Anxiety

M Zeidner, University of Haifa, Haifa, Israel

Glossary

Cognitive-focused interventions – Emphasize the mediating role of cognitive processes in sustaining or eliminating test anxiety and refer to a wide array of therapeutic approaches directed toward modifying the worry and irrational thought patterns of test-anxious clients.
Emotionality – Consists of perceptions of autonomic reactions evoked by evaluative stress.
Emotion-focused interventions – Primarily aim at reducing the arousal and heightened emotional reactions of test-anxious persons when faced with stressful evaluative situations.
Situation-specific personality trait – In the context of test anxiety research, this trait refers to the individual's disposition to react with extensive worry, intrusive thoughts, mental disorganization, tension, and physiological arousal when exposed to evaluative situations.
Test anxiety – Refers to the set of phenomenological, physiological, and behavioral responses that accompany concern about possible negative consequences or loss of competence on an examination or similar evaluative situation. Test-anxious behavior is typically evoked when a person believes that his/her intellectual, motivational, and social capabilities are taxed or exceeded by demands stemming from the test situation.
Worry – Primarily refers to cognitive concern about the consequences of failure.

Overview

Anxiety is incontestably the most researched of all emotional states in education (Schutz and Pekrun, 2007). Educational settings are contexts in which students at all levels are ubiquitously exposed to a wide array of potentially stressful and anxiety-evoking experiences. Thus, school-aged students are frequently exposed to stressors such as parental pressures for high achievement, fierce classroom competition for high grades, experiences of frustration and failure, teacher disapproval, peer conflict, social isolation and rejection, and physical and verbal aggression and abuse. Comparably, college students are typically required to adjust to a variety of novel and challenging academic and social stressors and demands that may evoke anxiety. These include demanding coursework assignments; heavy workload; time pressures in meeting deadlines for submission of papers; insufficient finances and work opportunities; demanding examinations administered under stringent time pressures; poor student–faculty rapport; inadequate and crowded study conditions; and conflict between meeting academic demands, leisure, and extracurricular pursuits, and family responsibilities. The anxiety experienced by many students as a result of school or academic stress is such an unpleasant and painful experience that it is not surprising that anxiety often interferes with student learning, well-being, and health.

Anxiety is a universal human experience, intrinsic to the human condition. The construct is defined by a loosely coupled ensemble of cognitive, affective, somatic arousal, and behavioral tendency components, evoked in response to mental representations of future threat or danger in the environment (Zeidner, 2007). However, the nature of the specific environmental stimuli evoking anxiety appears to have changed considerably over the years (Zeidner, 1998). Whereas in ancient times, wild beasts, natural catastrophes, and the like plausibly served as major sources of environmental stress, in the modern achievement-oriented society, stress and anxiety are evoked largely by a wide array of social-evaluative encounters (e.g., appearing for a college aptitude test, defending a dissertation, and taking a vocational aptitude test battery).

Modern conceptualizations view anxiety as an important adaptation that signals to us what is potentially harmful, dangerous, or threatening in a stressful encounter, with critical value for human survival (Rachman, 2004). Thus, anxiety in educational contexts serves as a call for action, taking precedence before all other activities and shifting attention to the sensed threats and potential losses and dangers at hand. When an individual experiences anxiety this is important information suggesting that something in the environment has been appraised as threatening or harmful to one's well-being and some action needs to be taken to ward off the threat (Lazarus, 1999).

Anxiety is frequently cited as a key villain in the ongoing drama surrounding educational testing and evaluation, and is claimed to be among the factors at play in determining a wide array of unfavorable outcomes and contingencies (e.g., poor cognitive performance, scholastic underachievement, low satisfaction with school or college, and psychological distress and ill health; Zeidner, 1998).

Clearly, many students have the potential to do well but perform poorly because of their debilitating levels of anxiety, thus limiting educational or vocational development. The loss to society of the full contribution of potentially capable students through anxiety-related distress and somatic ailments, underachievement and failure at school, or performance decrements constitutes an important problem for educational practitioners.

Conceptualizations

In contrast to early mechanistic views of anxiety as a unified construct, it is currently construed as a complex multidimensional construct embodying a series of interrelated cognitive, affective, and behavioral tendency components and reactions. Its complex nature, coupled with the fact that anxiety encompasses worry and self-preoccupation, physical upset, disruptive feelings, and maladaptive behaviors, makes it particularly difficult for educational researchers to sort out all these components. Anxiety has been variously conceptualized as an antecedent stimulus condition, a latent mediating process (e.g., as a probability of a harmful future outcome), and a response (physiological, affective, behavioral, etc.) to a stressful condition.

