Treatment of anxiety disorders

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Anxiety disorders (generalized anxiety disorder, panic disorder/agoraphobia, social anxiety disorder, and others) are the most prevalent psychiatric disorders, and are associated with a high burden of illness. Anxiety disorders are often underrecognized and undertreated in primary care. Treatment is indicated when a patient shows marked distress or suffers from complications resulting from the disorder. The treatment recommendations given in this article are based on guidelines, meta-analyses, and systematic reviews of randomized controlled studies. Anxiety disorders should be treated with psychological therapy, pharmacotherapy, or a combination of both. Cognitive behavioral therapy can be regarded as the psychotherapy with the highest level of evidence. First-line drugs are the selective serotonin reuptake inhibitors and serotonin-norepinephrine reuptake inhibitors. Benzodiazepines are not recommended for routine use. Other treatment options include pregabalin, tricyclic antidepressants, buspirone, moclobemide, and others. After remission, medications should be continued for 6 to 12 months. When developing a treatment plan, efficacy, adverse effects, interactions, costs, and the preference of the patient should be considered.

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Introduction

Anxiety disorders are the most prevalent psychiatric disorders and are associated with a high burden of illness.[1-3] With a 12-month prevalence of 10.3%, specific (isolated) phobias are the most common anxiety disorders,[4] although persons suffering from isolated phobias rarely seek treatment. Panic disorder with or without agoraphobia (PDA) is the next most common type with a prevalence of 6.0%, followed by social anxiety disorder (SAD, also called social phobia; 2.7%) and generalized anxiety disorder (GAD; 2.2%). Evidence is lacking on whether these disorders have become more frequent in recent decades.[5,6] Women are 1.5 to two times more likely than men to receive a diagnosis of anxiety disorder.[7]

The age of onset for anxiety disorders differs among the disorders. Separation anxiety disorder and specific phobia start during childhood, with a median age of onset of 7 years, followed by SAD (13 years), agoraphobia without panic attacks (20 years), and panic disorder (24 years).[8] GAD may start even later in life. Anxiety disor-

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ders tend to run a chronic course, with symptoms fluctuating in severity between periods of relapse and remission in GAD and PDA[9] and a more chronic course in SAD. After the age of 50, a marked decrease in the prevalence of anxiety disorders has been observed in epidemiological studies.[8,10-12] GAD is the only anxiety disorder that is still common in people aged 50 years or more.

The current conceptualization of the etiology of anxiety disorders includes an interaction of psychosocial factors, eg, childhood adversity, stress, or trauma, and a genetic vulnerability, which manifests in neurobiological and neuropsychological dysfunctions. The evidence for potential biomarkers for anxiety disorders in the fields of neuroimaging, genetics, neurochemistry, neurophysiology, and neurocognition has been summarized in two recent consensus papers.[13,14] Despite comprehensive, high-quality neurobiological research in the field of anxiety disorders, these reviews indicate that specific biomarkers for anxiety disorders have yet to be identified. Thus, it is difficult to give recommendations for specific biomarkers (eg, genetic polymorphisms) that could help identify persons at risk for an anxiety disorder.

Obsessive-compulsive disorder (OCD) and posttraumatic stress disorder (PTSD) were formerly included in the anxiety disorders, but have now been placed in other chapters in the fifth edition of the *Diagnostic and Statistical Manual of Mental Disorder* (*DSM-5*). Therefore, OCD and PTSD are not discussed in this review.

Diagnosis

A short description of the anxiety disorders is given in *Table I*. Anxiety disorders are often underdiagnosed in primary care.[15]

In *DSM-5*, the group of anxiety disorders has been expanded to include separation anxiety disorder, a diagnosis the previous *DSM* version reserved for children only.[16,17] The change was based on the findings of epidemiological studies that revealed the unexpectedly high prevalence of the condition in adults.[18] *DSM-5* also introduces selective mutism—the failure of children to speak in special social situations—and a new term called illness anxiety disorder, defined by excessive preoccupation and fear of having a serious medical illness. Illness anxiety disorder was formerly called hypochondriasis in *DSM-IV* and *Tenth Revision of the International Statistical Classification of Diseases and Related Health Problems* (*ICD-10*); in *DSM-5*, it is not classified under anxiety disorders but belongs to the Somatic Symptom and Related Disorders category. In the current *ICD-11* Beta Draft,[19] hypochondriasis is placed in the group Obsessive-Compulsive or Related Disorders. It is characterized by catastrophic misinterpretation of bodily symptoms and is manifest as obsessive and excessive health-related behaviors. The fear of having a serious medical condition persists despite thorough medical evaluation and repeated reassurance that the patient does not suffer from the feared illness.

Mixed anxiety and depression is a category listed only in *ICD-10* and not in *DSM-5*. It is often diagnosed in primary care. Research on the treatment of this disorder is limited.[20] Adjustment disorder with mixed anxiety and depressed mood (F43.22) is a condition with similar symptomatology. It occurs as a reaction to stressful life events.

The differential diagnosis of anxiety disorders includes common mental disorders, such as other anxiety disorders, major depression, and somatic symptom disorders, as well as physical illnesses such as coronary heart or lung diseases, hyperthyroidism, and others.

Anxiety disorders often co-occur with other anxiety disorders, major depression, somatic symptom disorders, personality disorders, and substance abuse disorders.[21] For example, major depression was found to be highly correlated with all anxiety disorders in a large European survey (eg, with GAD, the odds ratio was 33.7; with panic disorder, it was 29.4).[22] Anxiety disorders were also strongly interrelated: GAD was highly associated with agoraphobia (25.7), panic disorder (20.3), and SAD (13.5).

To determine the severity of anxiety disorders and to monitor treatment progress, commonly used rating scales can be used, including the Hamilton Anxiety Scale (HAM-A)[23] for GAD, the Panic and Agoraphobia Scale (PAS)[24] for panic disorder/agoraphobia, and the Liebowitz Social Anxiety Scale (LSAS)[25] for SAD.

Treatment

Box 1 contains a case vignette of the treatment of a patient with GAD.

In clinical settings, most patients seeking help suffer from GAD, PDA, and SAD.[7] Not all anxiety disorders have to be treated when symptoms are mild, transient,

and without associated impairment in social and occupational function. However, treatment is indicated when a patient shows marked distress or suffers from complications resulting from the disorder (eg, secondary depression, suicidal ideation, or alcohol abuse).

Anxiety disorders can be treated mostly on an outpatient basis. Indications for hospitalization include suicidality, unresponsiveness to standard treatments, or relevant comorbidity, eg, with major depression, personality disorders, or substance abuse.

The treatment recommendations in this article are based on guidelines for anxiety disorders.[26-28] For such guidelines, a systematic literature search for randomized clinical trials was performed. Studies were analyzed by using internationally acknowledged quality assessment tools, and the recommendations were reviewed by expert panels.

Patients with different anxiety disorders show different degrees of health care utilization. For example, in the United States, 54.4% of patients with PDA, but only 27.3% of patients with specific phobias, contacted health care services in 1 year.[29] Whereas patients with PDA often fear that they suffer from a severe somatic disorder, such as a myocardial infarction, and that they need immediate medical help, people with simple phobias often have the feeling that they can cope with the disorder or even think it is "normal" to have a fear of spiders or dogs.

