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Emotion in Education

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CHAPTER

10

Test Anxiety in Educational Contexts: Concepts, Findings, and Future Directions

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Gregory Mendel, the noted pioneer and founder of classical genetics, was the son of peasant farmers, living in what is now Slovakia. Early on, his teachers recognized Mendel as an extremely talented and promising student. With his sterling academic record, he gained admission to the renowned University of Vienna to pursue his interests in the natural sciences. While he was there, he received a first-class education from some of the academic luminaries of his time. Unfortunately, however, Mendel evidenced a rather severe case of evaluation anxiety. Every time he had to face an important university exam, he became physically ill, taking months to fully recover and get back to his academic work. As a result of this serious and debilitating condition, he was unable to complete his academic work and was forced to leave the university without completing his degree. In order to subsist, he joined a monastery in the city of Brno, where he continued to pursue his interest in inheritance and conduct experiments on plants to help uncover the mechanisms in the inheritance of physical traits in plants. Although his theory and results were at first discredited by key members of the biological community, his work eventually gained worldwide recognition and acclaim. As attested by Mendel's experience, evaluative anxiety can have serious consequences for one's physical and mental health, as well as for one's educational achievements and occupational career. At the same time, not everyone with evaluative anxiety will also necessarily fail in life's tasks.

Tests and evaluative situations have emerged as a potent class of stressors in Western society, which bases many important decisions relating to an individual's status in school, college, and work on tests and other assessment devices. Test anxiety is frequently cited among the pivotal factors at play in determining a wide array of unfavorable outcomes for students, including: poor cognitive performance, scholastic underachievement, psychological distress, and ill health (Zeidner, 1998). In addition to taking its toll in human suffering and impaired test performance, test anxiety may also jeopardize assessment validity in the cognitive domain and constitute a major source of construct-irrelevant systematic variance in test scores (i.e., test bias). To the extent that anxiety influences performance in some substantial way, some examinees will perform worse than their ability or achievement would otherwise allow. Indeed, a student's performance on a classroom exam may be as much an indicator of the students' ability to cope with high levels of evaluative stress and anxiety in the classroom as a reflection of the ability or achievement the exam aims at measuring. Thus the measurement of any particular ability or proficiency will be confounded with anxiety.

This chapter examines current and recurrent issues in test anxiety theory, assessment, research, and intervention. This chapter begins with a brief description of the test anxiety construct, including basic issues and conceptualizations. I then move on to discuss key issues in the assessment of test anxiety, using both self-report measures as well as alternative assessment procedures. I then briefly examine the relationship between test anxiety and academic performance and discuss a number of key issues in test anxiety research, with a focus on personal and situational determinants of test anxiety. I then discuss clinical parameters, including coping strategies as well as interventions tailored to alleviate test anxiety. The chapter concludes by pointing out future trends and directions and the implications of current research for test anxiety theory, research, and practice in educational settings.

BASIC AND CONCEPTUAL ISSUES

The term *test anxiety* refers to the set of phenomenological, physiological, and behavioral responses that accompany concern about possible negative consequences or failure in an evaluative situation (Zeidner, 1998). Test anxiety is typically evoked in educational settings when a student believes that his or her intellectual, motivational, and social capabilities and capacities are taxed or exceeded by demands stemming from the test situation.

Much of the ambiguity and semantic confusion associated with the status of test anxiety as a psychological construct stems from the fact that different investigators have invested this term with quite divergent meanings. Thus test anxiety has been used to refer to several related yet logically very different constructs, including stressful evaluative stimuli and contexts, individual

differences in anxiety proneness in evaluative situations (i.e., trait anxiety), and fluctuating anxiety states experienced in a test situation (i.e., state anxiety). Although the question still looms large whether test anxiety is best conceptualized as a relatively stable personality trait (individual difference variable) or an ephemeral emotional state, a widely accepted definition (see Spielberger & Vagg, 1995) construes test anxiety as a *situation-specific personality trait*.

A number of theoretical perspectives, surveyed by Zeidner (1998), have been suggested in the literature. Whereas cognitive-interference theories focus on the attentional demands of anxiety on the cognitive system and the debilitating effects of self-related cognitions on performance, deficit theories focus on the study and test-taking skill deficits of test-anxious students. Deficit theories of anxiety and competence are limited by their neglect of the interplay between the person's handling of environmental threats and their dispositional vulnerability.

Next, we discuss the dynamic interaction between person and situational demands, with reference to the *Self-Referent Executive Function* (S-REF) theory of emotional distress (Zeidner & Matthews, 2000; Zeidner & Matthews, 2005). The theory builds on earlier work on transactional stress processes (Lazarus, 1999) and cybernetic models of self-regulation (Carver & Scheier, 1989), to specify how executive processing of self-referent information generates anxiety and worry. This processing is shaped by declarative and procedural self-knowledge held in long-term memory. Dispositional or trait influences on anxiety are controlled by individual differences in the content of self-knowledge, consistent with evidence previously reviewed.

