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On the Measurement of Achievement Goals: Critique, Illustration, and Application

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The authors identified several specific problems with the measurement of achievement goals in the current literature and illustrated these problems, focusing primarily on A. J. Elliot and H. A. McGregor's (2001) Achievement Goal Questionnaire (AGQ). They attended to these problems by creating the AGQ-Revised and conducting a study that examined the measure's structural validity and predictive utility with 229 (76 male, 150 female, 3 unspecified) undergraduates. The hypothesized factor and dimensional structures of the measure were confirmed and shown to be superior to a host of alternatives. The predictions were nearly uniformly supported with regard to both the antecedents (need for achievement and fear of failure) and consequences (intrinsic motivation and exam performance) of the 4 achievement goals. In discussing their work, the authors highlight the importance and value of additional precision in the area of achievement goal measurement.

Keywords: goal, performance, mastery, approach, avoidance

For the past two decades, achievement goals have been a central construct in the study of motivation in achievement settings. Some achievement goal research has been experimental in nature, manipulating goals and examining their effect on outcomes relevant to achievement. However, the vast majority of achievement goal research has been correlational, measuring preexisting goals and examining the antecedents and consequences of these goals in concurrent, prospective, and occasionally longitudinal designs. Both the experimental and the correlational research have yielded a substantial amount of information about the strivings of individuals (most commonly students, athletes, and employees) in achievement contexts and the implications of these strivings (see Duda, 2005; Elliot, 2005; Meece, Anderman, & Anderman, 2006; Payne, Youngcourt, & Beaubien, 2007; Ryan, Ryan, Arbuthnot, & Samuels, 2007). Beyond doubt, the achievement goal construct represents a landmark contribution to the century-long study of competence and motivation.

Although clearly informative and generative, the achievement goal approach also faces its share of challenges and difficulties. Perhaps foremost among these challenges and difficulties is a long-term struggle to assess achievement goals in a conceptually rigorous manner. Some achievement goal measures rest on a weak foundation in that the achievement goal concept is not clearly articulated a priori, thereby providing little guidance for how goals should be operationalized. Even when a clear conceptualization of achievement goals is in place, however, there is often poor correspondence between how the goals are conceptualized and how they are operationalized. This poor correspondence is of great consequence, because it makes it difficult to interpret empirical results straightforwardly and confidently, whether they are supportive or unsupportive of theoretical predictions. Interpretational ambiguity, in turn, retards theoretical progress in the achievement goal literature and undermines attempts to transfer information gleaned from research to real-world achievement settings.

In the present article, we identify several specific problems with the measurement of achievement goals in the current literature. We focus primarily on one achievement goal measure—Elliot and McGregor's (2001) Achievement Goal Questionnaire (AGQ)—to explicate and illustrate these problems. We begin by describing the conceptual foundation from which the AGQ emerged. We then show different ways in which particular AGQ items do not optimally correspond to this conceptual foundation and describe how such problems may be rectified. We also point to other examples in the achievement goal literature to demonstrate that these problems are not unique to the AGQ. The result of critiquing and adjusting the AGQ is a new achievement goal measure, the AGQ-Revised (AGQ-R), which we proceed to empirically test. Specifically, we examine the structural validity of the measure using both established and novel procedures and report data on the predictive utility of the goal subscales from this measure. Our aim is to demonstrate that the problems with existing achievement goal measures can be rectified while retaining (and perhaps, in some instances, even enhancing) the reliability and validity of the original measures.

Conceptual Foundation

Elliot and McGregor's (2001) AGQ was designed to assess achievement goals as conceptualized in the 2 $\times$ 2 achievement