There is evidence for substantial undertreatment of anxiety disorders. In a large European study, only 20.6% of participants with an anxiety disorder sought professional help. Of those participants who contacted health care services, 23.2% received no treatment at all, 19.6% received only psychological treatment, 30.8% received only drug treatment, and 26.5% were treated both with drugs and psychotherapy.[30] Likewise, a Dutch study in primary care found that only 27% of patients with anxiety disorders received guideline-orientated care.[31]

Patients should receive "psychoeducation" about their diagnosis, the possible etiology, and the mechanisms of action of the available treatment approaches. The treatment plan should include psychotherapy, pharmacotherapy, and other interventions, which should be chosen after careful consideration of individual factors, eg, the patient's preference, the patient's history with

Alice, a 48-year-old female dentist, presented to a psychiatrist with a 7-month history of anxiety symptoms, which included persistent feelings of restlessness, irritability, difficulty concentrating, sleep disturbance, fatigue, nausea, diarrhea, muscle cramps, and the sensation of having a lump in her throat. She was suffering from constant worry that her husband could become ill or might have an accident while driving to work. Her symptoms resulted in frequent absenteeism, which caused significant problems at work. Her medical history was unremarkable. The psychiatrist diagnosed her with generalized anxiety disorder, *DSM-5* F41.1.

Four weeks previously, Alice had been prescribed the benzodiazepine diazepam by her general practitioner, and initially took it as prescribed. Although it helped with her anxiety, she felt that it made her feel dull and worried that it would interfere with her work as a dentist. She kept thinking that she would become addicted to the drug and stopped the intake.

The psychiatrist started treatment with the serotonin-norepinephrine reuptake inhibitor venlafaxine. Because the patient was sensitive to side effects, the drug was started with 37.5 mg/d for 3 days. Then, the dose was increased to 75 mg/d. She reported mild nausea and fatigue; however, it was not clear whether this was due to the medication or to the illness.

After another two weeks, these adverse effects resolved, and the dose was increased to 225 mg/d. The patient also received weekly sessions of cognitive behavioral therapy. Symptoms of GAD were resolved almost completely after 7 weeks. The psychiatrist advised Alice to continue on venlafaxine for at least 6 months. Then, the drug was slowly tapered, by reducing the dose to 150 mg/d for 1 month, then to 75 mg/d for another month. Then, after 2 weeks on 37.5 mg/d, the medication was stopped. The patient did not report relevant withdrawal symptoms and did no show reoccurrence of significant anxiety symptoms during a follow-up observation period of almost 1 year.

Box 1. Case vignette: generalized anxiety disorder.

previous treatment attempts, illness severity, comorbidities such as personality disorders, suicidality, local availability of treatment methods, wait time for psychotherapy appointments, costs, and other factors.

Pharmacotherapy

Whereas many studies have shown the efficacy of medications for GAD, PDA, and SAD, there are very few studies on drug treatment for specific phobias, for example, there is a small study suggesting the efficacy of paroxetine.[32] *Table II* lists the available drugs and dose recommendations. However, not all drugs mentioned here are licensed for anxiety indications in all countries, and the reader should refer to local prescribing information. *Table III* lists drug side effects. For a detailed list of available randomized controlled studies, the reader should refer to guidelines published by Bandelow et al,[27,33] which include a systematic evaluation of available studies.

Anxiety disorder		**Description**
***ICD-10* classification**	***DSM-5* classification**	
Panic Disorder F41.0	Panic Disorder 300.01 (F41.0)	Anxiety attacks of sudden onset, with physical manifestations of anxiety (eg, palpitations, sweating, tremor, dry mouth, dyspnea, feeling of choking; chest pain; abdominal discomfort; feeling of unreality, paresthesia, etc). Panic attacks can arise out of the blue; however, many patients start to avoid situations in which they fear that panic attacks might occur.
Agoraphobia F40.0 without Panic Disorder F40.00 with Panic Disorder F40.01	Agoraphobia 300.22 (F40.00)	Fear of places where it might be difficult or embarrassing to escape if a panic attack should occur (crowds, on public transport, or in closed spaces, eg, elevators). Fear of being alone is also common.
Generalized anxiety disorder F41.1	Generalized Anxiety Disorder 300.02 (F41.1)	Patients suffer from somatic anxiety symptoms (tremor, palpitations, dizziness, nausea, muscle tension, etc.) and from psychic symptoms, including concentrating, nervousness, insomnia, and constant worry, eg, that they (or a relative) might have an accident or become ill.
Social Phobia F40.1	Social Anxiety Disorder (Social Phobia) 300.23 (F40.10)	Patients are afraid of situations in which they are the center of attention and may be criticized—eg, public speaking, visits to authorities, conversations with superiors on the job, or with persons of the opposite sex. They are afraid of appearing clumsy, embarrassing themselves, or being judged negatively.
Specific (Isolated) Phobias F40.2	Specific Phobia 300.29	Phobias which are restricted to singular, circumscribed situations, often related to animals (eg, cats, spiders, or insects), or other natural phenomena (eg, blood, heights, deep water).
Mixed Anxiety and Depressive Disorder F41.2	-	Simultaneous presence of anxiety and depression, with neither predominating. However, neither component is sufficiently severe to justify a diagnosis of anxiety or depression in itself. If the diagnostic criteria for anxiety or depression (or both) are fulfilled, then the corresponding diagnosis should be made, rather than mixed anxiety and depressive disorder.
Separation Anxiety Disorder of Childhood (F93.0)	Separation Anxiety Disorder 309.21 (F93.0)	Inappropriate and excessive fear or anxiety concerning separation from those to whom the individual is attached. In ICD-10, the disorder can only be diagnosed in children.
Selective Mutism (F94.0)	Selective Mutism 312.23 (F94.0)	Consistent failure to speak in social situations in which there is an expectation to speak (eg, school) even though the individual speaks in other situations.
DSM-5, Diagnostic and Statistical Manual of Mental Disorders, 5th edition*; ICD-10, 10th revision of the International Statistical Classification of Diseases and Related Health Problems*		

Table I. Anxiety disorders: short description according to *ICD-10* and *DSM-5* classification.
Adapted from reference 107: World Health Organization. *ICD-10 Chapter V (F) Classification of Mental and Behvioural Disorders: Clinical Descriptions and Diagnostic Guidelines.* "Blue Book" *Clinical Descriptions and Diagnostic Guidelines*. Geneva, Switzerland: World Health Organization; 1991.

Selective serotonin reuptake inhibitors and selective serotonin norepinephrine reuptake inhibitors

Due to their positive benefit/risk balance, selective serotonin reuptake inhibitors (SSRIs) and selective serotonin norepinephrine reuptake inhibitors (SNRIs are recommended as first-line drugs. Patients should be informed that the onset of the anxiolytic effect of these antidepressants has a latency of 2 to 4 weeks (in some cases up to 6 weeks). During the first 2 weeks, adverse effects may be stronger. Initial jitteriness or an increase in anxiety symptoms may occur, which may reduce the patients' treatment compliance. Lowering the starting dose of the antidepressants may reduce these adverse effects. A review of studies in depressed patients suggested that SNRIs may be less well tolerated than the SSRIs.[34] However, according to clinical experience, tolerability may differ among patients, and it is also pos-

