Test Anxiety and the Hierarchical Model of Approach and Avoidance Achievement Motivation

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This research was designed to incorporate the test anxiety (TA) construct into the hierarchical model of approach and avoidance achievement motivation. Hypotheses regarding state and trait TA were tested in 2 studies, and the results provided strong support for the predictions. State TA (specifically, worry) was documented as a mediator of the negative relationship between performance-avoidance goals and exam performance. The positive relationship between performance-approach goals and exam performance was shown to be independent of TA processes. A series of analyses documented the conceptual and functional convergence of trait TA and fear of failure (FOF), and further validation of the proposed integration was obtained by testing trait TA/FOF and state TA together in the same model. Mastery goals were positively and performance-avoidance goals negatively related to long-term retention.

Over the past 60 years, many theoretical conceptualizations of achievement motivation have been proffered. Several of these conceptualizations have made substantial contributions to our understanding of achievement-relevant affect, cognition, and behavior, but reviewers of the literature commonly identify the following as the most influential and generative: the achievement motive approach, the test anxiety (TA) approach, the attributional approach, and the achievement goal approach (Covington, 1992; Dweck & Elliott, 1983; Elliot, 1997; Heckhausen, 1991). Despite navigating similar terrain, these prominent conceptual approaches have developed in relative isolation from each other, and it is clear that the optimal evolutionary path for the achievement motivation literature is one of intellectual cooperation and cross-fertilization (i.e., integration), rather than competition (i.e., survival of the fittest theory; Dweck & Wortman, 1982; Nicholls, 1989).

Recently, Elliot and his colleagues (Elliot, 1997; Elliot & Church, 1997; Elliot & Harackiewicz, 1996) have sought to promote the process of theoretical integration by developing a hierarchical model of approach and avoidance achievement motivation that incorporates the central constructs from two of the prominent traditions: the achievement motive approach (J. Atkinson, 1957; McClelland, Atkinson, Clark, & Lowell, 1953; Murray, 1938) and the achievement goal approach (Dweck, 1986; Nicholls, 1984). In this model, *achievement motives*—need for achievement and fear

of failure—are construed as general, higher order motivational tendencies that energize individuals and orient them toward positive or negative possibilities. *Achievement goals* are construed as more concrete, midlevel cognitive representations that direct individuals toward specific end states. Three types of achievement goals are posited: a performance-approach goal (focused on the attainment of competence relative to others), a performance-avoidance goal (focused on avoiding incompetence relative to others), and a mastery goal (focused on the development of competence and task mastery). Achievement motives are viewed as antecedents of achievement goal adoption, and these goals, in turn, are construed as direct predictors of achievement-relevant outcomes. Thus, achievement motives are hypothesized to have a *distal* (indirect) influence, and achievement goals a *proximal* (direct) influence on achievement-relevant outcomes, and these motives and goals are viewed as working in tandem to regulate achievement behavior (see Elliot, 1997, for additional details on the hierarchical model).

The primary purpose of the present research was to further the development of an integrative conceptualization of achievement motivation by incorporating the central construct from a third prominent tradition—the test anxiety (TA) approach—into the hierarchical model. The central construct in this approach, TA, is defined as the experience of evaluation apprehension during the examination process (Spielberger & Vagg, 1995), and the basic premise of this approach is that TA undermines performance attainment. A widely accepted distinction in the TA literature is that between state and trait TA (Spielberger, 1972). *State TA* refers to a transitory condition of anxiety experienced in an examination setting. *Trait TA* refers to relatively stable differences in the frequency and intensity with which individuals experience state TA. In the next two sections, this state–trait distinction serves as an organizing framework for introducing our primary hypotheses regarding integration; several secondary hypotheses are explicated in a subsequent section, followed by an overview of the specific studies conducted.

State TA and the Hierarchical Model of Approach and Avoidance Achievement Motivation

A strength of the hierarchical model is its predictive utility with regard to arguably the most important outcome in the achievement motivation nomological network—performance attainment. The hierarchical model posits achievement goals as direct predictors of performance outcomes, and the extant research supports this proposition. Elliot and Church (1997), for example, demonstrated that the adoption of performance-avoidance goals undermines exam performance in the college classroom, whereas the adoption of performance-approach goals facilitates performance (see also Skaalvik, 1997). A weakness of the hierarchical model, at present, is that it provides no account of the processes responsible for the link between achievement goals and performance. State TA appears well suited to fill this conceptual void, as it represents a situation-specific process variable that has important ramifications for performance outcomes.

Specifically, state TA is posited to be the mechanism responsible for the deleterious influence of performance-avoidance goals on performance. Performance-avoidance regulation entails striving to avoid a negative normative outcome. In test situations, this form of regulation is likely to elicit anxiety, as the individual anticipates norm-based performance evaluation and focuses on the possibility of failure. A plethora of research has demonstrated that the experience of TA debilitates performance (see Hembree, 1988, for a meta-analytic review), and this relationship is presumed to hold with performance-avoidance goals controlled. Thus, performance-avoidance goals are hypothesized as positive predictors of state TA, and state TA is expected to mediate (i.e., account for) the link between performance-avoidance goals and performance attainment.

Liebert and Morris (1967) proposed that TA consists of two primary components—worry and emotionality—and this differentiated conceptualization has become the normative view in the TA literature (Anderson & Sauser, 1995; Covington, 1985). The *worry* component represents cognitive reactions such as self-criticism or concern about the consequences of failure, and these cognitions have been shown to undermine performance, presumably by diverting attention from task demands and interfering with retrieval processes (Deffenbacher, 1980; Sarason, 1972; Wine, 1971). The *emotionality* component represents physiological and affective reactions such as an accelerated heart rate or nervousness, and these responses have been shown to have little, if any, deleterious effect on performance (Deffenbacher, 1980; Morris, Davis, & Hutchings, 1981). From this standpoint, it seems reasonable to hypothesize that worry, but not emotionality, is the operative mediator of the relationship between performance-avoidance goals and performance attainment. Performance-avoidance goals are posited to elicit both worry and emotionality in exam settings, but worry alone is expected to debilitate performance and serve the role of mediational mechanism.

The relationship between performance-approach goals and performance is hypothesized to be unaffected by TA (whether conceptualized in omnibus or differentiated fashion). The pursuit of performance-approach goals entails striving to attain a positive normative outcome. Given their emphasis on norm-based performance evaluation, these goals may elicit emotionality, particularly at the beginning of the testing process (Morris & Engle, 1981), but their focus on the possibility of success makes it unlikely that they would be linked to worry or overall state TA. Emotionality is usually unrelated to performance; therefore, even if performance-approach goals are linked to emotionality, emotionality is not expected to mediate the relationship between performance-approach goals and performance outcomes.

Mastery goals have not been found to reliably predict performance outcomes (Elliot & Church, 1997; Harackiewicz, Barron, Carter, Lehto, & Elliot, 1997); thus mediational hypotheses are superfluous for these goals. Mastery goal regulation entails striving for improvement and task mastery. In test situations, this form of challenge-based regulation is unlikely to evoke overall state TA or emotionality and may even counteract the emergence of worry cognitions.

Trait TA and the Hierarchical Model of Approach and Avoidance Achievement Motivation

Many TA theorists studying the nature of trait TA have come to the conclusion that fear of failure (FOF) is an important component of trait TA (Covington, 1985; Hagtvet, 1983; Schwarzer, van der Ploeg, & Spielberger, 1982), and some view it as the heart or "main ingredient" of the construct (Becker, 1982; Feld & Lewis, 1969; Hill, 1972). In the achievement motive literature, the FOF and trait TA constructs have been considered essentially equivalent (J. Atkinson, 1987; J. Atkinson & Feather, 1966), and researchers working in this tradition have typically employed trait TA measures as a proxy for FOF (see J. Atkinson & Litwin, 1960; Feather, 1965). Like FOF, trait TA represents a dispositional tendency to experience evaluation apprehension in achievement settings, and both trait TA and FOF are affective–motivational constructs that orient individuals toward negative possibilities (Bedell & Marlowe, 1995; Birney, Burdick, & Teevan, 1969; Heckhausen, 1975; Spielberger, 1972). As such, it seems reasonable to construe trait TA and FOF as conceptually analogous constructs and to propose that they serve the same function in the hierarchical model. Thus, like FOF, trait TA is posited to be a dispositional antecedent of achievement goal adoption and a distal predictor of achievement-relevant outcomes. Specifically, trait TA and FOF alike are hypothesized to elicit performance-avoidance and performance-approach goals, and it is these goals that are posited to be the proximal predictors of achievement-relevant outcomes (see Elliot & Church, 1997, for documentation of the FOF hypotheses).