Since the early 1950s, the anxiety construct was dramatically advanced by a number of important conceptual distinctions, which helped refine thinking and research in the area. One useful distinction differentiates between anxiety as a relatively stable personality trait and as a more transitory state reaction to specific ego-threatening situations (Spielberger, 1972). Thus, trait anxiety refers to relatively stable individual differences in anxiety proneness, whereas state anxiety is a palpable, temporary reaction to a stressful event (e.g., final examinations) characterized by subjective feelings of tension, apprehension, nervousness, and worry, as well as by the activation or arousal of the nervous system. Whether or not students who differ in trait anxiety will show corresponding differences in state anxiety in the school or college setting depends on the extent to which each of them perceives a specific situation (e.g., college algebra examination) as psychologically threatening, and this is influenced, in turn, by each individual's constitution (e.g., numerical ability) and past experiences (e.g., number of mathematics courses taken).

Another important conceptual and methodological contribution to the evaluative anxiety literature is the distinction between facilitating and debilitating anxiety (Alpert and Haber, 1960). Accordingly, facilitating and debilitating anxiety, respectively, are claimed to lead to task-related and task-irrelevant behaviors during evaluative ego-threatening situations. A particularly useful conceptual distinction differentiates between worry and emotionality components of anxiety (Liebert and Morris, 1967). Worry, the cognitive component of anxiety, was viewed primarily as a cognitive concern about the consequences of failure on evaluative tasks (e.g., college aptitude examinations). By contrast, emotionality, the affective component of anxiety, was construed as perceptions of autonomic reactions evoked by stress. These two components are empirically distinct, though correlated, and worry relates more strongly to performance decrements than does emotionality.

Lazarus's transactional theory of stress and coping (Lazarus and Folkman, 1984; Lazarus, 1991) provides a contemporary and fundamental conceptual framework for the analysis of stress and anxiety in educational settings. According to this perspective, emotions, such as anxiety, reveals something of a person's goal hierarchy and belief system and how events in the immediate environment are appraised by the person. Thus, any evoked emotion reflects a high-level synthesis of several appraisals relating to the individual's adaptational status in the current environment. The core theme in anxiety is a danger or threat to ego or self-esteem, especially when a person is facing an uncertain, existential threat. Thus, the very presence of anxiety in an evaluative encounter is informative because it communicates that an existential threat has not been controlled very well, thus providing the researcher and educational specialists (counselors, school psychologists, etc.) with critical diagnostic information.

Evaluative Anxiety

A host of different types of anxiety may be relevant to specific educational settings (test anxiety, math anxiety, computer anxiety, social anxiety, etc.). These forms of anxiety are frequently encountered in education and share the prospect of personal evaluation in real or imagined social situations, particularly when a person perceives a low likelihood of obtaining satisfactory evaluations from others (Leitenberg, 1990). Next, we discuss two prevalent forms of evaluative anxiety in education – test and math/computer anxiety.

Test Anxiety

Test anxiety refers to the set of phenomenological, physiological, and behavioral responses that accompany concern about possible negative consequences or poor performance on an examination or a similar evaluative situation (Zeidner, 1998). Test-anxious behavior is typically evoked when a student believes that his/her intellectual, motivational, and social capabilities are taxed or exceeded by demands stemming from the test situation.

Test anxiety has taken on a variety of different meanings throughout its relatively brief history as a scientific construct. In the early days of research, the construct was

defined in motivational terms, either as drive level, goal interruption, or a need to avoid failure. Subsequently, it was conceptualized as a relatively stable personality disposition linked to cognitive–attentional phenomena. Accordingly, the highly anxious person is one who attends excessively to evaluative cues concerning personal competence, and to feelings of physiological arousal. Test anxiety may also be a concomitant of self-handicapping employed to preserve ones self-merit in the face of potential failure (Zeidner and Matthews, 2005). Cybernetic self-regulative models have seen test anxiety as resulting from a conflict between competing reference values (Zeidner, 2007).