Medications						
		Efficacy shown in RCTs for			Daily dose	Adverse effects
	Drug	PDA	GAD	SAD		
SSRIs	Citalopram[1]	x		x	20–40 mg	Jitteriness, nausea, restlessness, headache, fatigue, increased or decreased appetite, weight gain, weight loss, tremor, sweating, QT_c prolongation, sexual dysfunction, diarrhea, constipation, and other side effects
	Escitalopram[2]	x	x	x	10–20 mg	
	Fluoxetine	x				
	Fluvoxamine	x		x		
	Paroxetine	x	x	x	20–50 mg	
	Sertraline	x	x	x	50–150 mg	
SNRIs	Duloxetine		x		60–120 mg	Jitteriness, nausea, restlessness, headache, fatigue, increased or decreased appetite, weight gain, weight loss, tremor, sweating, sexual dysfunction, diarrhea, constipation, urination problems, and other side effects
	Venlafaxine	x	x	x	75–225 mg	
Tricyclic antidepressant	Clomipramine	x			75–250 mg	Anticholinergic effects, somnolence, dizziness, cardiovascular side effects, weight gain, nausea, headache, sexual dysfunction, and other side effects
Calcium modulator	Pregabalin		x	x	150–600 mg	Dizziness, somnolence, dry mouth, edema, blurred vision, weight gain, constipation, euphoric mood, balance disorder, increased appetite, difficulty with concentration/attention, withdrawal symptoms after abrupt discontinuation, and other side effects
Azapirone	Buspirone		x		15–60 mg	Dizziness, nausea, headache, nervousness, light-headedness, excitement, insomnia, and other side effects
RIMA	Moclobemide			x	300–600 mg	Restlessness, insomnia, dry mouth, headache, dizziness, gastrointestinal symptoms, nausea, and other side effects

PDA, panic disorder/agoraphobia; GAD, generalized anxiety disorder; SAD, social anxiety disorder (also known as social phobia); RIMA, reversible monoamine oxidase A inhibitor; RCT, randomized controlled study; SNRI, selective serotonin norepinephrine reuptake inhibitors; SSRI, selective serotonin reuptake inhibitors.
[1]Do not exceed recommended dose (possible QT_c interval prolongation). Maximal dose with diminished hepatic function, 30 mg/d; for older patients, 20 mg/d.
[2]Do not exceed recommended dose (possible QT_c interval prolongation). Maximal dose for persons over age 65, 10 mg/d.

Table II. Pharmacological treatment recommendations for anxiety disorders in adults. Not all drugs are licensed for these indications in all countries.

sible that an individual patient may experience less adverse effects when switched from an SSRI to an SNRI.

Some SSRIs and SNRIs are inhibitors of cytochrome P450 enzymes and hence may interact with other psychopharmacological drugs and medications for medical illnesses.[35] After stopping treatment with an SSRI, withdrawal reactions may occur. However, these are much less frequent and severe than the withdrawal reactions observed after terminating benzodiazepine treatment. These adverse reactions may be more frequent with paroxetine than with sertraline or fluoxetine.[36]

Pregabalin

Pregabalin is a calcium modulator, acting at the $\alpha_2\delta$ subunit of voltage-gated calcium channels. The drug has sedating properties. Sleep disorders, which are common in patients with anxiety disorders, may improve earlier with pregabalin than with the SSRIs or SNRIs. Onset of efficacy is earlier with pregabalin than with antidepressants. Pregabalin is not subject to hepatic metabolism and hence does not interact with inhibitors or inducers of cytochrome P450 enzymes. However, there have been concerns about the abuse of pregabalin in individuals suffering from substance abuse and also withdrawal syndromes after abrupt discontinuation.[37]

Tricyclic antidepressants

The traditional tricyclic antidepressants (TCAs) imipramine and clomipramine are as effective as second-generation antidepressants in the treatment of anxiety disorders. In general, the frequency of adverse events is higher for TCAs than for SSRIs or SNRIs. Thus, these drugs should be tried first before TCAs are used. The dosage should be uptitrated slowly until dosage levels reach those used in the treatment of depression. TCAs should be used with caution in patients considered to be at risk of suicide, due to their potential fatal toxicity after overdose.[38]

Buspirone

Buspirone, a 5-hydroxytryptamine receptor 1A (5-HT_{1A}) agonist, has been shown in some controlled studies to be effective in the treatment of GAD. However, not all studies have shown superiority to placebo and/or equivalence to standard drugs.

Benzodiazepines

The anxiolytic effects of benzodiazepines begin soon after oral or parenteral application. In contrast to antidepressants, benzodiazepines do not lead to initially increased jitteriness and insomnia. In the United States, 55% to 94% of patients with anxiety disorders are treated with benzodiazepines.[39] Likewise, European studies have shown a high rate of long-term benzodiazepine use.[40] However, benzodiazepine treatment may be associated with central nervous system (CNS) depression, resulting in fatigue, dizziness, increased reaction time, impaired driving skills, and other adverse effects. Cognitive functions may be impaired, mainly in elderly patients. After long-term treatment with benzodiazepines (eg, over 4 to 8 months), dependency may occur in some patients,[41-47] especially in patients predisposed for substance abuse.[48] Tolerance (resulting in a patient's constant desire to increase the dose) seems to be rare.[49] Thus, the risks and benefits should be carefully considered before treatment with benzodiazepine. Current guidelines do not recommend benzodiazepines as first-line treatments.[50] The recommendations to give preference to newer antidepressants are not based on direct comparison studies but rather on the known risks of benzodiazepines.[51]

In exceptional cases (eg, severe cardiac disease, contraindications for the standard drugs, suicidality, and other conditions), benzodiazepines can be used for a limited time period. However, patients with a history of benzodiazepine or other substance abuse should be excluded from treatment. Benzodiazepines may also be used in combination with SSRIs/SNRIs during the first weeks before the onset of efficacy of the antidepressants.[52] Cognitive behavioral therapy (CBT) may facilitate benzodiazepine withdrawal.[53,54]

In singular cases, acute panic attacks may require immediate drug treatment. In that case, lorazepam melting tablets at a dose of 1.0 to 2.5 mg may be given as needed (up to a dose no higher than 7.5 mg/d). It is usually sufficient to talk calmly with the patient and explain that the attack is not due to a life-threatening medical condition.

In contrast to SSRIs and SNRIs, benzodiazepines do not treat depression, which is a common comorbid condition in anxiety disorders.

Moclobemide

Moclobemide is a selective and reversible inhibitor of monoamine oxidase A. It is used in the treatment of SAD. Because not all studies have shown evidence for superiority to placebo, the drug is not recommended as first-line treatment.

Other drugs

Some other drugs have shown efficacy in anxiety disorders in randomized controlled studies but are not licensed for the treatment of these disorders in most countries. Medicolegal issues have to be considered whenever drugs that have not been approved for anxiety indications are prescribed off label.

Agomelatine

The antidepressant agomelatine—which acts as an agonist for melatonin MT_1 and MT_2 receptors and as an antagonist for serotonin 5-HT_{2C} receptors—was shown to be effective in four studies in GAD.[55-58] However, the drug is only licensed for the treatment of major depression, not for GAD. With agomelatine, discontinuation symptoms[59,60] and sexual dysfunction[61] are less likely than with SSRI or SNRI antidepressants. Elevations of hepatic enzymes occur in around 1% of treated patients.[62]

Quetiapine

The atypical antipsychotic quetiapine was shown to be effective in a number of studies in GAD. It is usually prescribed in the treatment of schizophrenic psychoses in dosages between 150 and 800 mg/d. For the treatment of anxiety, lower doses (50 to 300 mg/day) are required. However, probably due to adverse effects such as the metabolic syndrome, the drug was not licensed for anxiety disorders in most countries. In general, typical adverse events, such as sedation or weight gain, were less frequent in patients receiving lower doses.[63,64] Quetiapine can only be used off-label in treatment-refractory patients. The onset of efficacy is earlier than with antidepressants.