The trait TA and FOF constructs may possess a high degree of conceptual convergence, but operationally, they are clearly distinct. Trait TA measures focus exclusively on examination settings, whereas FOF measures focus more broadly on achievement-relevant contexts in general. Thus, as commonly operationalized, trait TA may be viewed as a domain-specific analogue of FOF, a situation-specific disposition (Sarason & Sarason, 1990) representing FOF in achievement settings involving exam performance. Using trait TA as a proxy for FOF seems a reasonable practice when investigating issues related to exam performance; a broader indicator of FOF seems more appropriate when conducting research in other achievement-relevant contexts.
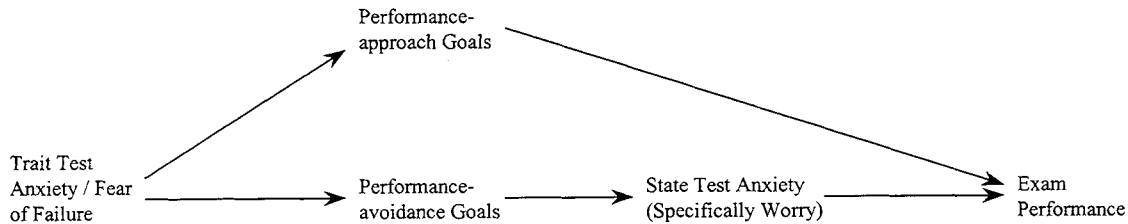
Figure 1. Overview of the proposed integration. Only the theoretically central variables are included in the diagram for presentation clarity.

The primary hypotheses for trait TA and state TA may be summarized and the proposed integration illustrated by putting trait and state TA together in the same path diagram. As seen in Figure 1, trait TA, like FOF, is hypothesized to prompt the adoption of performance-avoidance and performance-approach achievement goals, which in turn influence exam performance; the performance-avoidance goal to exam performance relationship is posited to be mediated by state TA (specifically, worry), whereas the performance-approach goal to exam performance relationship is expected to be unmediated by TA processes. Thus, conceptual and functional convergence are presumed for the trait TA and FOF constructs, whereas state TA (specifically, worry) is viewed as a distinct construct that serves the role of mediational mechanism. Parenthetically, mastery goals and emotionality are not included in Figure 1 (or subsequent figures) because the hypotheses generated for these variables are not integral to the proposed integration.[1]

Secondary Issues Addressed in the Present Research

The present research also addressed three secondary issues. First, some achievement motivation theorists have suggested that approach–avoidance motivation is simply a surrogate for objective or subjective ability (Kukla, 1972; Meyer, 1987; Nicholls, 1984). Research emerging from the hierarchical model has demonstrated that approach and avoidance motives and goals clearly have effects independent of *subjective ability* constructs (competence expectancies and perceptions; Elliot & Church, 1997; Elliot & Harackiewicz, 1996). In the present research, the hypothesis that the impact of approach and avoidance motives and goals (and TA processes) is independent of *objective ability* constructs—specifically, Scholastic Aptitude Test (SAT) scores—was investigated.

Second, learning is an end in itself under a mastery goal (Nicholls, 1984); accordingly, mastery goals undoubtedly engender the continued acquisition of knowledge and the further processing of already learned material well beyond the date of the exam. This subsequent acquisition and processing, in conjunction with the presumed depth of the learning involved, is likely to facilitate the *long-term retention* of material (Craik & Lockhart, 1972; Graham & Golan, 1991). Under a performance-approach goal, on the other hand, learning is an instrumental activity, and once the external impetus for knowledge acquisition has passed (i.e., the exam is over), the material is no longer goal-relevant and, therefore, no longer warrants further processing (Grolnick & Ryan, 1987). This absence of subsequent processing, in conjunction with the presumably shallow manner in which the material was encoded, makes it unlikely that performance-approach goals would facilitate reten-

tion. Performance-avoidance goals are not only likely to be associated with relatively shallow encoding and minimal postexam processing but they are also likely to elicit TA when the retention of information is evaluated. Thus, whereas performance-approach goals are posited to be unrelated to retention, performance-avoidance goals may evidence a negative relationship with retention. These hypotheses were investigated in the present research.

Third, Elliot and Church (1997) focused exclusively on *multiple choice (MC) exam performance* in investigating performance-approach, performance-avoidance, and mastery goals as predictors of academic performance; in the present work we expanded this focus to include *short answer–essay (SE) exam performance* as well. MC and SE exam questions are commonly categorized as recognition-based and recall-based tasks, respectively (Best, 1989; Sternberg, 1994), and recall is generally considered the more difficult task and the more sensitive procedure for assessing memory (R. Atkinson, 1990; Sternberg, 1994). Accordingly, the aforementioned hypotheses for both academic performance and long-term retention may receive their most sensitive test in the investigation of SE as opposed to MC performance.

Overview of the Present Research

The present research tested the aforementioned hypotheses in the context of two college classroom studies. Study 1 focused on TA at the state level, investigating the mediational role of state TA, worry, and emotionality in the achievement goal to performance relationship. Specifically, participants' achievement goals for the class (performance-approach, performance-avoidance, and mastery) were assessed at the beginning of the semester, and the influence of these goals (controlling for SAT scores) on MC exam performance was examined. Immediately following the exam, participants reported their degree of state TA, worry, and emotionality during the exam, and these variables were tested as mediators of the proposed direct relationships.

Study 2 focused on both state and trait TA, seeking to replicate Study 1 and extend it in numerous directions. Participants' achievement goals for their first exam (performance-approach, performance-avoidance, and mastery) were assessed at the beginning of the semester, and the influence of these goals (controlling for SAT scores) on MC, SE, and overall exam performance was

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[1] It should also be noted that the proposed integration bears only on the FOF aspect of the hierarchical model; thus need for achievement is not considered in the present research.

investigated. State TA, worry, and emotionality were assessed immediately after the exam, and the role of these variables as mediators of the proposed direct relationships was examined. Participants completed measures of trait TA and FOF at the beginning of the semester, and a number of data-analytic procedures were employed to examine the conceptual and functional convergence of the trait TA and FOF constructs, and to test trait TA/FOF and state TA together in the same model. At the end of the semester, participants received an unexpected ("pop") test on information from the initial exam, and the influence of participants' achievement goals on their retention of this material was examined.

Study 1

Method

Participants and Context

One hundred fifty undergraduates (68 men and 82 women) enrolled in an introductory-level psychology course at the University of Rochester participated in the study in return for extra course credit.[2] The class was conducted in lecture format, and students were informed at the beginning of the course that evaluation would be based on a normative grading structure.

Procedure

At the end of the first class session, participants provided information regarding their SAT scores. Participants' achievement goals for the course were assessed during the 2nd week of the semester, prior to the third class session. The exam was administered during the 5th week of the semester; no time limit was placed on the testing period, and completion times for participants ranged from approximately 30 to 100 min. Immediately following the exam, participants reported the degree to which they experienced state TA, worry, and emotionality during the exam. For all assessments, participants were assured that their responses would remain confidential and would not influence their course grade.

Measures

SAT scores. Participants' verbal and math SAT scores were summed to form a total SAT score index.

Achievement goals. Elliot and Church's (1997) achievement goal questionnaire was used to assess participants' achievement goals for the course.[3] In this questionnaire, six items are used to measure each of the three achievement goals: performance-approach (sample item: "I am striving to demonstrate my ability relative to others in this class"), performance-avoidance (sample item: "I just want to avoid doing poorly in this class"), and mastery (sample item: "I desire to completely master the material presented in this class"). Elliot and Church provided evidence for the reliability and validity of these measures. Participants indicated their response to each item on a 7-point scale (1 = *not at all true of me,* 7 = *very true of me*), and responses for each goal were averaged to form the performance-approach, performance-avoidance, and mastery goal indexes.

Exam performance. The exam consisted of 50 MC questions. An exam performance index was created by summing participants' correct responses and multiplying the total by two.

State TA. The state version of Spielberger, Gorsuch, and Lushene's (1970) 20-item revised State–Trait Anxiety Inventory was used to assess state TA. Participants were instructed to select a number ranging from 1 (*strongly disagree*) to 7 (*strongly agree*) for each item to indicate how they

felt while taking the exam (sample item: "I felt anxious"). The reliability and validity of this measure is well documented (see Spielberger et al., 1970). Participants' responses were summed to form the state TA index.

Worry and emotionality. Morris et al.'s (1981) 10-item Revised Worry–Emotionality Scale was used to assess worry and emotionality. Participants were instructed to select a number ranging from 1 (*does not describe my previous condition*) to 5 (*describes my previous condition very well*) to indicate how they felt while taking the exam (sample worry item: "I felt that I may not do as well on this exam as I could"; sample emotionality item: "I was nervous"). Morris et al. presented an overview of data attesting to the reliability and validity of the measure. Worry and emotionality indexes were formed by summing participants' responses to the 5 items of each scale.