As shown in the S-REF model, as applied to test anxiety and graphically depicted in Figure 1, self-referent processing is generated initially by intrusions of threatening cognitions or images generated by external stimuli or internal cycles of processing. In the case of test anxiety, these would be thoughts of potential failure on the exam. The intrusions activate executive processing that seeks to initiate appropriate coping. Choice of a coping strategy is influenced by retrieval from long-term memory of self-referent knowledge and schematic plans for action. In the short-term, acute distress and worry are generated by accessing negative self-beliefs, that one lacks academic competence, for example, and by choosing counterproductive coping strategies, such as self-blame and avoidance, that focus attention on personal shortcomings in the academic domain. Of special importance are metacognitive beliefs that maintain negative self-referent thinking, for example, that it is important to monitor one's worries. In the longer term, distress may be maintained by dysfunctional styles of person-situation interaction. The well-adjusted person modifies self-knowledge to accommodate reality and learns of more effective coping strategies, such as resolving to study harder after a poor examination performance. However, preservative worry appears to strengthen and elaborate negative self-beliefs, such as being unable to cope

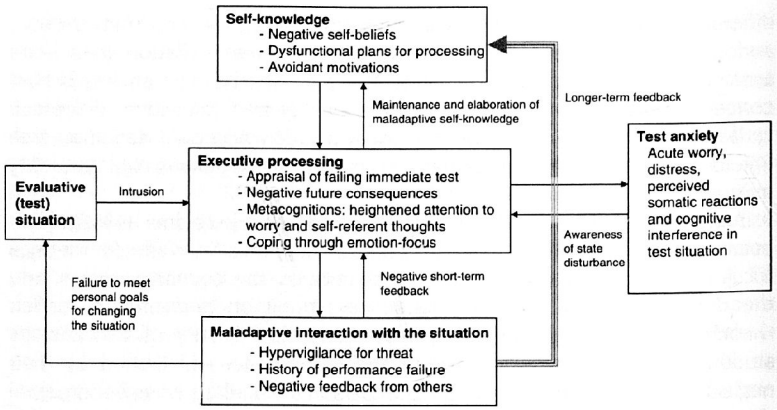

FIGURE 1
A prototypical self-regulative model of test anxiety (adapted from Zeidner & Matthews (2005).

with examinations. In addition, avoidant coping strategies lead to lack of exposure to situations that might enhance task-relevant skills. Thus the test-anxious student may be reluctant to study because the study situation focuses attention on the feared event.

MEASUREMENT AND ASSESSMENT OF TEST ANXIETY

Subjective reports include any direct report by the person regarding his or her own test anxiety responses, usually elicited via questionnaires, single-item rating scales, and think-aloud procedures or interviews before, during, or after an important exam. Self-report measures of *state* anxiety ask individuals to report which of the relevant symptoms of anxiety they are *currently* experiencing in a particular test situation, whereas trait measures ask subjects to report symptoms they *typically* or *generally* experience in test situations. Self-report inventories have been the most prevalent format for assessing test anxiety, largely because they are considered to provide the most direct access to a person's subjective experiential states in evaluative situations, possess good psychometric properties, are relatively inexpensive to produce, and are simple to administer, score, and interpret.

Fortunately, most of the more popular test anxiety inventories (e.g., Spielberger's *Test Anxiety Inventory [TAI]*, 1980; Sarason's *Reactions to Tests*, 1984; Suinn's *Test Anxiety Behavior Scale*, 1971; Benson & El-Zahhar's *Revised Test Anxiety Scale*, 1994; Wren & Benson's *Children's Test Anxiety Scale, 2004* have satisfactory reliability coefficients, typically from .85 to .95. During longer intervals

between assessments, such personality traits as test anxiety may change, causing lower stability coefficients. Additional factors influencing reliability are test length, test-retest interval, variability of scores, and variation within test situation.

Most scales that have been constructed used exploratory factor analytic techniques (e.g., Spielberger's *TAI*). Confirmatory factor analysis was used early in the 1980s to test the adequacy of the indicator-factor relationship in the measurement model of test anxiety scales (e.g., Schwarzer, Jerusalem, & Lange, 1982), and has also recently been employed for purposes of item analysis and selection. Recent years have seen more sophisticated methods, such as confirmatory factor analysis and latent state-trait theory, in validating test anxiety scales and in decomposing the effects of person and occasion (e.g., Schermelleh-Engel, Keith, Moosbrugger, & Hodapp, 2004).

The fact that anxiety is such a complex construct, encompassing worry, self-preoccupation, physical upset, disruptive feelings, and maladaptive behaviors, makes it particularly difficult for researchers to sort out all these components. Researchers have found it particularly useful to differentiate between a *cognitive* facet (e.g., worry, irrelevant thinking) and an affective facet (e.g., tension, bodily reaction, perceived arousal). Thus test-anxious individuals may be characterized by their thoughts, somatic reactions, feelings, and frequently their observable behaviors in evaluative situations. In any test situation, test-anxious subjects may experience all, some, or none of these test anxiety reactions. The specific anxiety response manifested may vary, depending on the constitutional qualities and past experience of the individual, the nature of the problem to be solved, and various situational factors affecting the level of anxiety evoked. The Worry and Emotionality components of test anxiety are revealed to be empirically distinct, though correlated.