Vortioxetine

A new antidepressant, vortioxetine, was investigated in several controlled studies in GAD. However, according to a meta-analysis, significant improvement for vortioxetine could not be demonstrated compared with placebo.[65]

Phytotherapy

Some controlled studies have shown the efficacy of an orally taken lavender oil preparation in GAD and mixed anxiety/depression.[66-69] It has yet to be established whether lavender oil is as effective as standard treatments. The comparison studies only used low doses of the comparators, eg, 20 mg paroxetine per day[66] or one tablet of lorazepam 0.5 mg per day,[69] which may have led to insufficient efficacy of the comparison drugs.

Studies with Kava-kava (*Piper methysticum*) showed inconsistent results,[70-72] and the extract was been withdrawn from the market in some countries due to hepatotoxicity in some preparations. Valerian extract was not effective in placebo-controlled studies in anxious patients.[70,73] Also, St John's wort was not effective in SAD.[74]

Some other phytotherapeutics have been investigated in individuals with anxiety conditions. Due to the low quality of these studies, the evidence for the investigated products is not sufficient (for a review, see Sarris et al[75]). Standardization may be an issue in herbal preparations. For example, it was shown that different preparations of St. John's wort exhibited large differences in the content of the putatively effective ingredients.[76]

Relative efficacy of drugs

In a meta-analysis of all available drug studies in anxiety disorders,[77] the pre-post effect sizes of the different drugs were determined. We simply looked at the absolute difference in anxiety scale scores before and after treatment, without regard to the relative efficacy compared with placebo. This approach makes it possible to include hundreds of studies in comparisons of differential efficacy of all available drugs and not only the few direct head-to-head comparisons. From the patients' point of view, the improvement in anxiety symptoms as measured by the change from baseline to end point is more relevant than the difference from a control group.

The available medications for anxiety disorders showed considerably large differences in pre-post effect sizes. For example, the improvement achieved with

the most efficacious drug (quetiapine; Cohen's *d*=3.39) was almost three times higher than what was accomplished with the drug with the weakest efficacy (buspirone; *d*=1.35). Quetiapine, however, is not licensed for the treatment of any anxiety disorder in most countries. Among the drugs showing high effect sizes and that are licensed for anxiety disorders and recommended by guidelines were the SSRIs escitalopram (*d*=2.75) and paroxetine (*d*=2.42), and the SNRIs venlafaxine (*d*=2.32) and pregabalin (2.30). Also, some benzodiazepines, eg, diazepam (*d*=2.46) and lorazepam (2.44), showed high effect sizes. However, these drugs are not recommended for routine treatment.

General treatment principles

Patients must be informed about possible adverse effects, interactions, safety warnings, and contraindications, as indicated in the current summary of product characteristics. If patients are educated about the possibility that some early side effects might later decrease in intensity, compliance may improve. Patients with anxiety disorders are often hesitant to take psychotropic drugs because they are afraid of adverse effects. In particular, patients with PDA may easily discontinue antidepressants because of initial jitteriness and nervousness.

Doses for drug treatments are shown in *Table II*. In around 75% of the cases, doses in the lower part of the therapeutic range are sufficient. In patients with severe hepatic impairment, a dosage adjustment or use of medications that are cleared primarily by the kidney (eg, pregabalin) may be required.

For all drugs recommended in this article, relapse-prevention studies in at least one anxiety disorder have been conducted in patients who have responded to previous open treatment with a certain drug and were then randomized to placebo or ongoing blind treatment with the same drug for periods of between 6 and 18 months. All of these studies showed a significant advantage for staying on active medication when compared with switching to placebo. Based on the findings from these relapse prevention studies and clinical experiences, drug treatment should be continued for 12 months or more after remission has occurred. Given the chronic course of anxiety disorders, it is regrettable that there are almost no controlled studies that investigate treatment periods over 12 months. To avoid withdrawal syndromes, the dose should be slowly tapered off over a period of 2 weeks at treatment termination.

It is a common opinion that patients treated with drugs show immediate relapse after stopping medication, whereas gains of psychological therapies are maintained for months or years after treatment termination. This would offer psychological therapies considerable advantage over drug treatment. However, in naturalistic studies following up anxiety patients, substantial relapse rates were also found years after CBT treatment. For example, in an analysis of eight randomized controlled trials on CBT for anxiety disorders, 48% of patients were still symptomatic after 2 to 14 years of follow-up.[78] On the other hand, in relapse prevention studies in which treatment responders to open drug treatment for 8 to 12 weeks were re-randomized to long-term treatment (24 to 52 months) with the same drug or to placebo, only around 40% of patients randomized to placebo relapsed.[79-83]

Drug-drug interactions

When treating anxiety disorders with medications, drug interactions have to be monitored.[35] SSRIs, such as fluoxetine, fluvoxamine, and paroxetine, are particularly liable to be involved in pharmacokinetic interactions, such as enzyme inhibition in the cytochrome P450 system. Additive CNS depression may occur when drugs with sedating properties are combined, eg, TCAs, benzodiazepines, or pregabalin, resulting in unwanted sedation, drowsiness, or increased reaction time. Additive effects at the neurotransmitter level can occur when medications are combined that have antagonistic effects on the same receptors, eg, two drugs with anticholinergic effects.

Unresponsiveness to standard treatments

Before considering a patient to be treatment unresponsive, it should be ascertained that the diagnosis was correct, adherence to the treatment plan was sufficient, the dose prescribed had covered the full range, and there had been a trial period of adequate duration. When patients report previous treatment failures, it often turns out that a drug was only prescribed in the lowest dose or was stopped within the first 2 weeks due to side effects that occurred in the initial phase before the patient could experience improvement.

Concurrent drugs may interfere with efficacy, eg, metabolic inhibitors or enhancers. Psychosocial factors may affect response, and comorbid personality or substance abuse disorders are especially likely to complicate anxiety disorders. When initial treatment fails, the physician has to decide when to change the treatment plan. There have been few systematic trials of treatment-refractory patients with anxiety disorders. If after treatment at what is considered an adequate dose for 4 to 6 weeks a patient shows no response, the medication should be changed. One analysis showed that the chance of responding beyond the fourth week was 20% or less if no effect had occurred by the second week of treatment,[84] suggesting an even earlier switching of drugs. Although "switching studies" are lacking, many treatment-refractory patients are reported to respond when a different class of antidepressant is tried (eg, change from one SSRI to another SSRI, or to an SNRI, or vice versa). If partial response is seen after this period, there is still a chance that the patient will respond after another 4 to 6 weeks of therapy with increased dosages. For some antidepressants, the studies on a potential dose-response relationship are inconclusive, perhaps due to the lack of statistical power for showing a difference between lower and higher doses. According to clinical experience, however, a trial with a higher dose in patients with insufficient response is warranted.

Elderly patients may take longer to show a response. *Table III* contains options in case of drug inefficacy or intolerance. In patients who are unresponsive to psychotropic drugs, the addition of CBT is generally recommended.[85]

A combination of antidepressants and benzodiazepines is sometimes used in treatment-refractory cases.