Results

Direct Relationships

Simultaneous multiple regression analyses were used to examine the hypothesized direct relationships. A basic regression model was used to test achievement goals as predictors of exam performance, state TA, worry, and emotionality, controlling for the influence of SAT scores. The main effect of gender was also tested in preliminary analyses, as were all possible interactions involving each of the independent measures; the interactions were created using mean-deviated main effects (Aiken & West, 1991). Variables that attained significance in these preliminary analyses were retained in the final analyses (Judd & Kenny, 1981). These preliminary analyses entailed testing myriad variables (including four- and five-way interactions) that were of minimal conceptual interest; therefore, results involving interaction product terms are not presented in the text (interested readers may contact Andrew J. Elliot for this information). Descriptive statistics and intercorrelations between the primary variables are presented in Table 1.

Achievement goals to exam performance. The regression of exam performance on the basic model yielded significant relationships for performance-avoidance and performance-approach goals. Performance-avoidance goals were negatively related to exam performance, $F(1, 137) = 7.92, p < .01$ ($\beta = -.25$), whereas performance-approach goals were positively related, $F(1, 137) = 5.68, p < .05$ ($\beta = .21$). Mastery goals were unrelated to exam performance.

Achievement goals to the mediator variables. The regression

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[2] One individual in Study 1 and 5 individuals in Study 2 were excluded from analyses because they were part of a learning–testing assistance services program at the university and took the exam under special circumstances (e.g., they completed the exam in an isolated room, had the exam read to them, or had someone write down their responses). All of these individuals had been diagnosed as having a disability that put them in need of alternative testing procedures. Repeating the analyses reported in the text with these individuals included had no appreciable impact on the pattern of results obtained.

[3] Elliot (1998) introduced a slightly modified version of Elliot and Church's (1997) performance-avoidance goal scale in which the item "I wish this class was not graded" was replaced with the more face-valid item "My goal for this class is to avoid performing poorly," and it is this version of the scale that was used in the present research. Research has demonstrated that this minor modification has slight psychometric, as well as conceptual, benefits (see Elliot, 1998).

Table 1

Study 1: Descriptive Statistics and Intercorrelations Between the Primary Variables

Variable	n	M	SD	Observed range	Reliability	Variable						
						1	2	3	4	5	6	7
1. Performance-approach goals	150	4.36	1.44	1–7	.90	—						
2. Performance-avoidance goals	150	3.94	1.34	1–6.67	.84	.32	—					
3. Mastery goals	150	5.66	0.87	3–7	.85	.15	.04	—				
4. State TA	147	76.97	22.75	23–130	.94	.01	.41	.08	—			
5. Worry	148	13.08	4.72	5–25	.88	.11	.34	.04	.72	—		
6. Emotionality	148	10.38	4.42	5–25	.86	.07	.34	.07	.78	.61	—	
7. Exam performance	150	73.32	13.47	38–100	—	.14	−.23	.13	−.33	−.47	−.12	—

Note. TA = test anxiety.

of state TA on the basic model yielded a significant relationship for performance-avoidance goals, indicating that participants with these goals experienced higher levels of anxiety during the exam, $F(1, 142) = 27.50, p < .0001$ ($\beta = .43$). Performance-approach and mastery goals were unrelated to state TA. Regressing worry on the basic model also revealed a significant relationship for performance-avoidance goals, indicating that participants with these goals experienced more worry during the exam, $F(1, 138) = 10.83, p < .005$ ($\beta = .29$). The emotionality analysis yielded a comparable result, as performance-avoidance goals were positively related to emotionality during the exam, $F(1, 139) = 16.73$, $p < .0005$ ($\beta = .35$). Performance-approach and mastery goals were unrelated to worry and emotionality.

Mediational Analyses

Empirical validation of a mediational model entails the satisfaction of three requirements (see Judd & Kenny, 1981). First, a relationship between the predictor variable and the outcome measure must be established for mediation to be a relevant issue. Second, a relationship between the predictor variable and the hypothesized mediator must be established to document the first link in the mediational chain. Third, to complete the mediational chain, a relationship between the mediator variable and the outcome measure must be established while controlling for the predictor variable, and the direct relationship between the predictor variable and the outcome measure should be reduced. The preceding analyses satisfied the first and second requirements by establishing a relationship between performance-avoidance goals and exam performance, as well as a relationship between performance-avoidance goals and each of the mediator variables. To test the final link in the mediational chain, we conducted a series of analyses in which exam performance was regressed on the basic model with one of the mediator variables also in the equation. Whenever mediation was successfully documented in these analyses, a supplementary structural equation modeling (SEM) analysis was also conducted to examine the fit of the mediational model to the observed data. In these analyses, the correlation matrix was used as input and LISREL 8 (Jöreskog & Sörbom, 1993) generated a solution based on maximum-likelihood estimation.

Each variable in the equations was represented by a single observed indicator; to account for random measurement error, we set the unique variance of each indicator at 1 minus its reliability (Bollen, 1989). In accord with Hoyle and Panter's (1995) recommendation, both absolute fit indexes—χ^2, goodness-of-fit index (GFI), adjusted goodness-of-fit index (AGFI)—and an incremental fit index—comparative fit index (CFI)—were used to evaluate the fit of the model to the data.

State TA. The state TA mediational analysis revealed a significant relationship for state TA, $F(1, 135) = 10.43, p < .005$ ($\beta = -.27$), indicating that participants experiencing high levels of anxiety performed worse on the exam. The beta coefficient for the direct relationship between performance-avoidance goals and exam performance dropped from $-.25$ to $-.12$ in this analysis and was no longer significant. The direct relationship between performance-approach goals and exam performance, on the other hand, evidenced little change (the beta coefficient moved from .21 to .18) and remained significant. The state TA mediational model provided a satisfactory fit to the data: $\chi^2(6, N = 147) = 10.02, p > .05$; GFI = .98; AGFI = .93; CFI = .95.

Worry and emotionality. The worry mediational analysis revealed a significant relationship for worry, $F(1, 136) = 33.68, p < .0001$ ($\beta = -.43$), indicating that participants with high levels of worry performed worse on the exam. The beta coefficient for the direct relationship between performance-avoidance goals and exam performance dropped from $-.25$ to $-.09$ in this analysis and was no longer significant. The direct relationship between performance-approach goals and exam performance, however, was essentially unchanged (the beta coefficient moved from .21 to .22) and remained significant. The worry mediational model provided a satisfactory fit to the data: $\chi^2(6, N = 147) = 5.00, p > .05$; GFI = .99; AGFI = .96; CFI = 1.00. The emotionality mediational analysis failed to yield a significant relationship between emotionality and exam performance; therefore, emotionality failed to satisfy the third requirement for mediation.

In sum, the above results clearly establish state TA and worry, but not emotionality, as mediators of the relationship between performance-avoidance goals and exam performance. Furthermore, these results indicate that state TA, worry, and emotionality do not mediate the relationship between performance-approach goals and exam per-

formance. A pictorial summary of the mediational results documented in the preceding analyses is presented in Figures 2a and 2b.[4]

Discussion

The results of this study provided strong support for our central hypotheses. State TA was documented as a mediator of the relationship between performance-avoidance goals and (MC) exam performance, and worry, rather than emotionality, was identified as the operative mediational mechanism. Furthermore, the relationship between performance-approach goals and exam performance was shown to be independent of TA processes. All of these results were obtained controlling for SAT scores.

Study 2 was broader in scope than Study 1, focusing on both state and trait TA. One purpose of the study was to conceptually replicate and extend the state TA results of Study 1. Study 2 used the same basic procedure as Study 1, with two changes: the achievement goal measure was focused at the exam, rather than the general course level, and SAT scores were obtained from official records rather than participants themselves. In addition, the indicator of performance in Study 2 was expanded to include SE exam performance. Thus, the mediational role of state TA, worry, and emotionality was examined with regard to the relationship between achievement goals and MC, SE, and overall exam performance.

A second purpose of Study 2 was to examine the conceptual and functional convergence of the trait TA and FOF constructs, and to test trait TA/FOF and state TA together in the same model. FOF was assessed by means of self-report and projective procedures; trait TA was assessed by means of self-report measure only, as projective assessment procedures are not available. Factor analyses and intercorrelations were used to investigate the issue of conceptual convergence: The primary source of discrimination between trait TA and FOF was expected to be methodological (i.e., self-report vs. projective assessments) rather than conceptual (trait TA vs. FOF) in nature. An extensive series of multiple regression analyses was used to examine the issue of functional convergence: It was anticipated that trait TA, like FOF, would be a positive predictor of performance-avoidance and performance-approach goals and that these goals, in turn, would be the proximal predictors of the performance outcomes. Multiple regression and SEM procedures were used to examine trait TA/FOF and state TA together in the same model.