Zeidner and Nevo (1992) assessed the dimensionality of the Hebrew version of Spielberger's TAI via multidimensional scaling methods. Accordingly, the 16 scale items assessing the Worry (e.g., thoughts of doing poorly interfere with ability to concentrate on the exam) and Emotionality (e.g., feelings of confidence and relaxation during test) facets of the Test Anxiety Scale were administered to a student sample sitting for a college entrance exam. The intercorrelation matrix of the items was submitted to smallest space analysis. As shown in Figure 2, presenting the results of the analysis, the two-space is partitioned by the Worry (W) and Emotionality (E) facets of test anxiety, thus lending additional credibility to the reliability of the two-facet partition of the test anxiety space. It is noted, however, that the separation between the W and E items was a bit fuzzy, with some of the items (e.g., items 6 and 18) possibly presenting a mixture of W and E content.

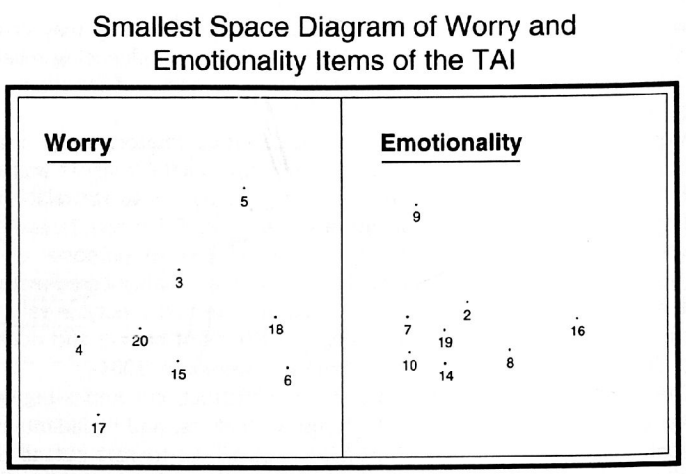

FIGURE 2
Multidimensional scaling of test anxiety inventory items.

Alternative Assessment Procedures

Although self-report inventories remain the most popular assessment tools, a variety of less frequently used assessments have been employed, including: think-aloud procedures (e.g., listing as many thoughts and feelings the student recalls having during this test), physiological measures designed to gauge changes in somatic activity believed to accompany the phenomenological and behavioral components of test anxiety (e.g., pulse, heart rate, respiration rate, skin resistance level), trace measures (e.g., accretion levels of corticosteroids, adrenaline products, free fatty acids), performance measures (e.g., examination scores, semester grade point averages, latency and errors in recall of stress-relevant stimulus materials), and unobtrusive observations of specific behaviors reflective of test anxiety in a test situation (perspiration, excessive body movement, chewing on nails or pencil, hand wringing, "fidgety" trunk movements, and inappropriate laughter when subjects were engaged in exam situations). Despite some important advantages, these alternative indices often suffer from a number of formidable methodological problems, including questionable construct validity, poor reliability, and low practicality in naturalistic field settings (Zeidner & Matthews, 2003). Overall, the assessment of test anxiety 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 test anxiety.

TEST ANXIETY AND COGNITIVE PERFORMANCE

Hundreds of studies have investigated the complex pattern of relations between anxiety and different kinds of performance. Test anxiety has been found to interfere with competence both in laboratory settings as well as in true-to-life test testing situations in school or collegiate settings (see Zeidner, 1998 for review). Processing deficits that relate to test anxiety include 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 (about −.20) with a wide array of conventional measures of school achievement and ability at both high school and college level. 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 −.2. Cognitive measures (i.e., aptitude and achievement measures combined) correlated more strongly with the Worry than Emotionality component of test anxiety ($r = -.31$ vs. $-.15$). Similarly, Worry was slightly more strongly correlated with course grades than Emotionality (Worry: $r = -.19$; Emotionality: $r = -.19$). Effects sizes were higher for low-ability students than high-ability students. They were also higher for tasks perceived as difficult than tasks perceived as easy. Overall, evaluative anxiety appears to account for about 4% of the performance variance in a variety of evaluative settings, including math performance, sports, occupational settings, and social settings (Zeidner & Matthews, 2005). Thus the importance of test anxiety as a key construct in understanding sources of student distress, impaired test performance in classroom evaluative situations, and academic underachievement is now readily apparent. This situation demands that test anxiety be better understood through systematic assessment and research and appropriately dealt with (Sarason, 1980).

A number of studies have sought to identify moderator variables that accentuate or reduce deficits in performance. For example, evaluative settings, speeded timed conditions, and negative feedback appears to be especially detrimental to test-anxious subjects, whereas providing reassurance, a structured situation, and social support may eliminate the deficit (Zeidner, 1998).

In a true-to-life study among 378 Israeli college students sitting for their college entrance exams, I examined the moderating effects of phase of testing on the anxiety-performance relationship (Zeidner, 1991). Students were randomly assigned to one of two assessment conditions: (1) *pretest phase*, in which test anxiety was measured via the *TAI* prior to Scholastic Aptitude Test (SAT) administration, and (2) *posttest phase*, in which test anxiety was measured by

the *TAI* following the SAT administration. Basically, time of assessment was shown to have a significant moderating effect on the anxiety-performance relationship, with correlations between test anxiety and SAT scores of −.11 and −.40, respectively, prior to testing and following testing. Thus it is critical to know when test anxiety was assessed to interpret the observed correlation between anxiety and performance. In fact, the inconsistencies reported in the literature in the anxiety-performance relationship may be due to differences among studies in the particular phase of testing at which test anxiety was measured.