Switch from one standard drug to another	– Switch from one SSRI to another – Switch from an SSRI to an SNRI, or vice versa – Switch to a TCA – Switch to pregabalin (only in GAD)	
Switch to nonstandard drugs		
Switch to a drug that is approved for other anxiety disorders	– Switch to moclobemide, opipramol, or hydroxyzine – Switch to a benzodiazepine (only when clinically justified)	
Switch to a drug that is not approved for the anxiety disorder in question but has been found effective in RCTs	PDA	- Mirtazapine, quetiapine, phenelzine
	GAD	- Quetiapine; agomelatine; in refractory cases, addition of risperidone or olanzapine to treatment with an antidepressant
	SAD	- Mirtazapine, gabapentin, pregabalin, olanzapine
Switch to a drug (or drug combination) that has been found effective in open studies	PDA	- Combined SSRI and TCA, olanzapine monotherapy, combined SSRI and olanzapine or a TCA, addition of pindolol to an SSRI, combined valproate and clonazepam. - In refractory cases, open studies have documented efficacy of olanzapine and of the addition of fluoxetine to a TCA, of a TCA to fluoxetine, and of olanzapine to an SSRI.
	GAD	- Ziprasidone
	SAD	- Levetiracetam, topiramate, tranylcypromine; in refractory cases, addition of buspirone to an SSRI
Switch to a drug (or drug combination) that has been reported to be effective in case reports	PDA	- The addition of lithium to clomipramine and the combination of valproate and clonazepam have been reported to be effective in refractory cases

GAD, generalized anxiety disorder; PDA, panic disorder with agoraphobia; RCT, randomized controlled trial; SAD, social anxiety disorder (also known as social phobia); SNRI, selective serotonin norepinephrine reuptake inhibitors; SSRI, selective serotonin reuptake inhibitors; TCA, tricyclic antidepressant.
*Medicolegal issues should be considered whenever drugs that have not been approved for the treatment of a certain anxiety disorder are given off label.

Table III. Stepwise plan for drug treatment if the initial standard drug treatment was ineffective or was poorly tolerated.*
Modified from reference 33: Bandelow B, Zohar J, Hollander E, et al. World Federation of Societies of Biological Psychiatry (WFSBP) guidelines for the pharmacological treatment of anxiety, obsessive-compulsive and post-traumatic stress disorders – first revision. *World J Biol Psychiatry*. 2008;9(4):248-312.

When all standard treatments have failed, the off-label use of drugs may be considered, for example, drugs licensed for another anxiety disorder or that are not licensed but have shown efficacy in clinical studies. Such drugs include quetiapine and agomelatine.

Treatment of GAD in older patients

With the exception of GAD, anxiety disorders are less common in patients over 65 years of age. Therefore, only a few studies for the treatment of GAD have been performed with older patients. Controlled studies have shown the efficacy of duloxetine, venlafaxine, pregabalin, and quetiapine in patients over 65 years old.[27] In the elderly, an increased sensitivity to drug side effects and interactions must be considered, including anticholinergic effects, risk of orthostatic hypotension and cardiovascular events, risk of falling, and paradoxical reactions to benzodiazepines.

In the elderly, effect sizes for CBT tend to be somewhat smaller than those found in mixed-age populations.[86] A meta-analysis of studies with older adults with GAD showed superiority of CBT to waitlist or "treatment-as-usual" conditions but not to active controls (eg, psychological or pill placebos).[87]

Treating children and adolescents

Whereas specific phobias, SAD, and separation anxiety disorder are common in younger people, PDA and GAD are relatively rare. There are some randomized, placebo-controlled studies of pharmacotherapy for anxiety disorders in children and adolescents showing efficacy of sertraline, fluoxetine, and duloxetine in young patients with GAD, of venlafaxine and paroxetine in SAD, and of sertraline, fluvoxamine, and fluoxetine in mixed samples, including patients with separation anxiety disorder, GAD, and SAD.[88] However, little is known about the value of long-term treatment.[89] The combination of CBT and sertraline was found to be more effective than both treatment modalities alone.[90]

There had been concerns about increased risk for suicidal ideation (not suicides) in children and adolescents treated for major depression with SSRIs (escitalopram, citalopram, paroxetine, and sertraline), mirtazapine, and venlafaxine.[91] According to a meta-analysis, the risk:benefit ratio in the treatment of depressed children and adolescents seemed to be most favorable with fluoxetine.[92] Although suicidal ideation is less common in anxiety disorders than in major depression, the risks of pharmacological treatment have to be weighed carefully against the risks of nontreatment. It was reported that antidepressant prescriptions for children and adolescents decreased substantially after European and US regulatory agencies issued warnings about a possible suicide risk with antidepressant use in pediatric patients in 2003/2004[93] and that these decreases were associated with increases in suicide rates in children and adolescents (although a causal relationship is not proven).[94]

For children and youths with separation anxiety disorder, several treatment studies exist.[95] However, no controlled studies on the treatment of adults with this disorder could be traced.

There is also a paucity of treatment studies for children with selective mutism. Small studies have shown that psychotherapeutic approaches were at least better than waitlist controls.[96,97] One review indicated that only two very small placebo-controlled drug studies showed efficacy of the SSRIs fluoxetine and sertraline.[98]

Pregnancy and breastfeeding

For pregnant women, the risk of an untreated anxiety disorder must be weighed against the risk of damage to the unborn child as a result of treatment. A large study suggested no substantial increase in the risk of cardiac malformations attributable to antidepressant use during the first trimester.[99] However, antidepressants have been associated with increased risk of spontaneous abortions, stillbirths, early deliveries, respiratory distress, and endocrine and metabolic dysfunctions.[100] Nevertheless, the current evidence suggests that the use of many antidepressants, especially the SSRIs, is favorable compared with exposing the mother to the risks of untreated depression or anxiety disorders.[101]

Likewise, a careful assessment of the risk/benefit balance has to be done when a mother is breastfeeding. In such cases, CBT should be considered as an alternative to medication treatment.

Psychotherapy

All patients with anxiety disorders require supportive talks and attention to the emotional problems that are associated with the anxiety disorder. Psychoeducation includes information about the physiology of the

bodily symptoms of anxiety reactions and the rationale of available treatment possibilities. Many patients may require formal psychological treatment interventions, which are mostly done on an outpatient basis.

The treatment of anxiety disorders by CBT is described in more detail in the article by Borza in this issue of *Dialogues in Clinical Neuroscience* (p 203). The efficacy of CBT for all anxiety disorders has been shown in a large number of controlled studies. If avoidance of feared situations is a relevant factor in phobic disorders, exposure techniques should be included in the treatment schedule, in which patients are confronted with their feared situations.

In comparison with CBT, the evidence for psychodynamic therapy is weaker.[50] Controlled studies with psychodynamic therapy were markedly fewer in number, and of lower quality, than those with CBT, and some comparison studies have shown superiority of CBT.

For specific phobias, there are only studies with behavioral therapy, which should be performed as exposure treatment. In the available treatment studies, it was shown that only a few sessions (eg, one to five) were necessary for effective treatment of specific phobias.

In recent years, many studies have investigated psychological therapies that are performed via the Internet, usually involving minimal or no contact with a therapist. However, at present, evidence is lacking that these treatments are as effective as individual CBT with face-to-face contact.[77] Internet therapies may be an option for regions in which psychotherapy is not widely available or to bridge the waiting period before a "real" therapy is scheduled to begin. They are also less expensive than face-to-face psychotherapies. However, important issues have to be solved, including reimbursement by health insurance systems, data protection, the problem of "remote diagnosis" without direct contact, assessment of suicidality, and medicolegal aspects. Treatments with a "virtual reality" setting (eg, Gilroy et al[102]) may be a promising new approach for specific phobias.

Combining psychotherapy and medication

Both psychotherapy and pharmacotherapy have been shown to be more effective than control groups. However, whereas drugs are mostly compared with placebo controls, the evidence for psychotherapy in anxiety disorders is mainly based on comparisons with a "waitlist," a control method that was used in 70% to 75% of the studies in adults and children.[77,103,104] Because pill placebos have higher effect sizes than waitlist controls, the effect size differences between active and control conditions cannot be compared between psychotherapy and medication studies. Therefore, our research group conducted a large meta-analysis of all available controlled short-term studies for anxiety disorders and compared the pre-post effect size differences (before and after treatment) between medications and psychotherapies.[77] In this meta-analysis, which was based on studies with around 35 000 patients, medications were associated with a significantly higher average pre-post effect size (Cohen's d=2.02) than psychotherapies (d=1.22; P<0.0001). It was also found that patients included in psychotherapy studies were less severely ill than those recruited for medication trials.