A final purpose of Study 2 was to extend the nomological network of the hierarchical model to include long-term retention. Of foremost interest was investigating the hypothesis that mastery goals facilitate the long-term retention of exam-relevant material.

Study 2

### Method

Participants and Context

One hundred seventy-two undergraduates (65 men and 107 women) enrolled in an introductory-level psychology course at the University of Rochester participated in the study in return for extra course credit. As in Study 1, the class was conducted in lecture format and students were informed at the beginning of the course that evaluation would be based on a normative grading structure.

Procedure

At the end of the first class session, participants completed the self-report FOF measure. During the 2nd week of the semester, participants completed the projective assessment of FOF and the trait TA measure in an "out-of-class" session. Participants' achievement goals for the exam were assessed during the 4th week of the semester, prior to class, and the exam was administered 2 weeks later. No time limit was placed on the testing period, and completion times for participants ranged from approximately 40 to 110 min. Immediately following the exam, participants reported the degree to which they experienced state TA, worry, and emotionality during the exam. At the end of the semester, the pop exam was administered and participants also completed a consent form allowing the investigator access to their SAT information from the university registrar. For all assessments, participants were assured that their responses would remain confidential and would not influence their course grade.

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[4] Additional analyses were conducted to address the following questions: (a) Are the observed results a function of the fact that two items in the performance-avoidance goal index focus on fear or worry in relation to graded performance ("My fear of performing poorly on this exam is often what motivates me" and "I worry about the possibility of getting a bad grade on this exam")? and (b) Do the observed results hold when controlling for anticipatory anxiety and worry prior to the exam? To address the first question, we repeated the analyses reported in the text using a four-item measure of performance-avoidance goals that excluded the fear- and worry-based items (the correlation between the original and revised indexes was .97). All of the theoretically central relationships reported in the text remained the same in these analyses (i.e., the beta coefficient remained within .01, the probability value remained less than or equal to .05, or both), and all of the fit statistics for all models provided evidence of a good fit to the data (i.e., χ^2: $df < 2$ and all fit indexes greater than or equal to .90). Thus, the answer to the first question is clearly "no." To address the second question, we used single-item measures of pre-exam anxiety and worry that had been collected for a separate project. Specifically, 1 week before the exam, participants had been asked to indicate the degree to which they felt anxious and worried when they thought about the upcoming exam ($0 = not at all$, $4 = very much$). Each of the original direct and mediational analyses involving state TA or worry were repeated controlling for the corresponding "pre" measure. These analyses revealed that (a) the "pre" anxiety measure was a significant predictor of state TA ($\beta = .23$, $p < .01$) and the "pre" worry measure was a marginally significant predictor of worry ($\beta = .17$, $p = .077$) and (b) all of the theoretically central relationships reported in the text remained the same when controlling for these "pre" measures, and all of the fit statistics for both models provided evidence of a good fit to the data. Thus, the answer to the second question is clearly "yes." Furthermore, as an additional way to address the second question, we made use of a separate data set (collected for a separate project) that afforded a test of the state TA mediational hypotheses controlling for a full (20-item) "pre" state TA measure, and a subjective, rather than objective indicator of ability (specifically, competence expectancies). Results from the analyses perfectly replicated those from the primary study: (a) Performance-avoidance goals were negative and performance-approach goals positive predictors of exam performance; (b) performance-avoidance goals and "pre" state TA were positive predictors of state TA; (c) in the mediational analysis, state TA was a negative predictor of exam performance; the relationship between performance-avoidance goals and exam performance evidenced a decrease and was no longer significant, whereas the relationship between performance-approach goals and exam performance was essentially unchanged and remained significant; and (d) all of the fit statistics for the model provided evidence of a good fit to the data.
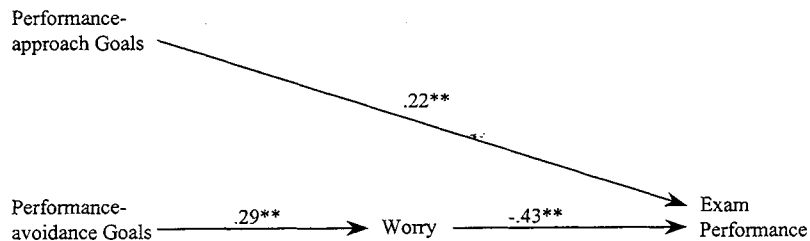
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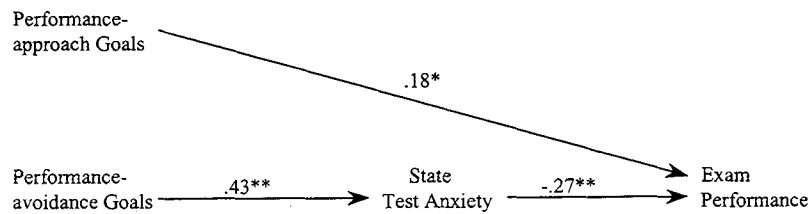
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Figure 2. The mediational models for Study 1 for (a) state test anxiety and (b) worry. Path values are standardized regression coefficients, and only the theoretically central variables are included in the diagram for presentation clarity. $*p < .05$. $**p < .01$.

Measures

SAT scores. Participants' scores on the verbal and math components of the SAT were summed to form a total SAT scores index.

Trait TA. Spielberger, Gonzalez, Taylor, Algaza, and Anton's (1978) 20-item Test Anxiety Inventory was used to assess trait TA (sample item: "I feel very panicky when I take an important exam"). A great deal of research attests to the validity and reliability of this measure (see Spielberger, 1980). Participants' responses on the 4-point scales (1 = *almost never*, 4 = *almost always*) were summed to form the trait TA index.

Self-report FOF. Herman's (1990) 27-item FOF measure was used as the self-report indicator of FOF (sample item: "I try to avoid failure at all costs"). This scale was developed to assess the "failure threatened personality" described by J. Atkinson and Feather (1966, p. 369). The revised version of the scale was used, and recent research attests to the reliability and validity of the measure (see Elliot & Church, 1997). Participants' responses on the 5-point scales (1 = *strongly disagree*, 5 = *strongly agree*) were summed to form the self-report FOF index.

Projective FOF. Birney et al.'s (1969) Hostile Press scoring system was used to derive the projective indicator of FOF. Participants were given 4 min to compose a story in response to each of a set of Thematic

Apperception Test-like pictures. Stories elicited by three of the pictures (female scientists, man in a barren room, and student in a checked shirt) were scored by two independent coders for the presence of hostile press imagery. Individuals are presumed to be high in FOF to the extent that they write stories in which the central character is experiencing or avoiding a threatening (hostile) situation (press). Birney et al. reported data supporting the reliability and validity of the Hostile Press scoring system. Interjudge agreement was 95% for the stories (with disagreements resolved through discussion), and participants' scores were summed to form the projective FOF index.[5]

Table 2

Study 2: Descriptive Statistics and Intercorrelations Between the Primary Variables

Variable	n	M	SD	Observed range	Reliability	1	2	3	4	5	6	7	8	9	10
1. Trait TA	171	39.16	13.89	20–80	.96	—									
2. Self-report FOF	172	72.19	12.42	36–110	.85	.55	—								
3. Projective FOF	156	1.87	1.79	0–7	—	.04	.25	—							
4. Performance-approach goals	173	4.24	1.51	1–7	.92	.29	.37	.21	—						
5. Performance-avoidance goals	173	3.63	1.36	1–7	.84	.56	.45	.18	.33	—					
6. Mastery goals	173	5.53	0.94	2.17–7	.90	.08	−.16	−.09	.09	−.02	—				
7. State TA	172	86.33	22.45	32–140	.94	.51	.38	.18	.20	.50	−.10	—			
8. Worry	172	14.89	4.92	5–25	.89	.40	.32	.17	.17	.43	−.06	.73	—		
9. Emotionality	172	11.15	5.02	5–25	.87	.60	.38	.17	.29	.48	−.02	.78	.64	—	
10. Exam performance	173	64.58	17.40	20–95	—	−.27	−.15	−.04	.09	−.31	.04	−.36	−.51	−.24	—

Note. TA = test anxiety; FOF = fear of failure.

Achievement goals. As in Study 1, Elliot and Church's (1997) achievement goal questionnaire was used to access performance-approach, performance-avoidance, and mastery goals, except that in this study, participants indicated their goals for the upcoming exam rather than the course in general.

Exam performance. The exam consisted of 25 MC questions and 12 SE questions (with the requirement that participants answer all but 1 question). A MC performance index was created by summing participants' correct responses and multiplying the total by two (maximum score = 50). Likewise, an SE performance index was created by summing participants' points for correct responses and multiplying the total by two (maximum score = 50). An overall exam performance index was created by summing the MC and SE performance scores.

