

16. Anxiety

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Summary

There is limited scientific documentation on the effects of physical activity on anxiety disorders. Anxiety syndromes are more prevalent among physically inactive than active people. The alleviating effect of physical activity on state anxiety is well-documented, while its effect on trait anxiety is less well defined. The documentation available on physical activity as an alternative or complement to other treatment methods relates mainly to panic disorder and agoraphobia, but it is probably useful in generalised anxiety disorder as well. Various forms of physical activity appear to have the same effect.

Definition

Anxiety encompasses a broad spectrum of feelings, from apprehension and worry to fear and panic. The anxiety often results in physical symptoms, indicating overactivity of the sympathetic nervous system: breathing difficulties, palpitations, sweating, dizziness, nausea and symptoms of muscle tension such as shaking and restlessness. Many people with anxiety experience a feeling of panic and their behaviour is often characterised by a tendency toward withdrawal and avoidance.

Anxiety is basically a survival instinct, but can become dysfunctional as a result of improper learning or an inherited biological vulnerability. The concept of anxiety is also used to describe normal emotional reactions in conjunction with severe stress, and there is a substantial grey zone between normal anxiety and anxiety disorders.

The diagnostic categories are generally consistent with DSM-IV and ICD-10. According to DSM-IV (1), anxiety disorders can be divided into the following diagnostic categories:

- **Panic disorder** is characterised by a sudden attack of rapidly increasing anxiety and palpitations, breathing difficulties, chest pain, dizziness and other physical symptoms. These physical symptoms are often interpreted as indications of a serious illness. During a panic attack, the person develops a severe fear of fainting, dying, losing their mind or losing control.
- **Agoraphobia** literally translates as a fear of open places, but this does not cover the full meaning of the concept. In ancient Greece, “agora” was the place where young men would meet to discuss social matters and politics. Modern equivalents to an “agora” are shopping centres, shops, cafés, restaurants, public meeting places or public transportation. The reason that agoraphobic individuals avoid these places is the fear of having a panic attack or panic-like symptoms.
- **Social phobia or social anxiety disorder** is characterised by a fear of making a fool of oneself or doing something embarrassing in social situations where it would attract attention. Patients with social phobia believe that other people are watching and judging them, and look down on them. Most patients with social phobia are worried that others will see how anxious they are, i.e. that they are shaking, sweating and embarrassed. Other patients have a fear of not being clever enough, for example, that they will forget things or lose their voice when speaking. These patients will either endure social situations with distress or avoid them altogether, limiting their prospects of functioning at work or in social situations.
- **Specific phobias** are characterised by anxiety in connection with situations or objects that most people would not be afraid of. For example, an animal such as a mouse, spider, bird, cat or dog or in a special situation, i.e. a fear of heights, thunder or the sight of blood. Individuals with specific phobias usually lessen their suffering by avoiding situations where they are likely to be exposed to their fears.
- **Obsessive compulsive disorder or obsessional neurosis** are characterised by compulsive actions and/or obsessive thoughts. A compulsion is when something is done for too long and as a ritual, often to neutralize an obsessional thought and the distress it involves. Common compulsions include excessive cleaning and repeated checking of doors, on-off switches, etc. An obsession is a persistent, unwanted and intrusive thought or impulse that the patient is unable to ignore. Such thoughts often entail a fear of hurting other people, catching a contagious disease, or being the cause of negative events.
- **Post-traumatic stress disorder** affects people who have been exposed to a disastrous event, whereupon they relive the trauma either while awake or as a nightmare. The traumatic event could be a traffic accident or a rape. These patients are in a constant state of hypervigilance and avoid situations or objects that remind them of the traumatic event.

- In the case of **generalised anxiety disorder**, the anxiety is not limited to a specific situation but is general and persistent. Patients with generalised anxiety disorder have unrealistic concerns that something bad will happen to them or their close family and friends. Common complaints include a constant feeling of worrying, apprehension, shaking, muscle tension, sweating, dizziness, palpitations and upset stomach.

The scientific literature usually differentiates between state anxiety, i.e. anxiety relating to the current situation, and trait anxiety, which relates to the character and personality of an individual (2).

Diagnosis is based on clinical talks using structured clinical interview guides developed to increase the reliability of the diagnosis, but no objective tests exist. Anxiety disorders often occur in connection with other mental disorders such as depression and drug abuse. Anxiety involves subjective feelings of distress and avoidance behaviours that often lead to underperformance at school or in the workplace.