These results substantiate previous theorizing in the literature (Folkman & Lazarus, 1985) that during the highly ambiguous anticipatory stage of testing (Time 1), the correlation between emotions associated with harm or threat appraisal (e.g., test anxiety) and test performance would be low, reflecting the high degree of uncertainty about both the emotions and the outcome. By contrast, the emotional and cognitive feedback provided to the examinee by the test experience at Time 2 is assumed to affect the accuracy and validity of the individual's performance expectancies and sense of competency, thus allowing the examinee to adjust his or her expectations and harm emotions accordingly. The negative test anxiety outcome emotions, which reflect appraisals about what has already transpired, tend to become increasingly negatively correlated with performance.

DETERMINANTS OF TEST ANXIETY

Interactional models of stress and anxiety (Endler & Parker, 1992; Lazarus, 1999) assume that situational anxiety in evaluative context is determined by the reciprocal interaction of personal traits (i.e., trait anxiety) and the characteristics of situations (i.e., social-evaluative). We next examine research on the role of personal and situational factors in test anxiety.

Personal Factors

The experience of evaluative anxiety is near universal across people differing in age, gender, and culture. A meta analysis of test anxiety data from 14 national sites (Seipp & Schwarzer, 1996) showed that, although mean test anxiety levels varied somewhat across cultures, test anxiety was a prevalent and relatively homogenous cross-cultural phenomenon.

The *differential hypothesis* of the interactional model (cf. Endler & Parker, 1992) claims that state anxiety will be experienced in an evaluation situation when there is a congruency or fit between the nature of a person's vulnerability (i.e., high evaluative trait anxiety) and the nature of the situation (evaluation/ego-threatening). Thus individuals high on evaluation anxiety are expected to show a higher increase in state anxiety than subjects low on evaluation anxiety primarily in a social evaluation situation (as opposed to, say, daily routine situation). The 'differential hypothesis' was tested by Zeidner (1998) in a study conducted among 198 Israeli college students (76% female) preparing for midterm exams. Specifically, it was predicted that significant differences in state anxiety would be found between high vs. low social evaluative trait-anxious students in evaluative conditions, and at the same time, nonsignificant differences in state anxiety would be observed between high vs. low social evaluative trait-anxious students in neutral conditions. Students were assessed for anxiety and coping during two phases: (1) a *neutral phase*, in which subjects were assessed during midsemester, and (2) an *evaluative phase*, in which subjects were assessed during an evaluative period, prior to midterm exams. State anxiety and situational coping served as criterion measures. Overall, the evidence supports the differential hypothesis of the interactional model of anxiety. Thus any account of determination of coping and anxiety in test situation needs to consider individual difference variables and situational variables.

Situational Parameters

In a series of studies we examined the effects of contextual and situational variables on test anxiety. Next, we present a number of exemplary studies to illustrate this programmatic research.

One line of research tested the effect of reference or comparison group, often called the *big-fish-little-pond effect* (Marsh, 1987; cf. Pekrun, Frenzel, Goetz, & Perry, 2006) with respect to test anxiety and academic self-concept (see Zeidner & Schleyer, 1999). Reference group theory posits that self-perceptions in educational settings, such as self-concept and evaluative self-cognitions, are shaped by the process of social comparison. Thus students compare their own attributes and attainments with their reference groups and use this relativistic impression as one basis for forming their self-perceptions and reaching conclusions about academic and social status. The central hypothesis, deduced from social comparison and reference group theory, was that gifted students enrolled in special gifted classes would perceive their academic ability and chances for success less favorably compared to students in regular, mixed-ability classes. Those negative self-perceptions, in turn, will serve to deflate students' self-concept and elevate their levels of evaluative anxiety and result in depressed school grades. The hypothesis was tested on a sample of 982 gifted students partaking in two types of classes: (1) special homogeneous gifted classes (n = 321), and (2) mixed-ability heterogeneous classes (n = 661), with a one-day pullout program. Students were administered an abridged version of the Test Anxiety Inventory ("Thoughts of doing poorly interfere with my concentration on the exam;" k = 12, alpha = .87). In addition, students were administered an academic self-concept scale (e.g., "I learn fairly easily;" k = 16, alpha = .85). Overall, our findings supported the

big-fish-little-pond effect for test anxiety and academic self-concept. Thus both test anxiety and academic self-concept are shown to be of a dynamic character and shaped in part by social comparison processes. As shown in Figure 3, academic self-concept as well as both the Worry and Emotionality components of test anxiety were observed to be lower for gifted children in homogeneous gifted classes than in heterogeneous classes. The elevated test anxiety in gifted classes may be accounted for by a combination of factors, including: higher teacher and student performance expectations, fierce competition, and strong fear of failure. Thus the data are consistent with prior research showing that test anxiety varies with changes in students' social reference group.