State TA. The measure used in Study 1 was also used in this study.

Worry and emotionality. The measures used in Study 1 were also used in this study.

Pop exam performance. The pop exam consisted of 10 MC questions and five SE questions, all of which pertained to material from the initial exam. Participants were informed that their score on the exam would not affect their base grade but could earn them extra credit. A pop MC performance index was created by summing participants' correct responses to the MC items and multiplying the total by two (maximum score = 20). Likewise, a pop SE performance index was created by summing participants' points for correct responses and multiplying the total by two (maximum score = 20). An overall pop exam performance index was created by summing the pop MC and pop SE performance scores.

the initial analyses, one other Hostile Press composite was also computed by coding and adding scores from a fourth story written to the man in the mirror picture cue. Analyses with this index yielded the same pattern of results as those reported in the text, only somewhat weaker overall. The analyses were also repeated with the subset of participants who had learned English before the age of 5 (90.3% of the sample), given that projective motive assessments may have reduced predictive utility for individuals who write stories in a non-native language (D. McClelland, personal communication, January 1997). Results from these analyses were highly similar to those reported in the text, with a majority of the relationships slightly stronger and a few slightly weaker in magnitude.

Results

Direct Relationships

As in Study 1, simultaneous multiple regression procedures were used to test the hypothesized direct relationships. The same basic regression model used in Study 1 was also used in these analyses (i.e., the three achievement goal variables and SAT scores); likewise, the same set of preliminary analyses involving gender and all possible interactions was also conducted. Descriptive statistics and intercorrelations between the primary variables are presented in Table 2.

Achievement goals to exam performance. The regression of exam performance on the basic model yielded significant relationships for performance-avoidance and performance-approach goals. Performance-avoidance goals were negatively related to exam performance, $F(1, 163) = 13.87, p < .0005$ ($\beta = -.29$), whereas performance-approach goals were positively related, $F(1, 163) = 9.21, p < .005$ ($\beta = .24$). SAT scores were also positive predictors of exam performance, $F(1, 163) = 4.21, p < .05$ ($\beta = .16$); mastery goals were unrelated.

This same pattern of results was obtained for both the MC and SE components of the exam, although the relationships were somewhat stronger for SE performance. Regressing MC performance on the basic model yielded the following results: Performance-avoidance goals were negatively related, $F(1, 163) = 6.08, p < .05$ ($\beta = -.20$); performance-approach goals were positively related, $F(1, 163) = 4.06, p < .05$ ($\beta = .16$); SAT scores were positively related, $F(1, 163) = 7.94, p < .05$ ($\beta = .21$); and mastery goals were unrelated. The following pattern of results was observed for SE performance: Performance-avoidance goals were negatively related, $F(1, 163) = 15.07, p < .0005$ ($\beta = -.30$); performance-approach goals were positively related, $F(1, 163) = 9.53, p < .005$ ($\beta = .24$); SAT scores were marginally positively related, $F(1, 163) = 3.24, p = .074$ ($\beta = .14$); and mastery goals were unrelated.

Achievement goals to the mediator variables. The regression of state TA on the basic model yielded significant relationships for performance-avoidance goals and gender. Performance-avoidance goals were positively related to state TA, $F(1, 154) = 36.51, p <$

Table 3
Study 2: Summary of the Mediational Results

Mediator/outcome variable	β for mediator	β for performance-avoidance goals		β for performance-approach goals		Sample fit statistics	
		Without mediator in equation	With mediator in equation	Without mediator in equation	With mediator in equation	AGFI	CFI
State TA/exam performance	−.28**	−.29**	−.15	.24**	.25**	.92	.97
Worry/exam performance	−.48**	−.29**	−.09	.24**	.23**	.95	.99
State TA/MC performance	−.25**	−.20*	−.07	.16*	.17*	.95	.99
Worry/MC performance	−.40**	−.20*	−.02	.16*	.17*	.97	1.00
State TA/SE performance	−.27**	−.30**	−.17	.24**	.25**	.90	.95
Worry/SE performance	−.49**	−.30**	−.10	.24**	.23**	.93	.98

Note. TA = test anxiety; MC = multiple choice; SE = short answer–essay; AGFI = adjusted goodness-of-fit index; CFI = comparative fit index.
* $p < .05$. ** $p < .01$.

.0001 (β = .44), and female participants experienced more state TA than male participants, $F(1, 154) = 12.21$, $p < .001$ (β = .24). Performance-approach and mastery goals were unrelated to state TA.

Regressing worry on the basic model revealed significant relationships for performance-avoidance goals, mastery goals, and gender. Performance-avoidance goals were positively related to worry, $F(1, 157) = 23.45$, $p < .0001$ (β = .37); mastery goals were negatively related, $F(1, 157) = 4.06$, $p < .05$ (β = −.15); and female participants experienced more worry than male participants, $F(1, 157) = 4.05$, $p < .05$ (β = .15). Performance-approach goals were unrelated to worry. The regression of emotionality on the basic model yielded significant relationships for performance-avoidance goals, performance-approach goals, and gender. Performance-avoidance goals were positively related to emotionality, $F(1, 165) = 30.16$, $p < .0001$ (β = .40), as were performance-approach goals, $F(1, 165) = 4.28$, $p < .05$ (β = .15), and female participants experienced more emotionality than male participants, $F(1, 165) = 4.76$, $p < .05$ (β = .15). Mastery goals were unrelated to emotionality.

Mediational Analyses

Mediational analyses were conducted for each outcome measure in the same manner as in Study 1; likewise, the same supplementary SEM procedures were used to examine goodness of fit when mediation was successfully documented.

State TA. The state TA mediational analysis revealed a significant relationship for state TA, $F(1, 161) = 12.14$, $p < .001$ (β = −.28), indicating that participants with high levels of anxiety performed worse on the exam. The beta coefficient for the direct relationship between performance-avoidance goals and exam performance dropped from −.29 to −.15 in this analysis and was no longer significant. The direct relationship between performance-approach goals and exam performance, on the other hand, was essentially unchanged (the beta coefficient moved from .24 to .25) and remained significant. The state TA mediational model provided a satisfactory fit to the data: $\chi^2(6, N = 172) = 10.98$, $p > .05$; GFI = .98; AGFI = .92; CFI = .97. As can be seen in Table 3, this same pattern of mediational results was also obtained with the MC and SE performance variables.

Worry and emotionality. The worry mediational analysis revealed a significant relationship for worry, $F(1, 161) = 45.94$, $p < .0001$ (β = −.48), indicating that participants with high levels of worry performed worse on the exam. The beta coefficient for the direct relationship between performance-avoidance goals and exam performance dropped from −.29 to −.09 in this analysis and was no longer significant. The direct relationship between performance-approach goals and exam performance, however, was essentially unchanged (the beta coefficient moved from .24 to .23) and remained significant. The worry mediational model provided a satisfactory fit to the data: $\chi^2(5, N = 172) = 5.98$, $p > .05$; GFI = .99; AGFI = .95; CFI = .99. The emotionality mediational analysis failed to yield a significant relationship between emotionality and exam performance; therefore, emotionality failed to satisfy the third requirement for mediation. This same pattern of mediational results was also obtained with the MC and SE performance variables (see Table 3).[6]

In sum, these results replicate those obtained in Study 1 by documenting state TA and worry, but not emotionality, as mediators of the direct relationship between performance-avoidance goals and exam performance. Also replicating Study 1, these results indicate that state TA, worry, and emotionality do not mediate the relationship between performance-approach goals and exam performance. A pictorial summary of the mediational results documented for exam performance in the preceding analyses is presented in Figures 3a and 3b.[7]

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[6] In both Studies 1 and 2 we also examined worry and emotionality together in the same mediational model. The results from these analyses were the same as those reported in the text in that worry, but not emotionality, was a negative predictor of performance, and worry mediated the relationship between performance-approach goals and performance but did not mediate the relationship between performance-avoidance goals and performance.

[7] As with Study 1, additional analyses were conducted to address the following questions: (a) Are the observed results a function of the fact that two items in the performance-avoidance goal index focus on fear or worry in relation to graded performance? and (b) Do the observed results hold when controlling for anticipatory anxiety and worry prior to the exam? To address the first question, we repeated the analyses using the four-item

The Convergence of Trait TA and FOF

A series of analyses was conducted to examine the convergence of the trait TA and FOF constructs. One set of analyses focused on the issue of conceptual convergence, whereas the other set focused on the issue of functional convergence within the hierarchical model.