Prevalence/Incidence

Nearly 20 per cent of all people will experience an anxiety disorder at some time in their lives, and approximately 10 per cent suffer from anxiety at any given point in time. Social phobia and specific phobias are the most common anxiety disorders (3, 4).

Causes and risk factors

There is a certain genetic disposition, which is most evident in obsessive compulsive disorder. Other risk factors include having experienced separation, physical assault, absence of loving care in childhood, and psychosocial stress later in life.

Prognosis

The severity of an anxiety disorder varies over time, with occasional spontaneous improvements. However, without any form of treatment, many patients become chronically disabled.

Treatment

Today's treatments for anxiety consist mainly of psychotherapy and medications. The benefits of exposure therapy have been known since the 1960s and cognitive behavioural therapy (CBT) is the most effective and best documented method for all anxiety disorders. Antidepressants are the most widely used drug therapy for anxiety disorders. The effects of both tricyclic antidepressants and selective serotonin reuptake inhibitors are well-documented (5).

Minor tranquilizers like benzodiazepines (Valium, Sobril and similar) are fast-acting and have an anxiety-inhibiting effect. The disadvantage with these drugs is that they may become addictive and impede the learning process and, hence, very limited use is recommended. Antidepressants, on the other hand, are not addictive and do not impede the learning process. It is common for patients to relapse after a complete course of medication, and long-term treatment is often necessary to achieve the desired effect. However, the effects of cognitive behavioural therapy usually remain after a completed treatment (5).

A number of patients report short-term effects from alcohol, and self-medication with alcohol is not uncommon. The disadvantage of using alcohol to relieve anxiety is that the symptoms often become worse when the level of alcohol in the blood decreases, leading to the added risk of alcohol misuse and dependence.

Effects of physical activity

Prevention

A major epidemiological study on a representative sample of people in the USA showed that those who were physically active suffered less anxiety: panic disorder, social phobia, specific phobias and agoraphobia (6). As this is a cross-sectional study, it does not establish a cause-effect relationship: Does physical inactivity cause anxiety or does anxiety, and especially the tendency to avoid, cause physical inactivity? Longitudinal studies are needed to examine the cause-effect relationship and no such studies have been published to date.

A German study looked at the question from a different angle (7). The objective of the study was to see whether light physical activity could prevent panic attacks in 15 healthy study subjects. The subjects performed 30 minutes of fitness training or were asked to rest before being injected with a panic-inducing substance. 12 of the 15 subjects in the resting group had a panic attack compared to only 6 after physical activity. This indicates that physical activity may prevent panic attacks in healthy individuals, but it is not yet clear whether it also applies to patients with panic disorder.

Treatment

A number of randomised control trials involving subjects with normal or elevated anxiety levels, who do not fulfil the criteria for a psychiatric diagnosis, have shown physical activity to reduce the level of anxiety and tension (state anxiety). The effect usually occurs 5–15 minutes after the training is finished and lasts on average 2–4 hours. How physical activity affects the more chronic character-related, trait anxiety remains uncertain (2).

Few studies have been carried out on patients with anxiety disorders. There are a number of studies on panic disorder and agoraphobia, but only one study on generalised anxiety disorder and social phobia.

Panic disorder and agoraphobia

A British psychiatrist by the name of Orwin (8, 9) conducted some interesting studies at beginning of the 1970s. He studied patients with agoraphobia who had a fear of travelling by bus. Every time the patients got on a bus, they experienced severe anxiety, with palpitations, increased heart rate, sweating and a feeling of not being able to breathe. As a result, they had been avoiding using buses and similar situations for a long time. Orwin asked the patients to approach the bus in a different way. He asked them to run to the bus stop, so that they would have an increased heart rate and palpitations, and be sweating and out of breath before they got on the bus. This meant that the patients' physical reactions were already activated to a maximum, eliminating the possibility of further reactions. The anxiety of riding the bus thus subsided as the physical symptoms were ascribed to the running and not the bus.

In a Norwegian study without a control group, patients with panic disorder and agoraphobia at a psychiatric hospital took part in an 8-week treatment programme. The main part of the treatment consisted of physical activity, with 1 hour of fitness training 5 days a week, and dynamic group therapy 3 times a week. While anxiety levels decreased significantly during the treatment period, at the 1-year follow-up most patients were found to have relapsed (10).