Recent theorizing (Zeidner, 1998) emphasizes the distinction between test anxiety as an attribute of the person and as a dynamic process. From the first perspective, dispositional test anxiety may be construed as a contextualized personality trait. Accordingly, test anxiety refers to the individual's disposition to react with extensive worry, intrusive thoughts, mental disorganization, tension, and physiological arousal when exposed to evaluative contexts or situations. The more transient-state expressions of anxiety may be assessed separately from the more stable trait. From the second, process-oriented perspective, test anxiety depends on the reciprocal interaction of a number of distinct elements at play in the ongoing stressful encounter between a person and certain parameters of an evaluative situation. These elements include the specific educational context, individual differences in vulnerability (trait anxiety), threat perceptions, appraisals and reappraisals, state anxiety, coping patterns, and adaptive outcomes.

Math and Computer Anxieties

Both math and computer anxieties, respectively, are conceptually related to test anxiety through a common theme of concerns about evaluation (e.g., Rosen and Maguire, 1990). Math anxiety is defined by feelings of tension, helplessness, mental disorganization, and associated bodily symptoms that are evoked in mathematical problem-solving situations (Ashcraft, 2002). Math anxiety is claimed to interfere with the manipulation of numbers and the solving of complex mathematical problems in a wide variety of ordinary life and academic situations. Statistics anxiety, referring to the feeling of anxiety encountered when taking a statistics course or working on statistical analysis, has frequently been construed as a subset of math anxiety (Zeidner, 1991). Math anxiety, coupled with objective cognitive difficulties experienced in learning mathematics, may lead people to reject goals, such as scientific career choices, for which studying mathematics is instrumental.

Computer anxiety (sometimes termed computer phobia, technophobia, or cyberphobia) may be decomposed into anxiety about present or future interactions with computers or computer-related technologies; specific negative cognitions or self-critical internal dialogs when interacting with the computer or when contemplating future computer interaction; and negative global attitudes about computers, their operation, or their societal impact (Weil *et al.*, 1990). The effects of computer anxiety on the utilization of computer-based technology may incur serious economic costs estimated at the level of billions of dollars per year (Bozionelos, 2001).

Math and computer anxieties may relate not just to the obvious stimulus attributes of mathematics/numbers and computers, but also to deeper personal concerns. Thus, math anxiety focuses not only on the evaluative nature of mathematics tests, but also concerns mathematical content (symbols, operators, etc.), its distinctive features as an intellectual activity (inductive and deductive reasoning, problem solving, etc.), and its meanings for many persons in our society (Richardson and Woolfolk, 1980). Similarly, computer anxiety is evoked by the consideration of the broader implications of computer use for perception of the self, society, and culture. Computer-anxious persons may also suffer from a more generalized technophobia, which itself is evident before adulthood (Weil *et al.*, 1990).

Similar to the state-trait distinction for test anxiety, trait math anxiety reflects relatively stable individual differences in the tendency to perceive situations involving the manipulation of numbers and the use of mathematical concepts and data as threatening or harmful. Persons high in trait math anxiety respond to these situations with elevations in state anxiety, involving both heightened emotion and interfering worry responses (Anton and Klisch, 1995). State math anxiety refers to elevations in worry, apprehension, and arousal in a situation involving mathematical content or reasoning. Likewise, in contrast to the dispositional nature of trait computer anxiety, state computer anxiety is aroused by specific objects (personal computer, scanner, printer, etc.) or situations (computer error). Individuals high in trait computer anxiety are especially vulnerable to state anxiety responses (Gaudron and Vignoli, 2002).

All forms of evaluative anxiety are quite common, with prevalence estimates in adults ranging from 20 to 50% for math and computer anxieties (e.g., Bozionelos, 2001). Experiencing various forms of evaluative anxiety in educational settings is a near-universal phenomenon across people differing in age, gender, and culture. Thus, meta-analyses of test anxiety data from various national sites show that although mean test anxiety levels vary to a certain extent across cultures, test anxiety is a prevalent and relatively homogenous cross-cultural phenomena. Furthermore, women tend to report higher levels of evaluative anxiety (test, math, and social) than men; however, the gender difference often does not translate into objective performance differences. In addition, as discussed below, evaluation anxiety has frequently been linked to performance decrements in educational settings.