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goal framework (Elliot, 1999; Elliot & McGregor, 2001) within the hierarchical model of approach–avoidance achievement motivation (Elliot, 1997, 2006). From this perspective, achievement goals are conceptualized as cognitive–dynamic aims that focus on competence, and any given achievement goal is thought to contain components from two independent competence dimensions. The *definition* dimension forms the basis of a mastery–performance distinction, which has been a part of the achievement goal tradition since its inception (Maehr & Nicholls, 1980). Competence may be defined in terms of the standard used to evaluate it, that is, relative to an absolute or intrapersonal standard (mastery) or relative to a normative standard (performance). Mastery-based standards tend to focus individuals on learning, whereas performance-based standards tend to focus individuals on performing (Dweck, 1986). The *valence* dimension of competence forms the basis of an approach–avoidance distinction, a later addition to the achievement goal tradition (Elliot & Harackiewicz, 1996). Competence may be valenced in terms of whether it is focused on a positive possibility to approach (i.e., success) or a negative possibility to avoid (i.e., failure). Combining the mastery–performance and approach–avoidance distinctions leads to four different types of achievement goals: mastery-approach (focused on attaining task-based or intrapersonal competence), performance-approach (focused on attaining normative competence), mastery-avoidance (focused on avoiding task-based or intrapersonal incompetence), and performance-avoidance (focused on avoiding normative incompetence).

When viewed from a hierarchical standpoint (see Elliot, 2006), the achievement goals of the 2 × 2 framework are posited to emerge from more general motivations (e.g., the need for achievement and fear of failure), self-conceptions and theories (e.g., entity and incremental theories of ability), and environmental emphases (e.g., classroom goal structures). These goals are viewed as the proximal predictors of important achievement-relevant outcomes such as intrinsic motivation and performance attainment (Elliot & Church, 1997).

Problems in Achievement Goal Measures

A host of achievement goal measures have appeared in the educational psychology, industrial–organizational psychology, social-personality psychology, and sport and exercise psychology disciplines over the past two decades, some of which have focused on the mastery–performance distinction alone, and others of which, like the AGQ, have focused on both the mastery–performance and approach–avoidance distinctions. In the following, we identify a number of problems that have appeared in these measures. We do so using the AGQ in illustrative fashion, as the focal point of both critique and solution.[1]

Failing to Assess Goals

In the 2 × 2 framework, *goal* is conceptualized as an aim that one is committed to that serves as a guide for future behavior (Elliot, 1999; Elliot & Fryer, 2008). However, the prefixes of some AGQ items seem to suggest a value (e.g., "It is important for me to do better than other students") or a concern (e.g., "I worry that I may not learn all that I possibly could in this class"), rather than a goal per se. Our solution to this problem is to select the same set of three prefixes for each goal scale in the AGQ-R, each of which is exclusively goal-based ("My goal is to . . .," "My aim is to . . .," and "I am striving to . . .").

Most achievement goals theorists would likely agree that achievement goals are best construed in terms of purposeful commitments that guide future behavior (Dweck & Elliott, 1983; Maehr, 1989). Nevertheless, taken at face value, many goal items do not seem to be temporally focused and do not appear to assess intentional commitments. Some items ask respondents to report on how they define success (e.g., "I feel most successful when . . ."; Button, Mathieu, & Zajac, 1996; Duda, Chi, Newton, Walling, & Catley, 1995; Duda & Nicholls, 1992; Midgley et al., 2000 [original]; Nicholls, Cobb, Wood, Yackel, & Patashnick, 1990; Nicholls, Patashnick, & Nolen, 1985; Roberts & Treasure, 1995; Roedel, Schraw, & Plake, 1994; Skaalvik, 1997). Others ask respondents to report on their values or concerns (e.g., "I value . . ."; Bouffard, Boisvert, Vezeau, & Larouche, 1995; Button et al., 1996; Conroy, Elliot, & Hofer, 2003; Elliot & Church, 1997; Harackiewicz, Barron, Elliot, Carter, & Lehto, 1997; Meece, Blumenfeld, & Hoyle, 1988; Middleton & Midgley, 1997; Midgley et al., 2000 [original and revised]; Roedel et al., 1994; Skaalvik, 1997; Stipek & Gralinski, 1996; VandeWalle, 1997; Zweig & Webster, 2004). Finally, others ask respondents to indicate what they like or prefer, or are pleased or satisfied by (e.g., "I feel really pleased when . . ."; Bouffard et al., 1995; Button et al., 1996; Elliot & Church, 1997; Harackiewicz et al., 1997; Middleton & Midgley, 1997; Midgley et al., 2000 [original]; Roedel et al., 1994; Skaalvik, 1997; Stipek & Gralinski, 1996; VandeWalle, 1997; Zweig & Webster, 2004). Although such items may capture goal adoption or lead to goal pursuit, more direct and precise wording is clearly both possible and desirable.