A group of German researchers carried out a randomised controlled trial on patients with panic disorder (11). The patients were divided into three groups. The first group participated in regular physical activity in the form of fitness training. The second group received antidepressants (clomipramine), and the third group was given placebo tablets, thereby constituting a control group. The study went on for a period of 8 weeks. The findings showed that physical training and antidepressants had a greater effect than the placebo tablets, and that the drug therapy was slightly more effective than the physical training. The drop-out rate for the training group tended to be higher than for the patients who received clomipramine. The results of this study are consistent with the Norwegian study. However, the German researchers did not follow up their patients, and it is therefore not known whether the progress made by the patients remained once the treatment had finished.

In another study, patients with panic disorder and agoraphobia were randomly assigned either conventional treatment by a general practitioner, or asked to participate in a 16-week lifestyle programme led by an occupational therapist. The lifestyle programme involved a review of each patient's fluid intake, diet and eating habits, physical activity, and the use of caffeine, alcohol and nicotine. Lifestyle changes were discussed, recorded and followed up (12). After 20 weeks, the patients in the lifestyle programme had significantly reduced anxiety levels and fewer panic attacks. After 10 months, the lifestyle programme group still showed better results, though the difference between the two groups was no longer significant. Although not solely a study on training, physical activity was an important part of the intervention.

Generalised anxiety disorder

A group of patients with generalised anxiety disorder also participated in the Norwegian study referred to above (10). The reduced levels of anxiety experienced by these patients throughout the treatment period persisted at the 12-month follow-up. No other studies on generalised anxiety disorder have been found. Before a randomised controlled trial on the effects of different treatments is carried out, it is difficult to determine the therapeutical value of physical training.

Other anxiety disorders

The Norwegian study also included a group of patients with social phobia. This group did not show any change either during the treatment period or at follow-up. No other studies on patients with social phobia and physical activity have been published to date. Neither have the effects of physical activity on specific phobias, obsessive compulsive disorder and post-traumatic stress disorder been studied. However, physical activity is unlikely to have any greater effect on specific phobias and obsessive compulsive disorder. There are many similarities between post-traumatic stress disorder and panic disorder, and it is therefore theoretically possible that physical activity may have a beneficial effect in post-traumatic stress disorder.

To sum up, a number of the studies appear to indicate that physical activity can prevent anxiety. A transient decrease in the level of anxiety after physical activity has been shown in a number of studies in healthy individuals with and without elevated anxiety levels. Physical activity can be used as a treatment alternative for panic disorder and agoraphobia, and perhaps even for generalised anxiety disorder. The other anxiety disorders have been studied only to a limited extent.

Patients with anxiety disorders can do normal physical training, and have a normal physiological response to the training.

Potential mechanisms

There are various hypotheses about how physical activity affects anxiety levels, with physiological, neurobiological and psychological hypotheses having been put forward.

- **Improved physical condition.** People in good physical condition are generally in better health and have greater resistance to disease and other pressures. Well-trained individuals are able to cope with the everyday challenges of life, by using a lower percentage of their maximal heart rate, whereupon the heart rate normalises more rapidly after a stressful situation.
- **Effects of neurotransmitters on the brain.** Dopamine, serotonin, noradrenaline and gamma-aminobutyric acid (GABA) levels may be affected. This is the basis of medical treatment of panic disorder, and the notion that physical activity has an impact on these systems is to some extent supported by animal experiments.

- **An increased release of beta-endorphins** may have a calming effect.
- **Reduced activation of the hypothalamic-pituitary-adrenal (HPA) axis** plays an important role in stress response regulation.
- **The thermogenic hypothesis.** Body temperature rises by 1–2 degrees during vigorous physical exertion. It is possible that the active increase in body temperature through exercise may have the same calming effect as a passive rise in temperature, e.g. in a sauna.
- **The distraction hypothesis** is based on trials conducted by Bahrke and Morgan (13). They found that the level of anxiety decreased after 30 minutes on an exercise bike, but that the reduction in anxiety was just as great after subjects had rested in a soundproof room. The result can be explained by distraction. Physical activity has been shown to divert negative thoughts and, hence, anxiety and distressing thoughts.
- **Cognitive reinterpretation** is yet another psychological hypothesis. According to the cognitive theory of panic disorder, the reason for patients developing and maintaining a panic disorder is that they interpret physical symptoms as a “disaster”. Palpitations, for example, are seen as a sign of heart disease and impending death (14). The physical reactions experienced during a panic attack and physical activity are quite similar in character, and both are due to acute activation of the sympathetic nervous system. However, when patients get used to the physical reactions experienced during physical activity, they learn to interpret them as less catastrophic.

