific studies is deeply problematic as an experience for the patient and rather expensive for the hospital in question. While the best solution for this particular problem might be to avoid forcing such scans on

these patients as much as possible, one must also be aware that there is a risk even for other patients of having a claustrophobic reaction to the cramped environment of an MRI-scan. To further complicate matters, as has also been previously mentioned, even a single instance of a claustrophobic reaction could develop into the full claustrophobic disorder (Harris, Robinson, & Menzies, 1999). Because of this risk i would argue that someone who experiences a claustrophobic reaction should be regarded and treated in the same manner as someone who suffers from the full claustrophobic disorder. Such interventions might save both suffering for the patients and money for the hospital.

The process of developing a genreal understanding of phobias is steadily ongoing and is starting to show results in several different areas. Studies have begun to differentiate reactions, behaviours and neurological patterns from each others which enables the categorization and distinct defining of different phobias.

Concerning the definition of claustrophobia, an important aspect is that it is cleary a disorder causing mild delusions, making the claustrophobic patients to percive themselves be in far worse danger than what is objectivlely found to be the case. It is not clear how many, or even which, components is underlying the disorder of claustrophobia, though it seems likely that fear of suffocation, fear of

restriction, and fear of losing control are three important factors of claustrophobia. Also, the indirect fear of experiencing a panic attack when trapped inside a confined area makes the disorder more complex then originally believed. The neuroscientific knowledge of, in particular, claustrophobia is still quite unexplored in comparison to the other types of phobia. There is at the moment not much neuroscientific information that can separate different phobias from each other. Although animal phobia, at the moment, is the most researched type, when it comes to neuroscientific research, the next step for neuroscience is to find more dissimilarities in the subcategories of the different phobia-types, which allows for a greater understanding and improved definitions of these subjective fears.

Even if the disorder is rather poorly defined for the time being, there is still a need in practical situations for treatments to solve the arising problems. Sedations as a treatment has been heavily criticised for not actually curing anything, but only temporarily decrease the ability of experiencing fear or other sensations. This grants no improvement on the actual condition and requires the sedatives to be repeatedly administered if any new procedures in MRI-scanners needs to be performed. These arguments make this method seem unsuitableas a treatment option, except in

emergencies when there is no time for other kinds of treatment.

Virtual simulation, on the other hand, is a treatment that has a strong potential, but needs to be developed further before it can become a reliable treatment option. Another drawback of the technology is the comparably large amount of time it takes to administer a treatment, making it unsuited for patients, which might only have a limited time before they need undergo an MRI-session, and more suited for someone who simply wishes to get rid of their phobia and is not under any time pressure.

The Hypnotic alternatives for treatments are interesting, and perhaps even promising. However, the fact that people doubt and disbelieve hypnosis as a potential treatment has, as previously mentioned, negative effects on its potential effectiveness. It is possible that hypnosis would be more credible to people, if the actual neurological mechanisms and processes of different kinds of hypnosis were discovered and explained. Such progress would probably also make way for clearer definitions of different kinds of hypnotic techniques, some of which would be validated and some of which would be refuted.

Conclusion

In conclusion, the most reliable treatment for minimizing both the full disorder and single reactions of claustrophobia is according to my findings the cognitive behavioral therapy. It is a safe, and compared to the other previously presented alternatives a relatively cheap, yet effective treatment. It is not without flaws, but since other treatments shows fatal shortcomings in safety, credability and economic sufficiency, cognitive behavioral therapy is in my estimation the best treatment for claustrophobia so far.

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