Table 1 Tentative typology of test-anxious students

Type	*Brief description*
I. Students deficient in study and test-taking skills	Characterized by a major deficiency in study and test-taking skills. Their poor examination performance results from deficits that include problems in acquisition (encoding), organization/rehearsal (study skills), and retrieval/application during a test.
II. Students experiencing anxiety blockage and retrieval problems.	These students have efficient study skills but suffer from anxiety blockage, consequently encountering problems in retrieving information during the examination. These anxious students study effectively, but cannot handle the stresses and pressures of evaluative situations.
III. Failure-accepting students	Failure-accepting students are characterized by a personal history of repeated test failures. They come to accept low ability as the primary explanation of their failures. As a consequence, they become accepting of failure, exhibiting apathy, resignation, and a sense of defeat, not unlike reactions traditionally associated with learned helplessness.
IV. Failure-avoiding students	Failure-avoiding students are driven to achieve primarily as a means of protecting themselves against beliefs that they lack ability. For these students, effort is truly a double-edged sword. They may strive for success through meticulous preparation; yet, failure despite high efforts increases the probability that one's ability will be considered low, thus inducing anxiety reactions.
V. Self-handicappers	These students avoid diagnostic information about intellectual tasks by reducing effort or avoiding the test situation. Accordingly, if a low score is obtained, the self-handicapping student can rely on the debilitating effects of anxiety as an excuse to escape responsibility for actions, thus reducing otherwise burdensome expectations others hold for that person.
VI. Perfectionistic overstrivers	These overstriving perfectionists are characterized by high personal standards of academic success, perception of high or even exaggerated expectations, perceived doubt regarding the quality of academic performance, and a need for order and organization in their academic work. No effort is ever sufficient as the perfectionistic examinee seeks approval and acceptance and tries to avoid errors and failure through an endless cycle of self-defeating overstriving.

Discussions of evaluative anxiety in the literature are commonly guilty of a uniformity myth, conveying the impression that evaluative anxiety is a rather homogeneous category. In the domain of test anxiety research, Zeidner (1998) has sketched some distinct, yet potentially overlapping categories, of subjects with test anxiety (see **Table 1**). In fact, as this tentative typology of test-anxious students demonstrates, test anxiety has a variety of sources and, similarly, its behavioral consequences vary with contextual and personal factors.

Measurement and Assessment

We now briefly discuss a number of issues in anxiety assessment, focusing on subjective self-reports, which are by far the most popular observational procedure for mapping out the phenomenology of anxiety in educational settings.

Subjective Self-Report Measures

Subjective reports include any direct report by the person regarding his/her own anxiety experience and responses in a particular setting (learning mathematical operations, using new computer programs, taking examinations, engaging in social interactions, etc.). These assessments typically employ single-item rating scales (e.g., "Please indicate how anxious you were speaking before the entire class, employing the following 7 point rating scale: 1 = not at all anxious, 7 = extremely anxious"); multi-item questionnaires (e.g., Spielberger's 20-item Test Anxiety Inventory, 1980); or oral interviews before, during, or after an important stressful event in the educational context.

Self-report instruments are now popular because they are considered to provide the most direct access to a person's subjective experiences in ego-threatening situations, possess good psychometric properties, are relatively inexpensive to produce, and are simple to administer and score (Zeidner, 1998). Self-report paper-and-pencil questionnaire measures of state anxiety ask individuals to report which of the relevant symptoms of anxiety they are currently experiencing in a particular situation, whereas trait measures ask subjects to report symptoms they typically or generally experience in a particular class of situations (e.g., public speaking, classroom examination, social interaction, and sports competition). Unfortunately, many studies use self-report data exclusively, without any attempt to measure salient behavior (e.g., through observational procedures), thus either under- or overestimating anxiety levels.

Rather fortunately, most popular anxiety inventories have satisfactory reliability coefficients, typically in the high 0.80s to low 0.90s. Among the factors influencing reliability are test length, test–retest interval, variability of scores, and variation within the test situation. However, at present, we have no infallible or perfectly objective criterion against which to validate anxiety scores. Scores

Table 2 Some alternative measures for assessing anxiety

Type of assessment	*Examples*
Physiological measures	Accretion levels of corticosteroids, adrenaline products, sugar, cholesterol, and free fatty acids.
Performance measures	Examination scores, semester grade point averages, and latency and errors in recall of stress-relevant stimulus materials.
Systematic observations of specific behaviors	Perspiration, excessive body movement, hand wringing, fidgety trunk movements, and inappropriate laughter when subjects were engaged in examination situations.
Trace measures	Amount of chewed traces on the pencil or ruler, sweat smudges on examination papers, and personal diaries.
Think-aloud procedures	Relating thoughts and emotions following or during stressful experience (e.g., ''Please list as many thoughts and feelings as you can recall having during this algebra examination'').

on ability tests, grade point average, observer ratings, behavior in structured evaluative situations, and the like have been employed as measures of criterion behaviors. A number of alternative measures of anxiety appear in **Table 2**.