Collapsing Together the Goal and the Motivation Underlying the Goal

In the 2 × 2 framework, a goal is construed as a cognitively represented aim, and this aim is viewed as separate from the reason or reasons why the person is pursuing the aim (Elliot & Thrash, 2001). As such, mastery-based and performance-based goals are differentiated with regard to the specific type of competence (incompetence) that one seeks to approach or avoid, and any additional reasons for such striving are excluded from the goal construct per se. From this standpoint, it is best to assess the reason behind the goal separately from the goal itself, thereby allowing the possibility of numerous achievement goal "complexes" (i.e., goal–reason combinations; see Elliot & Thrash, 2001, and Thrash & Elliot, 2001, for a discussion of the benefits of keeping goals conceptually separate from reasons). In the AGQ, however, one of the performance-avoidance goal items collapses the goal together

[1] Our review of other achievement goal measures is meant to be broad in scope but not comprehensive. The measures that we focus on herein are published in highly visible journals, have been widely used in the achievement goal literature, or contain items that are particularly fine examples of the points we seek to highlight. Some of these measures are currently used in achievement goal research, whereas others are no longer used (although data from these measures continue to be used to support conceptual points in the literature). It should be noted that not all measures that are cited together in the text within any given point necessarily share the same theoretical perspective.

with an underlying motive, fear of failure: "My fear of performing poorly in this class is often what motivates me"; indeed, it focuses more on the motive than the goal. Our solution to this problem is to omit the motive content in the AGQ-R version of this item, thus allowing fear of failure to be assessed separately and the link between fear of failure and performance-avoidance goals to be examined without item overlap.

Our view of goal as "aim separate from reason" is consistent with most conceptualizations of the goal construct in scientific psychology (Elliot & Fryer, 2008), but is different from the way that many, if not most, achievement goal theorists construe goals. Achievement goal theorists tend to prefer a combined aim–reason goal construct (Ames, 1992; Pintrich & Schunk, 1996); thus, items that combine aim and reason clearly would not be considered a problem for such theorists. Indeed, performance-based goal measures commonly include item content involving demonstrating or showing something to others, as well as a focus on normative competence (Button et al., 1996; Elliot & Church, 1997; Greene & Miller, 1996; Harackiewicz et al., 1997; Meece et al., 1988; Midgley et al., 2000 [revised]; Nicholls et al., 1985; Roberts & Treasure, 1995; Roedel et al., 1994; Skaalvik, 1997; Stipek & Gralinski, 1996). Some performance-based goal scales even focus on demonstration to the exclusion of normative competence (Middleton & Midgley, 1997; Midgley et al., 2000 [original]; VandeWalle, 1997; Zweig & Webster, 2004). Furthermore, in some measures, the performance-approach goal scale contains no or little mention of demonstration, whereas the performance-avoidance goal scale focuses exclusively or nearly exclusively on demonstration (Middleton & Midgley, 1997; Midgley et al., 2000 [original]; Skaalvik, 1997). In another measure, the performance-approach goal scale focuses exclusively on demonstration, whereas the performance-avoidance goal scale makes no mention of demonstration (Zweig & Webster, 2004). If reasons are accepted as part of a goal construct, it seems optimal for corresponding goal measures to balance the degree to which a focal reason, such as demonstration, is present in the two types of performance-based goals.

Item Content Applicable to Both Mastery-Based and Performance-Based Goals

In the 2 × 2 framework, mastery-based and performance-based goals are differentiated in terms of their competence foci. In the AGQ, one performance-approach goal item contains content regarding grades: "My goal is to get a better grade than most of the other students." Grades can be applicable to either mastery-based or performance-based goals, depending on the nature of performance evaluation in the achievement setting (e.g., a task-based or normative grading structure). Our solution to this problem is to simply omit the reference to grades in this item in the AGQ-R.