Conceptual convergence. The scores from the trait TA, self-report FOF, and projective FOF measures were submitted to a principal-components factor analysis. This analysis yielded a single factor with an eigenvalue exceeding unity, and the solution accounted for 54.2% of the total variance. Supplementary analyses were then conducted, with both orthogonal and oblique rotation, in which the program was instructed to select two factors. Each of these analyses yielded the same solution, which accounted for 86.7% of the total variance: Trait TA and self-report FOF loaded on the first factor and projective FOF loaded on the second. These results provide clear support for the conceptual convergence of the trait TA and FOF constructs and suggest that the primary source of divergence among trait TA, self-report FOF, and projective FOF is methodological (self-report vs. projective assessments) rather than conceptual (trait TA vs. FOF). The bivariate correlations between the measures paint a similar picture. The two self-report measures (trait TA and self-report FOF) were highly intercorrelated ($r = .55, p < .0001$), and this relationship was significantly greater than that between either self-report measure and projective FOF ($z = 5.53, p < .0001$ for trait TA; $z = 3.09, p < .005$ for self-report FOF).

Functional convergence. Working within the context of the hierarchical model (see Elliot, 1997), simultaneous regression analyses were conducted to test trait TA, self-report FOF, and projective FOF as (a) antecedents of performance-avoidance and performance-approach goal adoption and (b) distal rather than proximal predictors of exam performance. In the "antecedent" analyses, the two goal measures were independently regressed on each dispositional measure, with SAT scores also in the equation. The analyses revealed that trait TA ($\beta = .54, p < .0001$), self-report FOF ($\beta = .43, p < .0001$), and projective FOF ($\beta = .16$,

$p < .05$) all significantly predicted performance-avoidance goals. SAT scores were also significant predictors in the self-report FOF ($\beta = -.17, p < .05$) and projective FOF ($\beta = -.20, p < .01$) analyses. Each of the dispositional variables, trait TA ($\beta = .33, p < .0001$), self-report FOF ($\beta = .39, p < .0001$), and projective FOF ($\beta = .21, p < .01$), were also significant predictors of performance-approach goals. SAT scores were a significant predictor in the trait TA analysis ($\beta = .17, p < .05$). Thus, the same pattern of results was obtained for the three dispositional measures, and these results indicate that trait TA, like FOF, may be construed as an antecedent of performance-avoidance and performance-approach goal adoption.

In the "distal predictor" analyses, each of the previously reported analyses testing the relationship between achievement goals and a performance outcome was repeated with one of the dispositional measures also in the equation. Null results were obtained for the dispositional measure in each of these analyses, and all but 1 of the 18 significant achievement goal relationships that were initially documented remained the same.[8] Thus, all three dispositional measures yielded results in accord with the hierarchical model. Trait TA, like the two FOF measures, functioned as a distal rather than a proximal predictor of exam performance; these dispositional measures predicted performance-avoidance and performance-approach goals, which, in turn, functioned as proximal predictors of exam performance. Together, these "antecedent" and "distal predictor" results nicely attest to the functional convergence of the trait TA and FOF constructs.
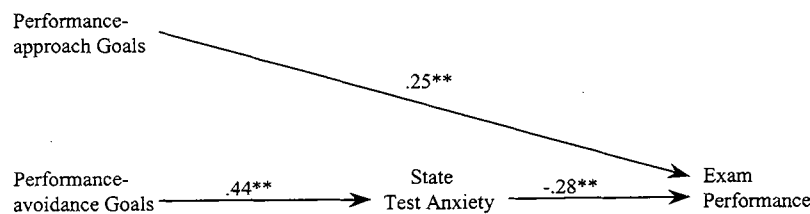
Trait TA/FOF and State TA in the Same Model

An additional series of regression analyses was conducted to incorporate trait TA/FOF and state TA together in the same model. To reiterate, in this model (see Figure 1) trait TA/FOF is hypothesized to prompt the adoption of performance-avoidance and performance-approach achievement goals, which in turn influence exam performance; the performance-avoidance goal to exam performance relationship is posited to be mediated by state TA (specifically, worry), whereas the performance-approach goal to exam performance relationship is posited to be unmediated by TA processes. The results of these analyses are too numerous to report in detail, but the most important findings may be summarized rather succinctly. For each combination of dispositional measure (trait TA, self-report FOF, projective FOF), mediational variable (state TA, worry), and outcome measure (MC, SE, and overall exam performance), all of the theoretically central relationships reported in the text remained the same. Follow-up SEM analyses produced equally impressive results (see Table 4): For each of the models tested, all of the fit statistics provided evidence of a good-fitting model.

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measure of performance-avoidance goals (see Footnote 4; the correlation between the original and revised indexes was .97). All of the theoretically central relationships reported in the text remained the same in these analyses, and all of the fit statistics for all models provided evidence of a good fit to the data. Thus, the answer to the first question is clearly "no." To address the second question, we again used single-item measures of pre-exam anxiety and worry that had been collected for a separate project (see Footnote 4) and each of the original direct and mediational analyses involving state TA or worry were repeated controlling for the corresponding "pre" measure. These analyses revealed that (a) the "pre" anxiety measure was a significant predictor of state TA ($\beta = .20, p < .005$) and the "pre" worry measure evidenced a trend toward a positive relationship with worry ($\beta = .12, p = .19$) and (b) all of the theoretically central relationships reported in the text remained the same when controlling for these "pre" measures (although the relationship between performance-avoidance goals and exam performance—specifically, SE performance—did remain significant with "pre" anxiety and state TA in the equation, despite a substantial drop in the magnitude of the beta coefficient) and all of the fit statistics for all models provided evidence of a good fit to the data. Thus, the answer to the second question is clearly "yes."

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[8] The relationship between performance-avoidance goals and MC performance was diminished slightly when trait TA was controlled ($\beta = -.15, p = .109$). The relationship between performance-avoidance goals and MC performance and that between performance-approach goals and MC performance remained the same with projective FOF controlled, but the loss of participants due to failure to complete the projective FOF measure did weaken these relationships relative to those initially reported in the text (βs $= -.16$ and $.13$, ps $= .069$ and $.127$, respectively).

a

Performance-
approach Goals

.25**

Performance-   .44**   State   -.28**   Exam
avoidance Goals ———————————>   Test Anxiety ———————————>   Performance

b

Performance-
approach Goals

.23**

Performance-   .37**   -.48**   Exam
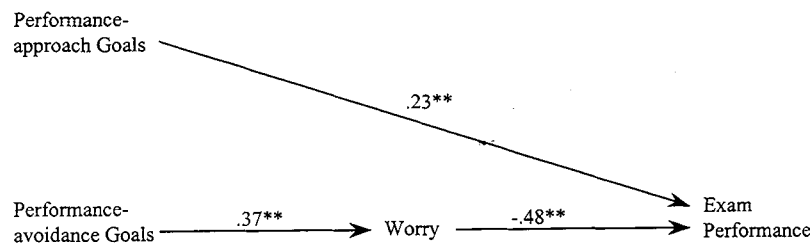avoidance Goals ———————————>   Worry ———————————>   Performance

Figure 3. The mediational models for Study 2 for (a) state test anxiety and (b) worry. Path values are standardized regression coefficients, and only the theoretically central variables are included in the diagram for presentation clarity. ** $p < .01$.

In sum, these results provide strong support for the overall model. Figures 4a and 4b provide a pictorial summary of a representative sample of these results, specifically, the findings for the exam performance model with trait TA as the dispositional measure and state TA (Figure 4a) and worry (Figure 4b) as mediator variables. Parenthetically, state TA and worry evidenced a significant (or nearly significant) relationship with each of the self-report dispositional measures in these analyses; null relationships were observed with the projective FOF measure.

The Relationship Between Achievement Goals and Pop Exam Performance

Finally, ancillary analyses were conducted to examine the relationship between achievement goals and the retention of exam-relevant material. Regressing pop exam performance on the basic model (controlling for performance on the initial exam) yielded several significant results. Exam performance and SAT scores were positively related to pop exam performance, $F(1, 163)$

$= 37.97, p < .0001$ ($\beta = .42$), and $F(1, 163) = 5.64, p < .05$ ($\beta = .16$), respectively. More important, mastery goals were also positively related, $F(1, 163) = 4.28, p < .05$ ($\beta = .13$), and performance-avoidance goals were marginally negatively related, $F(1, 163) = 3.65, p = .059$ ($\beta = -.14$). Female participants did better on the pop exam than male participants, $F(1, 163) = 5.81$, $p < .05$ ($\beta = -.16$); performance-approach goals were unrelated to pop exam performance.