Indications

Primary prevention

Everything considered, physically active individuals appear to run less risk of developing an anxiety disorder.

Secondary prevention

Physical activity can be recommended as an alternative or supplement to the ordinary treatment of panic disorder, with or without agoraphobia, and perhaps also for generalised anxiety disorder and for increased anxiety levels in healthy individuals.

Prescription

One randomised controlled trial compared fitness training (mainly jogging and brisk walking) with the training of flexibility, coordination and relaxation in patients with anxiety disorders, such as panic disorder and agoraphobia (15). After 8 weeks, significantly decreased levels of anxiety and avoidance were noted in both groups. There was not much difference between the training methods used. Sexton, Maere and Dahl (16) compared 8 weeks of walking versus jogging in hospital patients admitted for anxiety and depression treatment. At the end of the 8-week programme, both groups showed the same improvement in anxiety levels. At the 6-month follow-up, however, most joggers had stopped jogging, while the walkers had continued walking. The patients with the highest aerobic fitness had the lowest levels of anxiety.

Consequently, there does not appear to be a difference between different types of physical activity with regard to psychological value. Physical training should therefore be planned according to the interests and enjoyment of the patient.

The fitness training can, for example, be made up of brisk, 30-minute daily walks, or 30 minutes of jogging three times a week, at an intensity of 60–80 per cent of maximal oxygen uptake (talking speed). Other alternatives include strength, mobility or flexibility training of the same duration and frequency. Patients should start with low-intensity training, to facilitate tolerance.

Special considerations

One important consideration is that, paradoxically, many patients experience increased anxiety when they start training. This is explained by the activation of the sympathetic nervous system during physical activity producing symptoms like increased heart rate, palpitations, sweating and breathlessness. The same physical reactions occur in patients with severe anxiety. Thus many patients with an anxiety disorder avoid physical activity, as they feel it leads to an increase in anxiety. If informed about this phenomenon in advance, however, most patients tend to overcome these symptoms, with the majority able to carry on with their physical activity. Physical activity combined with education is a good way of getting to know one's bodily symptoms, which are less frightening when they occur under normal circumstances, such as training. Learning that the anxiety decreases when the patient persists rather than avoids a certain situation is also an important experience (17).

At one time, physical activity was generally thought to trigger panic attacks in the same way as lactic acid. Two out of three patients with panic disorder do suffer panic attacks when injected with lactic acid, but, although exposed to lactic acid during physical activity, panic attacks during exercise are very rare. In a literature review, O'Connor, Raglin and Martinsen (18) found only five panic attacks reported in connection with 444 training sessions in 420 patients with panic disorder. This yields a panic frequency of about 1 per cent, which is much lower than the 67 per cent reported by infusion studies. Consequently, an intravenous injection of lactic acid appears to produce a different effect than the lactic acid released naturally during intense physical activity.

Some patients who train regularly may experience increased anxiety when forced to stop or cut down on their training, for example, because of an injury. This can be unpleasant, but usually disappears after a time. This can be explained by the patients having become physically dependent on the training (17).

Functional test/Need for health check-ups

For some individuals with an anxiety disorder, in particular panic disorder, the physical symptoms can be painful – palpitations and chest pains are common. These symptoms are similar to those seen in patients with heart disease. Patients displaying symptoms such as these should undergo a physical examination before training is commenced. A standard medical examination and an ECG and thyroid hormone test (T4) is usually sufficient. If in doubt, the patient should be referred to a heart specialist. It is wise to conduct a thorough examination on one occasion. Patients often become more anxious when repeated examinations are carried out by uncertain doctors.

There are a number of patient questionnaires that can be used to record anxiety levels, to determine whether the training is beneficial or not.

Interactions with drug therapy

The most important group of drugs used to treat anxiety disorders are antidepressants, and the use of antidepressants or benzodiazepines in no way hinder the patient from being physically active. A possible adverse effect of some antidepressants is a fall or rise in blood pressure. In such cases, the blood pressure should be monitored, but this seldom stops the patient from training. Some patients may need a limited supply of beta blockers for social phobias, such as stage fright. Beta blockers can sometimes restrict physical capacity somewhat, mainly symptoms like tired legs, though this is not associated with any risk (19).

Contraindications

There are no contraindications to physical activity in physically healthy persons with anxiety disorders.

Risks

A small number of patients feel that their anxiety disorder deteriorates when they first begin to train. This may be unpleasant but poses no danger. Unless the patient has concurrent physical illnesses that render physical activity impossible, there is no risk involved with physical activity and training.

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