Most achievement goal theorists would agree that mastery-based and performance-based goals focus on different types of competence (Dweck, 1986; Nicholls, 1989), but measures commonly contain content that seems applicable to both types of competence. For example, as with the aforementioned AGQ item, grades are commonly mentioned in performance-approach goal items (Bouffard et al., 1995; Dweck, 1999; Elliot & Church, 1997; Harackiewicz et al., 1997; Roedel et al., 1994). Mastery-approach goal items sometimes include content assessing the degree to which the individual keeps busy (Nicholls et al., 1985, 1990), works hard (Duda et al., 1995; Duda & Nicholls, 1992; Nicholls et al., 1985, 1990; Roberts & Treasure, 1995), perseveres (Roedel et al., 1994), or reaches a goal (Roberts & Treasure, 1995); each of these characteristics is relevant to performance-based, as well as mastery-based, goals.

Pitting One Goal Against Another

In the 2 × 2 framework, achievement goals are not presumed to be negatively correlated but instead are expected to be positively correlated (when they share a dimension) or uncorrelated (when they do not share a dimension). Accordingly, achievement goals of various types may be pursued at the same time, and it is best to assess each goal separately from the others. In the AGQ, however, one of the performance-avoidance goal items uses the word *just* ("I just want to avoid doing poorly in this class") to subtly imply the exclusion of other goals. Our solution to this problem is to simply omit this subtle reference to exclusivity in the AGQ-R items.

Some achievement goal theorists explicitly embrace the possibility of multiple goal pursuit (Barron & Harackiewicz, 2001; Pintrich, 2000), and even theorists who emphasize the possibility of performance-approach goals driving out mastery-approach goals do not portray these goals, or any others, as strongly negatively correlated in most achievement settings (see Midgley, Kaplan, & Middleton, 2001, p. 83). Nevertheless, several achievement goal measures include items that play off one goal against another. For example, in the item "Although I hate to admit it, I sometimes would rather do well in a class than learn a lot" (Dweck, 1999, p. 185) the respondent is asked to choose between a mastery-approach goal and an implicit performance-approach goal. In other measures, certain items put goals in competition with each other in a more subtle fashion (e.g., "I like it best when something I learn makes me want to find out more," Harackiewicz et al., 1997, p. 319; see also Elliot & Church, 1997; Middleton & Midgley, 1997; VandeWalle, 1997). There is certainly room for measures that focus on contrasting or rank ordering achievement goals, but it is important that these measures be explicitly identified as such and that they be used with full awareness of their limitations regarding multiple goal adoption (see Van Yperen, 2006, for an example of such a measure).

Performance-Approach and Performance-Avoidance Goals That Differentially Emphasize Normative Comparison

In the 2 × 2 framework, normative comparison is an integral feature of performance-based goals. In the AGQ, the performance-approach goal items are explicitly normative in content, whereas the performance-avoidance goal items do not make specific mention of normative comparison (e.g., "My goal in this class is to avoid performing poorly"). Although it is likely that normative comparison would be implicitly read into most of these performance-avoidance goal items in most achievement contexts, it is clearly best to make the explicitness of normative comparison comparable across the two performance-based goals. As such, explicit normative content is added to each of the performance-avoidance goal items in the AGQ-R.

Most achievement goal theorists would concur that normative comparison and performance-based goals are closely connected (Maehr, 1983; Nicholls, 1984). Nevertheless, in some achievement goal measures, explicit normative content is either missing from performance-approach or performance-avoidance goals altogether (Elliot & Church, 1997; Middleton & Midgley, 1997; Midgley et al., 2000 [original]; VandeWalle, 1997) or there is an unequal proportion of normatively focused items in the two types of performance-based goals (Midgley et al., 2000 [revised]; Skaalvik, 1997; Zweig & Webster, 2004).

Performance-Approach and Performance-Avoidance Goals That Focus on Extreme Groups

In the 2 × 2 framework, performance-approach and performance-avoidance goals are presumed to be applicable across levels of perceived competence. Perceived competence is viewed as an important antecedent of these goals, but these relations are of moderate strength. As such, although high perceived competence tends to promote performance-approach goals, those with low and moderate perceived competence may also strive to do well relative to others; likewise, although low perceived competence tends to evoke performance-avoidance goals, those with high and moderate perceived competence may also strive to avoid doing poorly relative to others. It is possible for performance-based goal items to make high or low normative performance salient in a general way, without highlighting extremes (e.g., “do better than others” or “not do worse than others”); the more general the normative referent, the more likely the items will be to assess differences in valence per se, rather than differences in valence coupled with differences in perceived competence. In the AGQ, however, the word *most* in the performance-approach goal item, “My goal in this class is to get a better grade than most of the other students,” unnecessarily highlights a specific portion of the normative distribution. Our solution to this problem is to simply omit this qualifier in the AGQ-R item.