Anxiety and Cognitive Performance

Scores of studies have investigated the complex pattern of the relations between anxiety and different kinds of performance. Various forms of evaluative anxiety (test, mathematics, computer, statistics, etc.) have been found to interfere with competence both in laboratory settings as well as in true-to-life test situations in school or collegiate settings. Processing deficits that relate to test anxiety, including general impairments of attention and working memory, together with more subtle performance changes, such as failure to organize semantic information effectively.

Hembree's (1998) meta-analytic study, based on 562 North American studies, demonstrated that test anxiety correlated negatively, though modestly, with a wide array of conventional measures of school achievement and ability at both high school and college levels. Data collected on students from upper elementary school level through high school show that test anxiety scores were significantly related to grades in various subjects, although the correlation was typically about –0.2. Cognitive measures (i.e., aptitude and achievement measures combined) correlated more strongly with the worry than the emotionality component of test anxiety. Higher effect sizes were reported for low-rather than high-ability students and for tasks perceived as difficult rather than those perceived as being easy. Another meta-analysis reported by Ackerman and Heggestad (1997) showed a mean correlation of –0.33 between test anxiety and general intelligence test performance. Test anxiety was also correlated in the –0.20 to –0.30 range with other broad intellectual abilities including fluid and crystallized intelligence, learning and memory, visual perception, and mathematics ability.

There is a large literature on anxiety as a predictor of information processing in laboratory studies. The information-processing components sensitive to anxiety relate to input (encoding and acquisition of information), central processing (e.g., memory, language processing, conceptual organization, judgment, and decision-making), and output (e.g., information retrieval, response selection, and execution). These anxiety-related deficits, at various stages of processing, suggest some general impairment in attention and/or working memory. These various performance deficits are often attributed to high levels of worry and cognitive interference.

Both cognitive interference and cognitive bias appear to be pervasive in evaluative anxiety, influencing various stages of information processing (Eysenck, 1992). Anxiety often leads to scanning of the environment for threat (generating distractibility and attentional impairment), followed by focusing of attention on sources of threat (generating attentional bias). In addition, competence deficits may also be a consequence of poor skill acquisition. For example, deleterious effects of test anxiety may reflect not just cognitive interference, but also deficits in study habits and test-taking skills.

Behavioral avoidance generated in part by performance-avoidance goals plays a key role in the maintenance of evaluative anxiety and concomitant skill degradation. Evaluative anxiety leads to procrastination, motivated by fear of failure in learning specific subject matter or the aversiveness of the test situation or material. Procrastination, such as failure to complete homework assignments or study for the test, leads to failure to acquire the knowledge required. In turn, this lack of preparation leads to poor performance and anxiety in the test situation (Naveh-Benjamin, 1991), increasing subsequent test anxiety and avoidance of study.

Studies also identify moderator variables that accentuate or reduce deficits in performance. For example, negative feedback appears to be especially detrimental to anxious students, whereas providing reassurance and social support may eliminate the deficit. However, there have been sufficient instances of nonconfirmation of predicted deficits to suggest that high anxiety does not

automatically generate lower achievement outcomes. Generally, anxiety is more detrimental to attentionally demanding tasks, and may even facilitate performance on easy tasks. There may also be more subtle effects related to the qualitative nature of the task.

Interventions

A bewildering array of anxiety-treatment programs has been developed and evaluated over the past three decades. Current attempts to reduce debilitating levels of anxiety and enhance scholastic performance have typically focused either on treatments directed toward the emotional (affective) or cognitive (worry) facets of evaluative anxiety.

The emotionally oriented therapies primarily aim at reducing the arousal and heightened emotional reactions of anxious persons when faced with stressful evaluative situations. Based on the assumption that anxiety comprises a physiological component, attempts to alleviate anxiety symptoms should prove successful, in part, if they focus on reducing levels of arousal or on altering ways in which people appraise their arousal in evaluative situations.