To what extent does perceived control over the test situation impact anxiety and performance? On one hand, the literature focusing on decision-making under stress (Janis & Mann, 1977) would suggest that the constraints of having to choose among competing alternatives might plunge the individual into a conflict situation and increase subjective stress resulting in anxious behaviors and poorer performance. On the other hand, providing an individual with a choice among items may strengthen his or her sense of control over the situation and facilitate internal accommodation to outside events (Mills & Krantz, 1979), thus reducing stress and anxiety. The alternative hypotheses were tested by Keinan and Zeidner (1987) in a sample of 74 8th grade students, equally divided by gender. Students were informed they would be given a short math quiz and instructed to respond to three out of five items. Students were allocated to one of the two following testing conditions: (1) *decisional control*: students were given a short algebra quiz [e.g., 3 (X-2) + 3X = 60, X = ?] and instructed to respond to any three out of five items; or (2) *no decisional control*: same as above, except students were given the first three items on the exam and asked to respond to them. As shown in Figure 4, students tested under decisional control conditions were less anxious and also attained higher test scores. The data support the notion that provision of choice in an evaluative situation enhances examiner's perceived freedom of control over source of

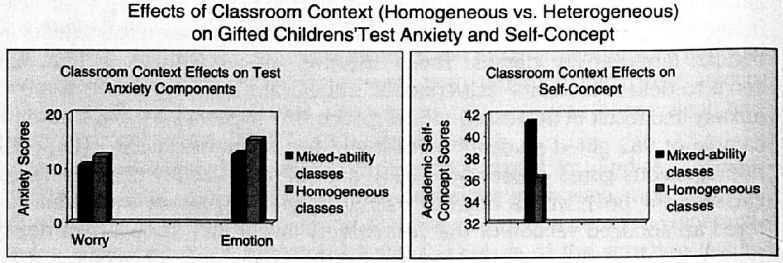

FIGURE 3
Test anxiety and academic self-concept, by educational program.

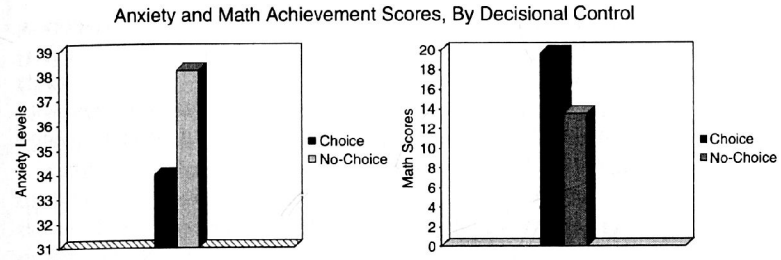

FIGURE 4
Anxiety and achievement, by decisional control.

threat. This in turn allows more favorable psychological adjustment of one's interior milieu to outside stimuli, lowering anxiety and elevating test attainment. Thus the results are more consistent with the hypothesis stating that provision of choice evokes less stress and anxiety relative to no choice.

CLINICAL PARAMETERS: COPING AND INTERVENTIONS

Coping With Test Anxiety

Test situations are currently viewed as a promising area of research for understanding how people cope with ego-threatening social encounters and how coping affects adaptational outcomes. An increasing number of studies over the past three decades have specifically focused on the ways students cope with stressful social evaluative encounters. Research by Folkman and Lazarus (1985) and Carver and Scheier (1994) provide support for the claim that problem-focused coping is adaptive in evaluative contexts, where such efforts will produce the desired outcomes. Problem-focused coping was shown to be especially adaptive in a student population during the anticipatory stage of an exam, when something can still be done to shape the outcome.

A review of the literature on coping with test anxiety (see Zeidner, 1998) concludes that it is meaningfully related to various forms of coping behaviors. Specifically, test anxiety relates positively to higher emotion-focus (e.g., trying to control anxiety symptoms) and greater avoidance (e.g., trying not to think of the test), but not to lower task-focus (e.g., focusing effort on task performance). Zeidner (1996) examined the coping strategies of 100 high school and 241 college students who were preparing for an important exam. Trait test anxiety and palliative coping strategies were both significantly predictive of state anxiety and situational coping in both groups. Furthermore, Zeidner (1994) reported that emotion-oriented coping responses were significant predictors of state anxiety among college students in close proximity to an important college exam.

Overall, research in evaluative situations concurs that some kinds of coping responses to some kinds of test situations and exigencies do make a difference, mainly with respect to affective outcomes. However, it is not entirely clear whether coping influences outcomes, coping merely covaries with adjustment to exam situations, or coping and distress are mutually intertwined reflections of something else.

Cognitive-Behavioral Interventions

A bewildering array of test anxiety treatment programs have been developed and evaluated over the past three decades (see Zeidner, 2004, for a review). Test anxiety intervention programs have flowered largely because of the salience of test anxiety in modern society and the general concern for the debilitating effects of test anxiety on the emotional well-being and cognitive performance of many. Treatment fashions and orientations have swayed sharply from the clinical to the behavioral, and more recently to the cognitive perspective—essentially mirroring the evolution of the behavior therapies.