Moreover, it was shown that the average pre-post effect sizes for pill placebos were of similar strength to the gains achieved with psychotherapies. This surprising finding cannot be explained by heterogeneity, publication bias, or by allegiance effects. However, this does not mean that psychotherapy is not helpful, as the average effect size obtained with psychotherapies is still strong—it only means that a placebo pill is a very powerful treatment, at least for the first weeks or months of treatment. Nevertheless, patients should be informed about the relative efficacy of the treatment options they are offered.

The meta-analysis also showed that combinations of psychotherapy and pharmacotherapy had a relatively high effect size (d=2.12). However, only a few combination studies were available for this comparison, and some of these have not been conducted with the most powerful drugs.

Other treatment options

Exercise (eg, aerobic training, such as jogging 5 km three times a week) has been studied in PDA. However, it was found that exercise was less effective than clomipramine[105] and no more effective than a control condition, relaxation.[106] Thus, exercise can only be recommended as adjunctive treatment to standard treatments.

Hypnosis, autogenic training, and biofeedback or complementary medicine methods such as acupuncture, osteopathy, or homeopathy are often recommended for the treatment of clinical anxiety. However, controlled

studies fulfilling at least basic methodological standards are lacking.

Although controlled studies on the usefulness of self-help groups are lacking, patients should be encouraged to participate if appropriate.

Conclusions

GAD and other anxiety disorders are the most prevalent mental disorders. A large amount of data available from randomized controlled trials permits the formulation of robust evidence-based recommendations for the treatment of GAD, PDA, and SAD. In most cases, drug treatment and CBT may substantially improve quality of life in GAD patients. ❑

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Tratamiento de los trastornos de ansiedad

Los trastornos de ansiedad (trastorno de ansiedad generalizada, trastorno de pánico/agorafobia, trastorno de ansiedad social y otros) son los trastornos psiquiátricos más prevalentes y están asociados con una alta carga de enfermedad. En la atención primaria los trastornos de ansiedad tienen a menudo un bajo reconocimiento y son subtratados. La terapia se indica cuando un paciente muestra un marcado distrés causado por el trastorno o sufre por complicaciones debidas a él. Las recomendaciones terapéuticas que se entregan en este artículo están basadas en guías clínicas, estudios de meta-análisis, revisiones sistemáticas y estudios controlados randomizados. Los trastornos de ansiedad deben ser tratados con terapia psicológica, farmacoterapia y/o una combinación de ambas. La terapia cognitivo conductual puede ser considerada la psicoterapia con el mayor nivel de evidencia. Los fármacos de primera línea son los inhibidores selectivos de la recaptura de serotonina y los inhibidores de la recaptura de serotonina/noradrenalina. No se recomiendan las benzodiacepinas para un empleo rutinario. Otras opciones terapéuticas incluyen pregabalina, antidepresivos tricíclicos, buspirona, moclobemide y otros. Después de la remisión, los medicamentos deben continuarse por unos 6 a 12 meses. Cuando se desarrolla un plan terapéutico se debe considerar la eficacia, los efectos adversos, las interacciones, los costos y la preferencia del paciente.

Traitement des troubles anxieux

Les troubles anxieux (anxiété généralisée, trouble panique/agoraphobie, anxiété sociale et autres) sont les troubles psychiatriques les plus prévalents et ils s'associent à une morbidité importante. Les troubles anxieux sont souvent peu reconnus et peu traités en soins primaires. Le traitement est indiqué quand ces troubles causent une détresse manifeste chez le patient ou lorsqu'il souffre de complications. Les conseils de traitement donnés dans cet article sont basés sur des recommandations, des métaanalyses et des revues systématiques d'études contrôlées randomisées. Les troubles anxieux doivent être soignés par un traitement psychologique, une pharmacothérapie, ou une association des deux. Le traitement cognitivo-comportemental est considéré comme la psychothérapie ayant niveau de preuve le plus élevé. Les inhibiteurs sélectifs de la recapture de la sérotonine et les inhibiteurs de la recapture de la sérotonine et de la noradrénaline sont les médicaments de première ligne. Les benzodiazépines ne sont pas recommandées en routine. La prégabaline, les antidépresseurs tricycliques, la buspirone, le moclobémide et d'autres sont d'autres traitements possibles. Les médicaments doivent être poursuivis 6 à 12 mois après la rémission. Lors de l'élaboration d'un plan de traitement, il faut tenir compte de l'efficacité, des effets indésirables, du coût et de la préférence du patient.

Reducing Test Anxiety Among Third Grade Students Through the Implementation of Relaxation Techniques

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Abstract

The purpose of this study was to reduce the negative effects that self-perceived levels of test anxiety have on third-grade students. The participants in this study consisted of 177 third-grade students at two Midwestern public elementary schools. Students at one school were taught relaxation techniques, while students at the second school served as the control group, receiving no training. The Westside test anxiety scale (Driscoll 2007), elevator breathing and guided relaxation were utilized to measure and manage levels of anxiety. The results indicated that the relaxation intervention had a significant effect in reducing test anxiety in the experimental group. In contrast, no significant decrease in test anxiety was found among the control group. This study highlights the implications for counselors, parents and teachers working with elementary students facing high-stakes testing.

Keywords: test anxiety, relaxation techniques, elementary school students

Reducing Test Anxiety Among Third Grade Students Through the Implementation of Relaxation Techniques

Anxiety is a phenomenon that human beings routinely encounter within their daily experience. It is considered to be one of the most prevalent and pervasive human emotions, with a large sector of the world's population suffering from excessive and overbearing levels (Rachman, 2004). Anxiety can be described as a perceived notion of psychological distress which occurs due to the expectation of a disconcerting and potentially threatening event. Although extensive research has focused on the concept of anxiety, it cannot be defined by purely objective or concrete means (Rachman, 2004). As a result of the ubiquitous nature of anxiety, the construct has been defined as different subtypes (e.g., social anxiety, state-trait anxiety). The focus of the present study was on one other such subtype, namely, test anxiety.

Within the American education system, the prevalence and significance of standardized testing has been increasing along with the stakes of this testing format (Black, 2005). As a result, today's students are associating a greater sense of consequence with the prospect of being tested, resulting in feelings of pressure to perform and fear of not performing adequately. According to Zbornik (as cited in Black, 2005), students who suffered from test anxiety tended to be consumed with feelings of anxiousness, worthlessness, and/or absolute dread in regard to their academic achievement. Test anxiety can produce a physiological hyper-arousal, interfering with students' mental processes and debilitating their ability to function during a test, as well as in the days and weeks leading up to a test (Soffer, 2008). Due to the pressure to perform, and the perceived importance of high-stakes testing, students' mental states

and sense of emotional stability can become impaired. Rather than feel confident about high-stakes tests and the higher level thinking they require, test-anxious students may become overly concerned with the repercussions of failure (Spielberger & Vagg, 1995). In addition to the adverse effects on cognitive processes, anxiety can produce physiological hyper-arousal, negative emotional responses, as well as behavioral problems in children.