In general, these emotion-focused treatments rely on key behavioral learning principles (counterconditioning, reciprocal inhibition, extinction, observational and coping skill learning, etc.) They also draw from an arsenal of behavioral techniques, such as deep muscle relaxation, guided imagery, and graduated hierarchies. For example, relaxation and guided imagery are not unique to a particular behavioral intervention method, but are employed in several methods, including relaxation as self-control, systematic desensitization, and anxiety management training. Procedures designed to reduce emotionality, while clearly useful in modifying subjectively experienced anxiety, by these methods, appear to have little effect on cognitive performance. Overall, emotion-focused treatments appear to be relatively ineffective in reducing evaluative anxiety unless these treatments contain cognitive elements.

Recent years have witnessed a proliferation of cognitively oriented intervention programs that emphasize the mediating role of cognitive processes in sustaining or eliminating anxiety. Cognitive therapy is a generic term that refers to a wide array of therapeutic approaches directed toward modifying the worry and irrational thought patterns of anxious clients. Broadly speaking, cognitively oriented approaches to anxiety intervention are quite similar in assuming that cognitive processes are determining factors in anxiety, although they differ in terms of actual intervention procedures. A fundamental assumption shared by contemporary cognitive models of test anxiety is that cognitive processes mediate the person's emotional and behavioral responses to stressful evaluative situations. It follows that to modify the negative emotional reactions of anxious clients to evaluative situations, therapy needs to be directed at reshaping the faulty premises, assumptions, and negative attitudes underlying maladaptive cognitions of anxious subjects. A brief summary of key emotion-focused, cognitive-focused, and skill-focused treatment techniques and methods, and their reported effectiveness, is presented in **Table 3**.

The choice of which therapy to use will be influenced not only by the diagnosis of the specific nature of the client's problem and type of test anxiety, but also by the broader diagnostic picture, the immediate and long-term goals of treatment, and the therapeutic orientation adopted. For example: although relaxation may not increase the performance of test-anxious students with study-skill deficits, it may be prescribed by the school psychologist in order to help the student achieve the immediate goal of achieving control over test anxiety – as a first step toward academic problem solving. Thus, once the anxiety that interferes with learning new study skills is removed, the following step would be training the student in efficient study skills. Furthermore, there are different ways that a therapist may view his/her students' problem (distorted thinking styles, poor problem-solving skills, etc.) In addition, each of these views may give rise to different treatment procedures.

Summary and Conclusions

Anxiety is one of the most ubiquitous and researched emotions in education. Anxiety is a multifaceted construct, involving cognitive, affective, and behavioral components. Although different forms of anxiety discussed above are distinguished by the antecedent conditions and contexts evoking the anxiety (e.g., tests, and mathematics/computers), they have important structural similarities (worry and arousal) and are governed by similar cognitive and motivational processes (apprehension of being evaluated and fear of not meeting standards).

The nature of the anxiety–performance relationship is best viewed as reciprocal in nature. Thus, high levels of anxiety, accompanied by elevated levels of worry and cognitive interference, absorb part of the capacity needed for attention, working memory, problem solving, or other cognitive processes required for successful completion of a task. Evaluative anxiety also produces certain aversive patterns of motivation, coping, and task strategies that interfere with learning and performance. The result is that competence and self-efficacy suffers, thus leading to further anxiety over time and generating a vicious circle of increasing anxiety and degrading competence.

Overall, the assessment of anxiety in educational settings has not kept pace with the theoretical advances in conceptualizing the construct. Thus, much of the construct domain (e.g., task-irrelevant thinking, off-task thoughts, and poor academic self-concept) is underrepresented in current measures of anxiety. Stressful situations

Table 3 Some focal emotion-focused and cognitive-focused anxiety intervention techniques