Attempts to reduce debilitating levels of test anxiety and enhance test performance have typically focused either on treatments directed toward the emotional (affective) or cognitive (worry) facets of test anxiety (Spielberger & Vagg, 1995). Thus treatment programs include both *emotion-focused* treatments, designed largely to alleviate negative affect experienced by test-anxious persons, and *cognitive-focused* treatments, designed to help the test-anxious client cope with worry and task-irrelevant thinking and enhance their test performance.

Cognitive behavior modification (CBM), as applied to test anxiety intervention, is a multifaceted treatment designed to influence the various components of anxiety. The author and his coworkers (Zeidner, Klingman, & Papko, 1988) implemented an exemplary CBM primary prevention program among fifth and sixth grade elementary school students drawn from twelve classes in Israel. The five-phase treatment program was based primarily on Meichenbaum's (1977) cognitive modification model, implemented by those teachers whose homeroom classes participated in the study. The five phases of the program were: (1) *educational presentation*, providing students with a conceptual framework for understanding the nature of test anxiety by illuminating the nature, origins, and antecedents of test anxiety; (2) training in relaxation techniques and in the fundamentals of rational thinking; (3) *coping imagery and attentional focusing skills*, introducing students to coping imagery, which was then practiced with other previously taught techniques (positive self-statements, relaxation exercises, etc.); (4) *time management and work schemes*, focusing on the management of time both during and after the exam period and various test-taking strategies; and (5) *rehearsal and strengthening of coping skills*, aimed at rehearsing and fortifying the coping skills taught in previous sessions, primarily with the aid of guided coping imagery. Students were given instruction in using the coping techniques in future test situations. In

conclusion, students summarized what they thought they had learned during the course of the training program. Evaluation of the effects of this proactive CBT program points to its effectiveness in meaningfully enhancing students' cognitive performance in test situations, with student performance meaningfully improving on three cognitive measures. As shown in Figure 5, the program was not successful in reducing test anxiety, although it may have taught some useful cognitive skills to students, thus accounting for their differential rise in test performance relative to the control. It is not unlikely that students in the experimental group may have become more aware of their test anxiety as a result of their experience, thus elevating their test anxiety scores. Although this particular program was not successful in significantly reducing students' test anxiety, reviews of the literature suggest that the combination of cognitive treatment and skills training targeted at reducing test anxiety is among the most successful types of interventions available to date (see Zeidner, 1998).

EDUCATIONAL IMPLICATIONS AND DIRECTIONS FOR FUTURE RESEARCH

In the next section I discuss the implications of our work in the area of test anxiety for psychoeducational practice. Furthermore, I note that although contemporary research has made important strides in mapping out the test anxiety terrain, there is still much uncharted territory that needs to be explored and more extensively mapped out by future research. I therefore highlight a number of these important areas, pointing out needed directions for future research.

Conceptualizations and Basic Issues

A variety of models and theoretical perspectives have been proposed over the past 50 years or so to account for various facets of test anxiety in educational

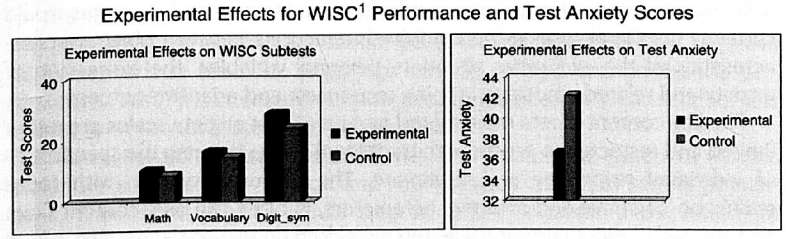

FIGURE 5
Effects of cognitive modification program on anxiety and cognitive performance.

settings, but no single unifying model is able to account for the multiple phenomena (antecedents, phenomenology, consequences) and the many complex empirical findings. Thus future test anxiety research would benefit from efforts directed at theory construction, and we have presented a provisional process model pointing in that direction. This may be achieved through broader integrative theoretical formulations, amalgamation of existing theoretical perspectives, identification of complementary approaches, common conceptual elements across theories, and so on.

Test anxiety is clearly not a unified phenomena, and I have identified a variety of different types of test anxious students (Zeidner, 1988). Development of a comprehensive taxonomy of test-anxious students would be useful for both theoretical, research, and intervention purposes. Furthermore, despite earnest efforts by practitioners to individualize treatments to the particular needs and problems of test-anxious students, we still do not have clear evidence to indicate which of the various intervention approaches is most effective for particular types of test-anxious students or for treating different manifestations of test anxiety. This stems, in part, from the absence of an established typology of test-anxious persons.

Methodology

There is a strong need for large-scale and systematic research relating to various facets of test anxiety, based on multiple observations of various target groups, at various time points, and in various contexts and cultural settings. Future research would benefit from application of sophisticated research designs—longitudinal and multivariate experimental designs, in particular. Data analysis would also benefit from application of state-of-the-art multivariate procedures, including hierarchical linear models, nonrecursive causal modeling, and multidimensional scaling techniques. Future conceptualizations and research should make more allowances for complex associations between variables, including reciprocal relationships and feedback loops as well as nonlinear relationships and interactions. More complex designs would certainly help in assessing the complex interactions between objective characteristics of the evaluative situation, personal variables, the expression of anxiety and related emotions, coping responses, and adaptive outcomes.