Differential results were obtained for the MC and SE components of the pop exam. The pop MC performance analysis yielded no significant relationships for achievement goals, whereas the pop SE performance analysis yielded a pattern of results that corresponded to those with the overall pop exam performance variable. SE performance was positively, and SAT scores were marginally positively related to pop SE performance, $F(1, 163) = 13.94, p < .001$ ($\beta = .28$), and $F(1, 163) = 3.40, p < .067$ ($\beta = .14$), respectively. More important, mastery goals were also positively related to SE pop performance, $F(1, 163) = 5.12, p < .05$ ($\beta =$

Table 4

Study 2: Goodness-of-Fit Statistics for the Overall Model

Variable: dispositional/mediator/outcome	χ^2	df	GFI	AGFI	CFI
Trait TA/state TA/exam performance	18.95	14	.97	.93	.98
Trait TA/state TA/MC performance	15.24	14	.98	.93	.99
Trait TA/state TA/SE performance	20.42	14	.97	.93	.97
Trait TA/worry/exam performance	13.52	14	.98	.95	1.00
Trait TA/worry/MC performance	11.15	14	.98	.96	1.00
Trait TA/worry/SE performance	14.96	14	.98	.95	1.00
Self-report FOF/state TA/exam performance	21.77	13	.97	.92	.96
Self-report FOF/state TA/MC performance	18.06	13	.97	.93	.97
Self-report FOF/state TA/SE performance	23.29	13	.97	.91	.95
Self-report FOF/worry/exam performance	21.20	14	.97	.93	.97
Self-report FOF/worry/MC performance	18.61	14	.97	.93	.97
Self-report FOF/worry/SE performance	22.64	14	.97	.92	.96
Projective FOF/state TA/exam performance	18.94	15	.97	.93	.97
Projective FOF/state TA/MC performance	15.60	15	.98	.94	1.00
Projective FOF/state TA/SE performance	20.42	15	.97	.92	.96
Projective FOF/worry/exam performance	15.77	15	.98	.94	.99
Projective FOF/worry/MC performance	13.15	15	.98	.95	1.00
Projective FOF/worry/SE performance	17.37	15	.97	.94	.98

Note. GFI = goodness-of-fit index; AGFI = adjusted goodness-of-fit index; CFI = comparative fit index; TA = test anxiety; MC = multiple choice; SE = short answer–essay; FOF = fear of failure. For trait TA analyses, $N = 171$; for self-report FOF analyses, $N = 172$; for projective FOF analyses, $N = 156$.

.16), and performance-avoidance goals were marginally negatively related, $F(1, 163) = 3.61, p = .059$ ($\beta = -.15$). Female participants did better on the SE part of the pop exam than male participants, $F(1, 163) = 7.61, p < .01$ ($\beta = -.19$); performance-approach goals were unrelated to pop SE performance.

In sum, these results clearly implicate mastery goals, not performance-approach goals, as facilitators of retention and suggest that performance-avoidance goals have a negative impact. Although no mediational hypotheses were generated regarding retention, exploratory analyses were nevertheless conducted. Neither state TA, worry, nor emotionality were significant predictors of a pop exam performance variable in these analyses, indicating that these variables did not mediate the retention results. In addition, for the sake of comprehensiveness, all of the analyses reported in the previous two paragraphs were repeated controlling for each combination of dispositional measure and mediational variable. In these analyses, all but one of the theoretically central relationships reported in the text remained the same.[9] Furthermore, repeating the SEM analyses reported in the previous section with the pop exam performance variables added also yielded impressive results, as all of the fit statistics for all models provided evidence of a good fit to the data.

Discussion

The results of Study 2 conceptually replicated and extended those of Study 1. State TA was documented as a mediator of the relationship between performance-avoidance goals and MC, SE, and overall exam performance. Worry, not emotionality, was established as the operative mediator of these relationships, and the relationships observed between performance-approach goals and the outcome variables were shown to be independent of TA processes.

The results also provided clear support for the proposition that trait TA and FOF are conceptually analogous constructs that serve the same function in the hierarchical model. Trait TA, self-report FOF, and projective FOF loaded together on a single factor in the main factor analysis, and the factoral separability that was observed in secondary analyses proved to be methodological (self-report vs. projective assessments) rather than conceptual (trait TA vs. FOF) in nature. The bivariate correlations between the measures painted a similar picture, as trait TA and self-report FOF were highly intercorrelated, and this relationship was significantly greater than that between either self-report measure and projective FOF. Each of the dispositional measures produced the same pattern of results when tested as antecedents of achievement goals and as distal predictors of the outcome variables. Trait TA, like self-report and projective FOF, was a significant predictor of performance-avoidance and performance-approach goals, and these goals were shown to be the proximal predictors of the exam performance variables. Analyses testing trait TA/FOF and state TA together in the same model provided further validation of the proposed integration.

Finally, mastery goals were documented as positive predictors of long-term retention. Performance-approach goals did not predict retention, whereas performance-avoidance goals evidenced a negative relationship. All of the above results were obtained controlling for SAT scores.

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[9] The relationship between performance-avoidance goals and pop exam performance was diminished slightly when trait TA and worry were controlled ($\beta = -.12, p = .136$).
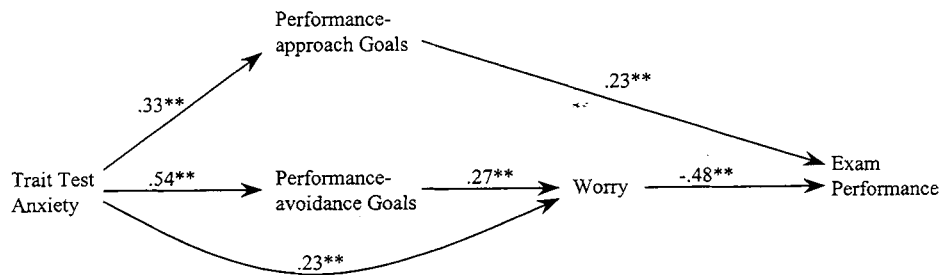
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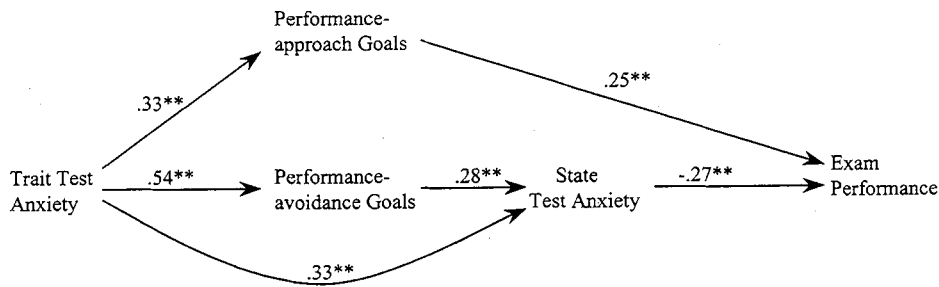
b

Figure 4. The overall mediational models for Study 2 for (a) trait test anxiety and state test anxiety and (b) trait test anxiety and worry. Path values are standardized regression coefficients, and only the theoretically central variables are included in the diagram for presentation clarity. ** $p < .01$.

General Discussion

The present research was designed to further the development of an integrative conceptualization of achievement-relevant affect, cognition, and behavior by incorporating the TA construct into the hierarchical model of approach and avoidance achievement motivation. Hypotheses were generated for both state and trait TA, and the results from two college classroom studies provided strong support for both sets of predictions. Study 1 demonstrated that state TA may be construed as a mediator of the relationship between performance-avoidance goals and MC exam performance. Worry, rather than emotionality, was documented as the component of state TA serving the role of operative mediational mechanism. The relationship between performance-approach goals and MC exam performance was shown to be independent of TA processes. All of these results were replicated and extended to SE exam performance in Study 2.

In addition, Study 2 obtained evidence for the conceptual and functional convergence of the trait TA and FOF constructs. Factor analyses and bivariate correlations attested to the conceptual comparability of trait TA and FOF; the primary source of discrimination observed among the trait TA, self-report FOF, and projective FOF measures was due to methodological differences (self-report vs. projective assessments) rather than conceptual differences (trait TA vs. FOF). The functional comparability of trait TA and FOF was demonstrated by the fact that trait TA produced the same results as self-report and projective FOF in analyses investigating these measures as antecedents of performance-avoidance and performance-approach goals and as distal predictors of exam performance. Further validation of the proposed integration was obtained in analyses testing trait TA/FOF and state TA together in the same model.

Finally, Study 2 extended the nomological network of the hierarchical model to include long-term retention. Mastery goals pos-

itively and performance-avoidance goals negatively predicted the retention of material; performance-approach goals were found to be unrelated to retention. In both studies, all results were obtained controlling for an objective indicator of competence, SAT scores.

The state TA construct nicely complements the motive and goal constructs that heretofore had formed the core of the hierarchical model. Achievement motives, achievement goals, and state TA represent conceptually distinct constructs, each of which is presumed to serve a distinct explanatory function. Achievement motives are construed as affectively based dispositions that serve the role of instigator or energizer of achievement behavior (Elliot & Church, 1997); achievement goals are viewed as cognitively based, situation-specific orientations that focus the individual on a specific end state and proximally predict achievement-relevant outcomes (Elliot & Harackiewicz, 1996); and state TA is seen as an affective–cognitive experience during activity engagement that mediates the link between performance-avoidance goals and achievement-relevant outcomes. Thus, inclusion of the state TA construct clearly enhances the conceptual breadth and explanatory precision of the hierarchical model.