Treatment	*Description*	*Effectiveness*
I. Emotion-focused interventions		
Biofeedback	Use of instrumentation (e.g., a physiograph) to provide a person with immediate and continuous information about one or more physiological processes (e.g., skin conductance, temperature, heart rate, blood volume pulse, respiration, and electromyograph). Biofeedback teaches highly test-anxious persons to monitor and modify the physiological processes associated with their emotional reactions.	A large body of literature supports the notion of increased physiological control when using physiological feedback and self-regulation. However, biofeedback alone is not effective in reducing anxiety (nor does the addition of biofeedback training improve the efficacy of other forms of treatment). Given the potential cost and inconvenience of using biofeedback training, it may not be the treatment of choice for anxiety intervention.
Relaxation training	Recommended on the premise that maintaining a relaxed state, via deep breathing and muscle relaxation exercises, would counteract a person's aroused state. Presumably, if a person knows when and how to apply relaxation, it will be applied directly as a counterresponse to anxiety.	Meta-analytic research tends to support the effectiveness of relaxation therapy. However, the effects on performance tend to be negligible.
Systematic desensitization	Situation-specific anxiety is viewed as a classically conditioned emotional reaction resulting from a person's aversive experiences in aversive situations. Systematic desensitization proposes that anxiety reactions to threatening situations may also be unlearned through specific counter-conditioning procedures. The anxious client is typically trained in a deep muscle relaxation procedure and, while relaxed, instructed to visualize an ordered series of increasingly stressful scenes (an anxiety hierarchy). The client imaginally proceeds up the hierarchy until he/she is able to visualize the most stressful scenes on the list without experiencing anxiety. Through repeated pairings of imaginal representations of threatening evaluative situations with deep relaxation, the bond between the threatening evaluative scenes and anxiety is expected to be weakened.	Meta-analytic data lend support to the effectiveness of systematic desensitization in reducing anxiety, particularly test anxiety, in school children and college students. It is shown to be as, if not more, effective in reducing test anxiety than a variety of other treatments, including relaxation training, hypnosis, and skills training. However, systematic desensitization fares less well when cognitive performance (e.g., academic achievement) is the criterion or when outcome is being assessed.
Anxiety management	Teaches highly anxious subjects to recognize their situation-specific related arousal responses as they are building, and then to use them as cues for initiating the coping response of relaxation in threatening situations.	A body of research supports the effectiveness of this technique in reducing anxiety. Thus, anxiety management training appears to be as, if not more, robust and effective than related interventions. Reductions in debilitating anxiety were maintained for follow-up periods ranging several weeks to months.
Modeling	Involves the live or symbolic (e.g.. through videotape) demonstration of desired coping behaviors in a stressful situation such that they can be subsequently imitated by the anxious person. It is assumed that exposure to models displaying adaptive behavior may play a positive role in facilitating performance. Clients are instructed to vividly imagine the stressful evaluative scene and focus on the anxiety and associated response-produced cues (e.g., racing heart, neck and shoulder tensing, dryness of the mouth, and catastrophic thoughts). Clients are then trained to use these cues to prompt adaptive coping skills to actively relax away tension, and reduce anxiety before it mounts too severely.	A body of research lends support to the effectiveness of modeling in treating anxiety. In particular, exposure to models who are task oriented and provide attention-directing cognitive structuring clues is beneficial to the performance of anxious persons. Of additional benefit is evidence in the behavior of the model that he/she is successfully coping with the worry and tension associated with anxiety.