The key content facets represented in current test anxiety scales are rather limited and restricted in scope, with traditional scales ignoring the specificities of individual responses and situations. The response system, with focus mainly on cognitive and affective parameters, is often the only content facet represented in most current scale items. Seldom do test anxiety scales inform us about the various situational and personal factors eliciting test anxiety (e.g., anxiety proneness, inadequate preparation, over-stimulation), the full range of manifestations of test anxiety (e.g., cognitive, affective, behavioral), coping procedures and strategies, the consequences of test anxiety, or the

dynamic fluctuations in test anxiety states across various phases of a stressful evaluative encounter. The restricted content scope can be improved by employing more systematic domain mapping procedures (e.g., through facet theory) and using better representation of additional facets in the test specification matrix, and subsequently on the test anxiety inventory.

When used for diagnosing and treating test anxious students, current instruments only allow measurement of the overall level of test anxiety or identification of a few of its key components. Prevalent measures are not very informative with respect to how anxiety is expressed in a student and in what situations. Future scales need to be more relevant for planning, execution, and evaluation of educational intervention through specification of the various antecedent conditions, manifestations, and consequences of test anxiety.

Finally, based on our work on the effects of decisional control, educational psychologists have often not looked favorably on free choice questions because of psychometric considerations (i.e., low reliability). However, as our research on decisional control suggests, considerations relating to examinee's emotional disposition during testing may be equally important and should therefore be given due weight and consideration by test specialists and teachers when deciding upon test administration policy.

Empirical Research in Educational Settings

Further research is needed on the specific school-related encounters that shape children's anxiety reactions and avoidance behaviors in evaluative situations. Research would benefit from more large-scale systematic and controlled studies that would pinpoint the effects of a wide array of classroom and school environmental variables (e.g., group climate and norms, evaluation and grading practices, tracking and streaming, transitional periods, teacher characteristics, teacher-student interactions, peer pressures, expectations) on the development of test anxiety in general, and different anxiety components (e.g., Worry vs. Emotionality), in particular. Additional research is also needed on the relationship between a child's failure-induced anxiety experiences in the preschool and elementary school years and their anxiety and cognitive performance later on in life (e.g., high school, college, and on-the-job performance). Also, the interaction between teacher test anxiety and student test anxiety is worthy of systematic investigation.

Further research is also needed to map out the specific effects of chronic evaluative stress on the physical and psychological health of school populations. Thus more research would help us better understand the effects of evaluative stress on maladaptive types of coping (e.g., alcoholic consumption, drug use), various forms of pathology (e.g., suicide, depression), and somatic illness in high-risk populations.

Although we have focused on highly test-anxious students in this paper, future research would benefit from examining the developmental and

situational determinants of students who are on the low end of the test anxiety continuum. Thus more research is needed, focusing on resilient and low test-anxious students, who tend to view tests more as challenges than threats and who show adaptive coping responses to social evaluation situations. Furthermore, little research has been devoted to uncovering students' coping resources and factors that may serve to buffer negative emotions prior to and during stressful evaluative encounters in student populations. Future research would also benefit from examining the additive and interactive effects of test anxiety and other emotions (e.g., anger, sadness, guilt, pride, envy, joy) on a student's success and well being (cf. Pekrun, & Frese, 1992).

Our research on the impact of educational context on test anxiety in gifted students has a number of practical implications for placement of gifted students. Thus attending a selective educational framework may lead to higher school achievement, particularly for very gifted students. Yet, at the same time it may lead to reduced academic self-concept and higher test anxiety. Thus parents need to consider both the costs and benefits of sending a gifted child to a particular educational framework. On one hand, there may be little basis for assuring that students in selective classes will be advantaged on all fronts by attending selective classes. For some, the early formation of a poor self-image or the development of high test anxiety may be more detrimental than the possible benefits of attending a high ability school and concomitant higher school achievement. On the other hand, one may conceivably judge the positive academic outcomes of special classes in enhancing school achievement to be more important than evaluative anxiety or self-concept. Gifted students in a regular class whose academic self-concept was boosted relative to that for students in special classes may be in for a rude shock when they enter a profession in which there may be other equally gifted people. Also, there may be other gains that have long-term payoffs, such as the development of skills and lifelong friendships. Parents and counselors need to consider the drawbacks and advantages for a particular student before a placement decision is made.

Clinical Parameters: Coping and Interventions

About two decades ago most researchers in stress and coping would probably not have seriously questioned the assumption that coping is an important determinant of a person's emotional well-being during the various phases of a stressful transaction. Today, in contrast, researchers are asking whether coping helps; is it epiphenomenal or may it even interfere with outcomes such as emotional adjustment (Zeidner, 1988). Further research is needed to clarify how coping strategies resolve exam-related problems, relieve emotional distress, and prevent future difficulties in classroom evaluative situations.

As noted, a myriad of test anxiety intervention programs have been reported in the literature. Our research focused on assessing a school-based primary prevention program to help students cope with test situations.