We are not aware of any achievement goal theorist who would espouse restricting the focus of performance-based goals to extreme groups. Nevertheless, in some achievement goal measures, performance-based goal items focus respondents on extremes in the normative distribution—specifically, being one of the best performers for performance-approach goals or not being one of the worst performers for performance-avoidance goals (Conroy et al., 2003; Elliot & Church, 1997; Middleton & Midgley, 1997; Midgley et al., 2000 [original]; Skaalvik, 1997).

Mastery-Approach/Mastery-Avoidance and Performance-Approach/Performance-Avoidance Goals That Contain Differential Amounts of Affective Content

In the 2 × 2 framework, affect is implied whenever any sort of goal commitment is present because this commitment represents an affective investment of the self with regard to a future possibility (Custers & Aarts, 2005; Elliot & Fryer, 2008). However, affect per se is not the central focus of the goal construct, and therefore it would be ideal if achievement goal items either were devoid of specific affective reference or, at minimum, distributed such references equally across the different types of goals. In the AGQ, the prefix of some of the mastery-avoidance goal items contains specific affective content (e.g., “I’m afraid . . .”), whereas this is not the case for the mastery-approach goal items; likewise, one of the performance-avoidance goal items contains specific affective content (“My fear of performing poorly in this class is often what motivates me”), but none of the performance-approach goal items contain such content. Our solution to this problem is to omit explicit reference to affective content from the goal items altogether in the AGQ-R.

Some achievement goal theorists may be open to incorporating specific affective content in achievement goal items, but none would suggest that the amount of such content should vary across goals. Nevertheless, such variation is present in some measures for mastery-approach and mastery-avoidance goals (Conroy et al., 2003), as well as for performance-approach and performance-avoidance goals (Elliot & Church, 1997; Middleton & Midgley, 1997; Midgley et al., 2000 [original]; Skaalvik, 1997; Zweig & Webster, 2004).

Table 1 provides the items for the AGQ-R and pairs each revised item with the original AGQ item that it is meant to replace. This revised measure is designed to assess, in face valid fashion, the four goals of the 2 × 2 achievement goal model while taking care to attend to each of the potential pitfalls that we have identified. We do not hold up the revised measure as the end of the measurement development process. Rather, we see it as an important step toward enhanced rigor and precision in an ongoing process. Furthermore, our critique of the AGQ and existing achievement goal measures is not meant to invalidate these measures or the empirical work that has been produced with them. Despite the aforementioned issues, we think that these measures have for the most part done a reasonably good job of assessing achievement goals and that the achievement goal literature has progressed accordingly. However, we do think that there is room for improvement in the area of measurement and that improvement on this front will both strengthen the empirical base of the achievement goal literature and enhance the prospects for successful application of achievement goal findings to actual achievement settings.

Examining the Structure and Predictive Utility of the AGQ-R

The empirical component of the present research involved testing whether an achievement goal measure that takes into account the aforementioned measurement problems can exhibit good structural validity and have good predictive utility. Accordingly, we examined the factor structure of the AGQ-R using standard confirmatory factor analytic techniques and compared the proposed four-factor model to a series of alternative three- and two-factor models (see Conroy et al., 2003; Elliot & McGregor, 2001). We also examined whether the hypothesized four-factor model was influenced by response bias, which could produce results that appear supportive but in actuality represent artifacts (see Podsakoff, MacKenzie, Lee, & Podsakoff, 2003), and whether inclusion of the same prefixes across goal scales distorted the factor structure of the goals. Most important, we moved beyond the analysis of factor structure to an analysis of dimensional structure, testing for the first time the hypothesis that the four goals represent combinations of two underlying dimensions. This hypothesized model was also compared to alternative dimensional models. Our

Table 1
Items for the Achievement Goal Questionnaire–Revised (AGQ-R) Paired With the Original Achievement Goal Questionnaire (AGQ) Items