Investigating worry and emotionality, as well as (omnibus) state TA, as mediator variables in the present research afforded a more fine-grained analysis of the process through which performance-avoidance goals debilitate performance. In accord with the prevailing view in the state TA literature, it was the worry aspect of state TA that had an inimical influence on performance; emotionality was linked to performance-avoidance goals as well but did not undermine performance attainment. The present research focused on the worry/emotionality distinction because it has attained widespread scholarly acceptance and enjoys substantial empirical validation (Covington, 1992; Deffenbacher, 1980), but other ways of differentiating TA have also been discussed in the literature. Sarason (1984), for example, proposed that TA be separated into four components—worry, test-irrelevant thoughts, tension, and bodily symptoms—and the research that has been conducted from this perspective has, for the most part, yielded promising results (Benson & El-Zahhar, 1994; Sarason & Sarason, 1987; Zimmer, Hocevar, Bachelor, & Meinke, 1992; see also Elliot & Harackiewicz, 1996; Spielberger & Vagg, 1995). It is possible that additional insights into the precise role of state TA within the hierarchical model could be gleaned by conducting subsequent research using Sarason's components or those suggested by others in the field (see Depreeuw, 1992; Rost & Schermer, 1992; Schwarzer & Quast, 1985). It may also be interesting to move beyond state TA in future research to investigate other potential mediators of the deleterious impact of performance-avoidance regulation such as agitation-related affect more generally (Higgins, 1996), difficulty in sustaining effort (Sheldon & Elliot, 1998), the refusal to seek assistance (Middleton & Midgley, 1997), or self-handicapping tendencies (Rhodewaldt, 1990).

In contrast to performance-avoidance goals, the two approach forms of achievement regulation were shown to facilitate performance outcomes—performance-approach goals positively predicted exam performance, and mastery goals promoted the retention of exam-relevant material. Thus, the optimal regulatory framework for individuals in the present research may have been the simultaneous adoption of a performance-approach goal to facilitate performance in the short run and a mastery goal to facilitate performance in the long run (and, of course, the absence of a performance-avoidance goal, which was shown to debilitate both types of performance). At present, it remains to be seen whether performance-approach and mastery goals are compatible enough forms of approach regulation that they can function effectively (i.e., produce their desirable effects) in the accompaniment of each other. It also remains to be seen what variables mediate the aforementioned relationships, as the present research simply ruled out TA processes.

One important attribute of any theoretical framework is parsimony, and Study 2 of the present research addressed this issue by examining the comparability of the trait TA and FOF constructs. The obtained results provide clear support for the conceptual and functional convergence of trait TA and FOF, but the results also raise an interesting issue regarding these dispositions. Although trait TA and self-report FOF converged nicely, there was evidence of divergence between the two self-report measures and projective FOF. McClelland and his colleagues (McClelland, Koestner, & Weinberger, 1989) drew a sharp distinction between self-report and projective measures of motivational dispositions, arguing that the two types of measures assess qualitatively different systems. Self-report measures are posited to assess *self-attributed* motives, which are construed as conscious values that are part of the self-concept, whereas projective measures are posited to assess *implicit* motives, which are construed as relatively nonconscious needs built on early learning experiences. The present results suggest that it may indeed be important to distinguish self-attributed from implicit FOF conceptually and to investigate the ramifications of this distinction in subsequent research. Another interesting issue in need of future research concerns the multidimensionality of the trait TA and FOF constructs. Trait TA has been portrayed as multidimensional for many years (see Anderson & Sauser, 1995), but little theoretical or empirical work has been done on the structural properties of FOF. The research that does exist suggests that trait TA and FOF possess similar dimensions (Jerusalem, Liepmann, & Hermann, 1985; Schmalt, 1982), but clearly more work is needed in this area.

Although we are advocating parsimony at the conceptual level (i.e., the merging of trait TA into the FOF construct), this does not necessarily lead to an advocation of parsimony at the operational level (i.e., the elimination of trait TA measures). On the contrary, we believe that trait TA as well as FOF measures represent valuable research tools. Trait TA measures seem to be the optimal indicator of FOF in achievement settings involving exam performance in that they possess better correspondence (Ajzen & Fishbein, 1977) with the focal outcome measure. Trait TA measures also seem preferable in applied educational settings involving the diagnosis and treatment of general TA or specific manifestations thereof (e.g., math anxiety). TA researchers have done an excellent job in the area of test construction and validation, and consequently there are numerous well-validated measures available for use in research and diagnosis (for a review, see Anderson & Sauser, 1995). Unfortunately, the same cannot be stated regarding the development of FOF measures. Although there are several well-validated projective assessments of FOF available (Birney et al., 1969; Heckhausen, 1991; Schmalt, 1998), there is a dearth of corresponding self-report measures. Clearly, this is an area in need of research attention.

Construing trait TA as a dispositional antecedent of achievement goal adoption within the hierarchal model not only facilitates conceptual parsimony but it also affords a renewed consideration of Alpert and Haber's (1960) contention that TA may, in some instances, facilitate rather than debilitate performance. This intriguing idea has generated little research over the years, primarily because it has proved difficult to assess anxiety type (debilitating/facilitating) independently of performance (Rost & Schermer, 1989; Spielberger et al., 1978). This confounding of predictor and outcome variables may be illustrated with the following debilitating anxiety item from Alpert and Haber's Achievement Anxiety Test: "Nervousness while taking an exam or test hinders me from doing well." From the perspective of the hierarchical model, trait TA is debilitating or facilitating based on the type of achievement goal it elicits; it can lead to performance-avoidance goal adoption, which undermines performance, or it can lead to performance-approach goal adoption, which produces positive performance outcomes. Thus, debilitation and facilitation are not viewed as properties of anxiety itself; rather trait TA is presumed to be debilitating or facilitating depending on the type of performance goal it evokes. Given that trait TA, achievement goals, and performance may be assessed independently, the hierarchical model is immune from the primary impediment to progress in this area—the confounding of predictor and outcome variables.

Several years ago, Wine (1980) noted that TA is an unnecessarily restrictive label, given that the principles discussed in the literature are applicable to evaluation apprehension in any competence-relevant situation. For example, many adults experience anxiety regarding competence evaluation in the workplace; the term *test anxiety* is usually not appropriate in this domain, but the construct under consideration is clearly the same as that addressed by TA researchers and theorists. The hierarchical model has been formulated to account for achievement motivation in all contexts, not just examination settings, and we believe, in accord with Wine's observation, that our statements regarding TA in the present research are equally applicable to evaluation anxiety in achievement settings more generally. Thus, our two main premises may be restated in broader terms: Evaluation anxiety at the state level may be viewed as an affective–cognitive process variable that mediates the relationship between performance-avoidance goals and achievement-relevant outcomes, and evaluation anxiety at the trait level and FOF may be viewed as conceptually analogous dispositional variables that serve the same function in the hierarchical model (that of antecedent of achievement goal adoption and distal predictor of achievement-relevant outcomes).

In delineating our hypotheses and reporting the obtained results, we have proceeded under the assumption that the relationships under consideration are causal in nature. It is important to acknowledge that definitive causal inferences require experimental manipulation, and in the present research achievement goals were measured rather than manipulated. Thus, the results from the present studies represent correlational data, and unequivocal causal statements are not warranted.

In closing, *Webster's New World Dictionary* (1988) provides the following definition of the verb *integrate*: "to make whole or complete by adding or bringing together parts." In the present research, we integrated the TA tradition with the hierarchical model of approach and avoidance achievement motivation and did so by addressing each of the major theoretical distinctions that have emerged in the TA literature (see Covington, 1985): state/trait TA, worry/emotionality, and debilitating/facilitating TA. Prior to this work, the hierarchical model represented a synthesis of the achievement motive and achievement goal traditions; with the addition of the TA tradition, it now represents an amalgam of three highly influential and generative approaches to achievement motivation. Additional integrative work remains, most notably a consideration of the attributional approach proffered by Weiner and his colleagues (Weiner et al., 1971; Weiner & Kukla, 1970), and, undoubtedly, the incorporation of ideas from other approaches (e.g., the self-worth theory of Covington & Beery, 1976, that has been influential in the educational psychology literature). However, we believe that the present research has taken an important step toward the development of a comprehensive, synthetic approach to achievement motivation. Achievement motives, achievement goals, and TA processes all represent integral parts of the achievement motivation puzzle, and when "added or brought together," we believe they indeed begin to form a more "whole or complete" picture of motivated achievement behavior than any single part in isolation.

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