The CBT program we implemented in the school system supports the provision of primary prevention programs to help students cope with test situations. Furthermore, the results appear to validate a number of assumptions derived from the tenets of psychological health education and primary prevention. First, psychological education and provision of test coping skills in the classroom context are believed to be as useful as the clinically oriented intervention by health professionals, implemented only after test anxiety has emerged as a full-blown classroom problem. We further believe that professional intervention, after repeated student failure or acute manifestations of test-anxiety reactions, can further heighten students' stress reactions. Therefore it would be more effective to provide students with relevant coping skills as part of a primary prevention program before acute test-anxiety levels are established.

A tacit assumption of many behavioral treatments is that the reduction of anxiety would release attentional and cognitive resources, thus enabling test-anxious examinees to devote a higher proportion of their capacity to learning and performing on evaluative tasks. However, as our experience dictates, procedures designed to reduce emotionality, while clearly useful in modifying subjectively experienced anxiety, by themselves appear to have little effect on cognitive performance. Overall, emotion-focused treatments appear to be relatively ineffective in reducing test anxiety, unless these treatments contain cognitive elements. It may therefore be necessary to combine such approaches with therapy modes focusing specifically on cognitive change to reliably elicit improvement in cognitive performance.

Most available studies of test anxiety intervention programs may be considered "outcome studies." Future research needs to assess differential types of treatment designed to assure maximum congruence between the test-anxious client and a particular form of intervention. Thus future research needs to provide a better answer to the question: What treatment works best for different individuals and under what conditions? Also, we currently need research to promote the development of interventions that would more reliably reduce test anxiety as well as improve academic performance. Current methods are more successful in modifying the former than the latter. Furthermore, current research suggests a number of ways in which teachers can help reduce test anxiety in the classroom (see Zeidner, 1998). Some of these procedures are summarized in Table 1. It is also noted, in passing, that a teacher's anxious behaviors may contribute to students' anxiety, and this is worthy of further research.

Finally, it is important to stress that test anxiety needs to be understood within the context of a person's life and social milieu, and requires appreciation of the possible multiple and interactional influences on anxiety scores. This includes the subject's past affective and academic history, and current social, emotional, vocational, and economic adjustments, as well as behavior during the exam. When a life history (no reported test anxiety in the past) is in disagreement with the test anxiety scale results, it is best to pause before

TABLE 1
Some Practical Suggestions for Optimizing Testing Conditions (based on Zeidner, 1998)

- Provide examinees with advance information about the test (e.g., content to be assessed, time limits, test format, and mode of administration).
- Strive to keep the average item difficulty level under control, incorporate a reasonable number of easy items, place them early in the exam, and avoid unnecessary use of extremely difficult or complex test material.
- Attempt to match the test format and mode of administration with students' preferences for specific test formats (e.g., multiple-choice or essay) and their prior experience (e.g., with computers and computerized testing).
- Assure greater examinee control of the test situation by allowing choice among items, use of open books, and adaptive testing.
- Provide examinees with the opportunity to blow off steam and comment on any facet of the test they so desire during testing.
- Create a non-threatening test atmosphere by providing examinees with task-oriented rather than ego-oriented instructions, avoiding emphasis on competition, eliminating threatening proctors, etc. Humor, soothing background music, and snacks may help to ease the tension for some examinees.
- Relax time pressures and limits whenever possible.
- Provide reassurance and emotional social support to test anxious examinees.
- Provide external memory aids and other supports.
- Provide appropriate facilities (e.g., recovery room) for anxious examinees who freeze up, to regain their composure and continue with the exam.

making a diagnosis or decision on the basis of the test anxiety scale alone, as the former is generally a more reliable criterion. Thus interpretation should only be made after examining the relevant information beyond test scores. A simple composite test anxiety score should never be used in describing, predicting, or explaining an examinee's behavior. Sound interpretation involves integrating various sources of data and assimilating them into an exposition that describes the examinee's functioning, details specific strengths and weaknesses, and predicts the specific behavioral manifestations one could be expected to see.

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CHAPTER
11

Students' Emotions: A Key Component of Self-Regulated Learning?

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> "Emotions are not just the fuel that powers the psychological mechanism of a reasoning creature, they are parts, highly complex and messy parts, of this creature's reasoning itself." (Nussbaum, 2001, p. 3)

Since the 1980s, self-regulation has taken a prominent place in our thinking about learning and instruction. In line with constructivist views on learning, it is pointed out that learning is not something that happens *to* students but happens *by* students. More specifically, it is seen as

> ...the self-directive process through which learners transform their mental abilities into task-related academic skills. This approach views learning as an activity that students do for themselves in a proactive way, rather than as a covert event that happens to them reactively as a result of teaching experiences. (Zimmerman, 2001, p. 1)

Originally, self-regulation was almost exclusively perceived as the regulation of cognitive processes resulting in an emphasis on 'higher order' information processing and metacognition. Motivational and affective factors were considered minor components in explaining students' learning behavior and results (see Pintrich, Marx, & Boyle, 1993; Schutz & Davis, 2000).

Although the conception of (self-regulated) learning and competence has broadened over the years to include conative (i.e., motivational and volitional)