Item	Item content
	Mastery-approach goal items
1	My aim is to completely master the material presented in this class. (original Item 9: I desire to completely master the material presented in this class.)
7	I am striving to understand the content of this course as thoroughly as possible. (original Item 8: It is important for me to understand the content of this course as thoroughly as possible.)
3	My goal is to learn as much as possible. (original Item 7: I want to learn as much as possible from this class.)
	Mastery-avoidance goal items
5	My aim is to avoid learning less than I possibly could. (original Item 4: I worry that I may not learn all that I possibly could in this class.)
11	I am striving to avoid an incomplete understanding of the course material. (original Item 5: Sometimes I'm afraid that I may not understand the content of this class as thoroughly as I'd like).
9	My goal is to avoid learning less than it is possible to learn. (original Item 6: I am often concerned that I may not learn all that there is to learn in this class.)
	Performance-approach goal items
4	My aim is to perform well relative to other students. (original Item 3: My goal in this class is to get a better grade than most of the other students.)
2	I am striving to do well compared to other students. (original Item 2: It is important for me to do well compared to others in this class.)
8	My goal is to perform better than the other students. (original Item 1: It is important for me to do better than other students.)
	Performance-avoidance goal items
12	My aim is to avoid doing worse than other students. (original Item 10: I just want to avoid doing poorly in this class.)
10	I am striving to avoid performing worse than others. (original Item 12: My fear of performing poorly in this class is often what motivates me.)
6	My goal is to avoid performing poorly compared to others. (original Item 11: My goal in this class is to avoid performing poorly.)

Note. Original AGQ items are from "A 2 × 2 achievement goal framework," by A. J. Elliot and H. A. McGregor, 2001, *Journal of Personality and Social Psychology, 80,* 501–519. Copyright 2001 by the American Psychological Association.

predictions regarding the structure of the AGQ-R were that the 12 items would represent four separable achievement goals emerging from two independent underlying dimensions and that the hypothesized factorial and dimensional structures would prove superior to all alternatives.

An additional aim of our research was to test the new achievement goal measure within the context of the hierarchical model of approach–avoidance achievement motivation. That is, we examined achievement motives as antecedents of achievement goals and the achievement goals as proximal predictors of achievement-relevant outcomes. With regard to the antecedents of achievement goals, achievement motives—the need for achievement and fear of failure—are general, affectively based orientations toward competence presumed to be rooted in early childhood experience (Birney, Burdick, & Teevan, 1969; McClelland, Atkinson, Clark, & Lowell, 1953). We hypothesized that need for achievement would positively predict mastery-approach and performance-approach goals (Tanaka & Yamauchi, 2001; VandeWalle, 1997; Zusho, Pintrich, & Cortina, 2005). Once negative affect is removed from the mastery-avoidance goal items, need for achievement may positively predict these goals as well, although we offer this hypothesis tentatively. Avoiding errors and mistakes is sometimes a necessary component of successfully accomplishing a task; therefore, individuals high in need for achievement may be more likely to make strategic use of these mastery-avoidance goals than those low in need for achievement. We hypothesized that fear of failure would positively predict performance-approach goals, mastery-avoidance goals, and performance-avoidance goals (Conroy et al., 2003; Elliot & McGregor, 2001; Tanaka, Murakami, Okuno, & Yamauchi, 2002). With regard to the consequences of achievement goal pursuit, we hypothesized that mastery-approach goals would be positive predictors of intrinsic motivation (Harackiewicz, Barron, Tauer, Carter, & Elliot, 2000; Lee, Sheldon, & Turban, 2003; Rawsthorne & Elliot, 1999), whereas mastery-avoidance goals would be negative predictors of intrinsic motivation (Cury, Elliot, Da Fonseca, & Moller, 2006). We hypothesized that performance-approach goals would be positive predictors of performance (Harackiewicz et al., 1997; Urdan, 2004; Wolters, 2004), whereas performance-avoidance goals would be negative predictors of both intrinsic motivation and performance (Elliot & Church, 1997; Finney, Pieper, & Barron, 2004; Pajares & Valiante, 2001).