Physiological arousal is defined by the American Psychological Association Dictionary of Psychology as aspects of arousal shown by physiological responses, such as increases in blood pressure and rate of respiration and decreased activity of the gastrointestinal system (Vandenbos, 2007). Other physiological effects of test anxiety include constricted blood vessels, raised body temperature, increased dilation of the eyes, muscle spasms, increased blood flow to muscles, and decreased blood flow to the skin (Zeidner, 1998). The Educational Testing Service (ETS: 2005) has also identified nausea, muscular cramps, faintness, and dry mouth to the list of physiological symptoms as a result of test anxiety.

Emotionality is a link between the cognitive affects of test anxiety and the physiological effects. Zeidner (1998) defined emotionality as the attention paid to, and interpretations of, affective/physiological arousal. Thus, two students who are overcome by the same physiological symptoms of test anxiety may have different levels of anxiety based on their differing awareness of physiological changes and bodily arousal. Triplett and Barksdale (2005) identified specific symptoms of emotionality in a study measuring levels of test anxiety, including feelings of hate, anger, nervousness, boredom, confusion, and frustration. Cheek, Bradley, Reynolds, and Coy (2002) found, from

teachers' reports, that following testing, some children exhibited several behavioral problems such as avoidance, crying, illness, and outburst of anger.

Test Anxiety and Relaxation Training

Various forms of relaxation training have been used to mitigate the deleterious effects of anxiety. Two particular techniques, deep breathing and muscle relaxation, have been shown to effectively decrease anxiety levels in individuals who have difficulty relaxing in anxious situations (Zuercher-White, 1998). These techniques can result in individuals' increased focus on the task at hand rather than on their level of anxiety.

Deep breathing can be defined as slow, diaphragmatic breathing that balances out the oxygen and carbon dioxide levels in the body (Nassau, 2007). While utilizing diaphragmatic breathing, it is important that air is inhaled through the nose and exhaled through the mouth. In response to this sensation, the body will react with less severe symptoms in a time of high anxiety or panic (Zuercher-White, 1998). The author recommended that when training individuals how to utilize this technique, inform them of the purpose of this training and what the outcome of the techniques will be. A longitudinal study conducted over two years with 64 post-baccalaureate premedical students investigated perceived experience of test anxiety (Paul, Elam, & Verhulst, 2007). The students were taught to utilize deep breathing techniques to reduce their anxious feelings. The students' self-reports after the intervention indicated that they felt less test anxiety, more relaxed, and more confident.

Progressive muscle relaxation is a process that involves decreasing the physiological aspects of anxiety while distracting the individual from their awareness of anxious feelings (Nassau, 2001). The progressive muscle relaxation technique consists

of a sequential tensing and relaxing of different muscle groups. The individual progresses through the major muscle groups in the body, usually progressing from the head and neck muscles to the legs and ankles, or visa versa.

Rasid and Parish (1998) conducted a study examining the effects of two types of relaxation training with 55 high school students' levels of anxiety using an experimental-control group design. Results showed that both behavioral relaxation and progressive muscle relaxation techniques produced significantly lower anxiety scores in the experimental group as compared to the control group. Zaichkowsky & Zaichkowsky (1984) found that children as young as nine years of age can learn stress control in a short period of six weeks. Children were taught progressive muscle and imagery-based techniques to control physiological arousal (i.e., heart rate, respiration, and skin temperature). The authors found decreases in all three of the children's physiological responses to anxiety. In a more recent study, Lohaus and Klein-Hessling (2003), utilized progressive muscle relaxation in an effort to reduce text anxiety in 160 fourth- and sixth-grade students. They found that relaxation techniques can have a more significant calming effect in children over the short-term (i.e., five sessions) as compared to additional training sessions (i.e., ten sessions). These results suggested that children are capable of learning relaxation techniques over a relatively short period of time.

It is clear from previous research with both young adults and children, relaxation techniques can reduce test anxiety. The present study tested three hypotheses: 1) the pre-and post-test differences for the experimental group will show a significant decrease in anxiety level; and 2) the pre-and post-test differences for the control group will show

no significant decrease in anxiety levels 3) there will be a significant post-test difference in anxiety levels between the experimental and control groups.

Method

Participants

The sample was made up of two cohorts of third-grade students (N=177, 87 males and 89 females), each enrolled in two Midwestern public elementary schools. Ages ranged from 8 to 10 years with a median of 9 years. The greatest percentage of participants reported their race as Caucasian (89.3%), followed by African American (5.1%), Hispanic (0.6%). The remaining participants identified themselves as Mixed race (5.8%) or indicated “other” (2.8%).

Instrumentation

Westside Test Anxiety Scale. The Westside Test Anxiety Scale (WTAS: Driscoll, 2007) was designed to identify participants with anxiety impairments who could benefit from anxiety-reduction and yields a general test anxiety score. The WTAS consists of 10 items, each using a Likert response scale where 1 = “never true” and 5 = “always true.” The instrument was modified for the purpose of this study in an attempt to make the items easier to understand by the young participants. For example “exam” was replaced with “test,” “fail” was replaced with “bad job” and “mind sometimes wanders” was replaced with “daydream.”

The WTAS was constructed to measure anxiety impairments with six items assessing incapacity (i.e., memory loss and poor cognitive processing) and four items measuring worry and dread (i.e., catastrophizing) which interferes with concentration (Driscoll, 2007). Scores for the two subscales, incapacity (items 1, 4, 5, 6, 8, & 10) and

worry (items 2, 3, 7, & 9) are obtained by summing the respective item responses. A total score is obtained by adding up the scores and dividing by 10, where higher scores indicate a greater level of test anxiety (Driscoll, 2004). The present researchers used the total score to obtain a general level of test anxiety.

Validity has been shown in some small samples. The WTAS has yielded a moderate positive correlation with the Cognitive Test Anxiety Scale (Cassidy & Johnson, 2002). The WTAS has also shown a negative relationship with gains in test scores (Driscoll, 2007). That is, as WTAS scores decreased, test scores increased. At the time this study was conducted, reliability information was unavailable. However, internal consistency estimates were calculated for the present study.

Procedure

Data collection took place at two Midwestern public elementary schools in separate school districts. All third-grade students were invited to participate in the study. Those students who returned a signed parental consent form were included. The students at one of these schools comprised the control group while the other school's students served as the experimental group. All participants were given the WTAS (pre-test) and a short demographic questionnaire to complete.

Members of the experimental group were taught relaxation techniques by one of the investigators. Training took place at school, two days a week, over a five-week period. On training days, the participants either stayed in their classrooms or moved to another location within the school building. During training, relaxing music was played in the background. While in training, participants in the experimental group were taught

both deep breathing exercises (i.e., elevator breathing) and progressive muscle relaxation (i.e., guided relaxation for children).

Elevator Breathing. Elevator breathing (Teel, 2005a) was one of the interventions utilized in this study to help children relax quickly when facing stressful situations. Breathing techniques are very important for inducing relaxation. Through training, an individual's breathing will automatically slow down and deepen, bringing more oxygen into their bodies and helping them to relax. Diaphragmatic breathing, or "belly breathing," is a particularly helpful way to release mental and physical stress and tension. It calms the mind and induces a state of relaxation in one's body. Elevator breathing incorporates visualization for children. Participants practiced breathing exercises for five minutes at each of the 10 sessions.

Guided Relaxation for Children. Guided relaxation for children (Teel, 2005b) was also utilized in this study to help manage levels of anxiety that children may be experiencing. Progressively relaxing each of the muscle groups along with deep breathing is intended to promote relaxation and counter the physiological components of arousal by first tensing the major muscle groups then relaxing those muscles. The investigator would instruct the students to get comfortable (e.g., lying down, closing eyes, or resting against a wall) and then began reading the relaxation script to the participants while incorporating the deep breathing. This portion of the experiment took approximately 8 to 10 minutes at each session.