II. Cognitive-focused interventions		
Cognitive-attentional training	Cognitive attentional training provides specific training in the redirection of attention to task-focused thinking and emphasizes the inhibition of task-irrelevant thinking and nonproductive worry. The cognitive attentional approach relates performance decrements to the diversion of attention to self-focused thinking, coupled with the cognitive overload caused by the worry component of anxiety. By redirecting attention to the task and reducing worry and task-irrelevant thinking, cognitive resources are freed and, when redirected to the task, performance is improved. Attentional training programs traditionally provide clients with instructions to attend fully to the task and to inhibit self-relevant thinking while working on a variety of academic tasks.	The beneficial effects of attentional instruction on the anxiety and cognitive performance of highly anxious students is supported by some empirical research. Task instructions that provide examinees with information about appropriate problem-solving strategies, and away from self-preoccupied worry, may be particularly helpful to the anxious individual's cognitive functioning.
Cognitive restructuring	The rationale is that anxious persons will be able to master their anxiety by learning to control task-irrelevant cognitions that generate their anxiety and direct attention from their task-directed performance. The two most prominent cognitive therapeutic methods in test anxiety intervention are Rational Emotive Therapy and Systematic Rational Restructuring. Both forms of treatments are based on the premise that anxiety or emotional disturbance is a result of illogical or irrational thinking. Two key irrational beliefs that maintain anxiety are that one must succeed at all costs, and that success is equivalent to self-worth. Anxious individuals are taught how to recognize, vigorously challenge, question, and dispute their irrational beliefs, and replace their maladaptive internal dialog with more rational structures and beliefs. Presumably, by modifying irrational beliefs and schemas, negative emotional reactions will be reduced, and performance improved. Systematic Rational Restructuring aims at helping test-anxious clients to discover the worrisome task-irrelevant thoughts they entertain, to eclipse such thoughts, and to substitute positive self-statements that redirect their attention to the task at hand.	Research indicates that whereas cognitive restructuring reduces anxiety, there is no concomitant improvement in performance. A number of studies provide evidence showing that these techniques may be effective in reducing anxiety. However, concomitant improvements in cognitive performance are observed with far less consistency.
Cognitive Behavioral Modification	A multifaceted program merging both cognitively-focused and emotionally focused techniques (as well as skill training in many cases), thus offering the test-anxious client the best of many worlds, so to speak. This multimodal treatment attempts to deal with the multiple manifestations of anxiety, including negative motivational or affective tendencies, irrational thought patterns, and skills deficits, and emphasizes the application, and transferring of acquired coping skills to *in vivo* test situations. Given its dual emphasis on modifying both emotional processes and irrational thoughts and cognitions, this results in a powerful approach that merges emotionally oriented and cognitively oriented techniques to alleviate clients' anxiety and enhance their performance. This procedure is based on the premise that reducing a person's level of anxiety involves both anxiety-reduction training as well as detailed cognitive restructuring of certain faulty beliefs or misconceptions.	Multimodal treatment packages, such as cognitive-behavior modification, are most likely to be effective by their support for the inclusion of multiple domains related to anxiety. These procedures are relatively effective in reducing self-reported levels of debilitating anxiety, and are equally effective, more or less, in reducing both cognitive and affective components of anxiety. These procedures increase test performance, on average, by about half a standard deviation in school-aged samples, and elevate grade point average by close to three-quarters of a standard deviation.

would typically have effects on various response systems (i.e., verbal, physiological, and cognitive performance), and each measurement method possesses unique functions in anxiety assessment and is characterized by specific and unique limitations. It is desirable to obtain measures from a number of systems and triangulate any observed effects by means of converging operations.

Evaluative anxiety is more than a combination of physiological arousal, negative self-preoccupation, deficit in stress-related coping skills, and poor study habits. It is the complex interaction among these diverse components that seems to define anxiety. As the cognitive, affective, and behavioral components of anxiety interweave in contributing to the problem of evaluative anxiety and its treatment, it is predicted that an induced change in one system would generally be followed by a change in the other. Therapeutic approaches, which emphasize cognition, often extend to the emotional life too, and vice versa. For example, it is likely that emotion-focused training (e.g., progressive relaxation) may make the client less anxious and result in a decrease in anxiety-focused, task-irrelevant ideation. Similarly, some forms of cognitive therapy may provide anxious subjects with an increased sense of perceived control, which might spill over into the emotional domain and result in lower emotional arousal in an evaluative situation.

Anxiety assessments need to be understood within the context of a student's life and social milieu. Thus, understanding the results of a score on an anxiety measure requires an appreciation of the possible multiple and interactional influences on anxiety. These includes the subject's past affective and academic history, and current social, emotional, vocational, and economic adjustments, as well as behavior during the examination. When a life history (no reported math anxiety in the past) is in disagreement with the results of a math anxiety scale, it is best to pause before making a diagnosis or decision on the basis of the anxiety scale alone, as the former is generally a more reliable criterion.

It is now readily apparent that interventions should be based on a careful theoretical analysis of the nature of evaluative anxiety and its key components and manifestations. Traditionally; however, interventions have mainly evolved from interest in specific behavioral treatment techniques rather than from an analysis of the nature and effects of anxiety. Indeed, most investigators who have applied behavioral methodology to the reduction of evaluative anxiety have generally paid little attention to relating the treatment process to important theoretical conceptions. The current diversity of treatments, while supplying the clinician with a rich variety of treatment options to choose from in rendering services, also reflects a state of uncertainty marked by the lack of consensus regarding the most effective method for treating anxiety in educational settings.

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