At the conclusion of the five weeks, all participants in both the experimental and control groups completed the Westside Test Anxiety Scale (post-test).

Data Analyses

In an attempt to ameliorate the effects of large differences in sample sizes between the experimental and control groups (N = 124 and N = 53, respectively), the experimental group was partitioned into two subgroups using the SPSS random selection routine. The two subsamples consisted of 29 females, 27 males and 32 females, 36 males, respectively. The control group consisted of 28 females and 25 males. Pre- and post-test differences were analyzed for each experimental subgroup as well as for the control group. Post-test differences between each experimental subgroup and the control group were also conducted. Both pre- and post-test differences, as well as differences between the experimental groups and the control group were tested using *t*-test analyses.

Results

Table 1 contains the separate descriptive and inferential statistics for the pre- and post-test differences for each of the groups (i.e., both experimental subgroups and the control group). For both experimental subgroups, significant differences between the pre-test and post-test means were found ($t(55) = 2.24$, $p = .029$ and $t(67) = 4.07$, $p = .000$, respectively). These results indicated that the relaxation intervention had a significant effect in reducing test anxiety. By contrast, no significant difference was found between the control group's pre- and post-test means ($t(52) = 0.39$, $p = .699$). These findings supported the first two hypothesis tested in this study. Post-test differences between the respective experimental subgroups and control group yielded non-significant results ($t(107) = – 0.79$, $p = .431$, and $t(119) = – 0.57$, $p = .573$, respectively). These findings did not support the third hypothesis tested in this study.

Table 1

Pre- and post-test means, standard deviations, t- values, and coefficient alphas for experimental and control groups

Group	Mean / sd (pre-test)	Mean / sd (post-test)	*t*-value (pre – post)	df	alpha
Experimental 1	2.5 (.89)	2.3 (.88)	2.24 *	55	.88
Experimental 2	2.8 (.87)	2.3 (1.02)	4.07 *	67	.89
Control	2.4 (.84)	2.3 (1.17)	0.39	52	.75

Note. * $p < .05$.

Discussion

The submitted study explored the effects of relaxation techniques on test anxiety in elementary school students. The analyses in this study yielded mixed results. The present results supported the first hypothesis. The experimental group was taught two relaxation techniques, deep breathing and muscle relaxation after which the experimental group showed a significant decrease in anxiety. In contrast, a group of their peers, receiving no relaxation training, conveyed no significant difference in test anxiety. The results support earlier findings that relaxation techniques can be learned and utilized successfully by young children (Zaichkowsky & Zaichkowsky, 1984; Lohaus and Klein-Hessling, 2003). Thus, the first two hypotheses presented above were supported. Students receiving relaxation training achieved a significant reduction in test anxiety scores, and students receiving no training demonstrated no significant decrease in test anxiety scores.

By contrast, the third hypothesis presented in this study was not supported by the findings. No significant difference in test anxiety scores between the experimental and

control groups was found. In an attempt to avoid practice effects and the influence of demand characteristics we used an experimental group comprised of third grade students that attended a different school district than the students in the control group. Therefore, we think it is highly unlikely that communication between the two groups and competition between the members had any effect on the study, and even more unlikely that they would be able to guess that our study was predicting a statistical interaction and artificially produce one (Heppner, Linlighan, & Wampold, 1999).

Interestingly, the participants were faced with high-stakes testing when they were trained in the relaxation techniques. Some limitations of the present research are worth noting. While the intent was to conduct the study in two schools of similar cultural effect, it is still likely that several environmental factors within each respective school had differing effects on test anxiety. Due to the pressure to perform and perceived importance of high-stakes testing, students' mental states and sense of emotional stability may become adversely affected (Spielberger & Vagg, 1995; Paul, Elam, & Werhulst, 2007). Through a follow-up interview with the control group's principal and teachers, we speculate that the pressure to perform in the learning environment that has been created at the site of the control group, by parents, teachers, and administrators, may not have been as heightened as the pressure created over high-stakes testing at the site of the experimental group (Maleske, K., personal communication, May 13, 2009). Likewise, the emotional climate created at one school regarding high-stakes testing may have contrasted with that of the other elementary school. The experimental group is located in a school district that is in close proximity to a University. The experimental group therefore, may be in an atmosphere that has more

pressure to perform due to the presence of higher academic achievement. In fact, it is reported that 33.1 % of the population in the city of the experimental group have a bachelor's degree or higher (city-data, 2009). From this we can infer that a higher percentage of children in the experimental group could be children of University faculty and may experience more pressure to perform and prepare for a college education. In addition, a part of the control group's school culture is to celebrate state-mandated examinations (Maleske, K., personal communication, May 13, 2009). These environmental factors should be considered when selecting comparison groups.

Conclusion

High-stakes testing appears to be the 'norm' in the American public schools and children need interventions to combat the adverse behavioral, cognitive and physiological effects (Carter, Williams, & Silverman, 2008). The results of the present study along with previous work demonstrate that children can benefit from relaxation training (Zaichkowsky & Zaichkowsky, 1984). These findings may have implications for psychological intervention. United States Secretary of Education, Arne Duncan (2009) spearheaded the "Race to the Top" competition where he challenged states to devise educational reform plans. Based on these proposed reforms it is suggested that data systems, linking teacher evaluations to student gains, and buy-in from districts around the state are key elements to be considered when making an educational reform plan (The Christian Science Monitor, 2009). Despite these proposed reforms it is unlikely that high-stakes testing will be eliminated or significantly reduced in the near future (No Child Left Behind Act, 2002; Triplett & Barksdale, 2005). Schools can play a role in addressing test anxiety by incorporating intervention programs such as relaxation

training into the curriculum (Cheek, Bradley, Reynolds, & Coy, 2002). School counselors and teachers can have a scheduled time of the day to teach students how to respond to physiological and psychological responses to anxiety and stress through the utilization of relaxation training. The interventions discussed in this article are brief and not difficult for children to learn. These interventions and techniques can be implemented in the academic environment to mediate anxiety and can be generalized to life skills. Another implication of this research is to alert administrators, parents, and teachers that children are experiencing adverse effects from having pressure to perform and that there is a need to address this with children (Cheek, Bradley, Reynolds, & Coy, 2002). Principals, administrators, and teachers can model for children how to respond to stress and anxiety and thus impact children's responses to pressure and anxiety. If performance anxiety is not addressed in elementary school, it could continue through the adult years and impact quality of life and career paths (Miller, Morton, Driscoll, & Davis, 2006). Lastly, the tone that the school sets can have an effect on student performance and anxiety, and ultimately their love for learning (Triplett & Barksdale, 2005). A warm and energetic environment can elicit greater success and psychological equilibrium in children.

These findings suggest a number of different possibilities for future research. The potential for parents' and teachers' anxiety levels, as well as the overall atmosphere of the school to influence children's perceived levels of anxiety, is a promising area of future research. Principals have the responsibility to lead their school to success on high-stakes testing in order to continue to receive school funding. The principals in effect, give teachers the responsibility to promote desired results on high-stakes testing.

As a result, teachers experience pressure to produce high test scores which relates to their job security. Consequently, this causes teachers to feel disempowered, anxious, and alienated (Triplett & Barksdale, 2005). It is important for future research to determine whether children are impacted by the levels of stress and anxiety that they perceive in their principals and teachers. Parents' and teachers' expectations may correlate with students' anxiety. Future research using measures to empirically investigate the anxiety levels of teachers, principals and parents are needed to understand the impact it has on school children.

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