Method

Participants and Achievement Context

A total of 229 (76 male, 150 female, and 3 unspecified) undergraduates enrolled in an introductory-level psychology course at a northeastern university participated in the study in return for extra course credit. Most participants were sophomores or juniors at the university, with a mean age of 19.41 years for the sample. Participants' ethnicity was as follows: 3.93% African American, 16.16% Asian, 68.56% Caucasian, 4.80% Hispanic, 0% Native American, 4.37% other, and 2.18% unspecified. The class was conducted in lecture format, and evaluation was based on a normative grading structure.

Procedure

The achievement motive and response bias variables were assessed in take-home questionnaire packets during the first 2 weeks of the semester. Participants' achievement goals for their first exam were assessed in a large group session approximately 1 month after the achievement motive and response bias variables were assessed, and 1 week prior to the exam. Intrinsic motivation was assessed in a large group session near the end of the semester, approximately 3 months after the initial take-home assessments. For all assessments, participants were assured that their responses would remain confidential and would in no way influence their course grade. Exam grades were obtained from the professor at the end of the course; participants' SAT scores were obtained from the university registrar.

Measures

Need for achievement. The Achievement Motive subscale of Jackson's (1974) Personality Research Form was used as an indicator of the need for achievement (sample item: "I enjoy difficult work"). A number of empirical investigations have attested to the construct validity of this measure (see Fineman, 1977). Participants responded with *true* (1) or *false* (0) to the 16 items; after reverse scoring eight negatively worded items, the items were summed to form the need for achievement index. Cronbach's α, computed using the tetrachoric correlation matrix, is .88.

Fear of failure. The five-item short form of Conroy's (2001) Performance Failure Appraisal Inventory was used as an indicator of fear of failure (sample item: "When I am failing, I worry about what others think about me"). Several studies have demonstrated the construct validity of this measure (see Conroy & Elliot, 2004). Participants responded on a scale of 1 (*do not believe at all*) to 5 (*believe 100% of the time*), and responses were averaged to form the fear of failure index (Cronbach's $\alpha = .76$).

Achievement goals. A series of pilot studies was conducted prior to the present research in the interest of obtaining an optimal set of 2 × 2 achievement goal items. The 12 items listed in Table 1 were eventually selected because they were thought to accurately represent the four goals of the 2 × 2 model while attending carefully to the potential pitfalls reviewed in the introduction. In the present study, the focus of the measure was on students' achievement goals for their first exam in their introductory-level psychology course. Participants responded on a scale of 1 (*strongly disagree*) to 5 (*strongly agree*), and the items were averaged to form the mastery-approach, performance-approach, mastery-avoidance, and performance-avoidance indexes (see Results section for internal consistencies).

Intrinsic motivation. Elliot and Church's (1997) eight-item measure was used to assess participants' intrinsic motivation for the class (sample item: "I think this class is interesting"). The construct validity of this measure has been documented by Elliot and Church (1997). Participants responded on a scale of 1 (*strongly disagree*) to 7 (*strongly agree*); after reverse scoring two negatively worded items, the items were averaged to form the intrinsic motivation index (Cronbach's $\alpha = .92$).

Response bias. The 40 items from Paulhus's (1991) Balanced Inventory of Desirable Responding (BIDR) were used to create several different measures of response bias. The BIDR is comprised of two 20-item subscales: Impression Management (IM) and Self-Deceptive Enhancement (SDE). Participants responded to each item using a scale of 1 (*not true*) to 7 (*very true*). Half of the items for each subscale represent desirable statements (e.g., IM: "I always obey laws, even if I'm unlikely to get caught"; SDE: "I always know why I like things"), and half represent undesirable statements (e.g., IM: "When I was young I sometimes stole things"; SDE: "I have not always been honest with myself"). After reverse scoring the undesirable statements, participants received one point for each extreme (6 or 7) response, and their scores for each subscale were summed to form IM and SDE indexes (see Paulhus, 1991, for information on construct validity). An overall BIDR social desirability index was also created by summing the IM and SDE items. Cronbach's αs for the IM, SDE, and overall BIDR social desirability indexes, computed using the tetrachoric correlation matrices, are .87, .81, and .87, respectively.

Following Elliot and Thrash (2002), we used the BIDR items to also create self-enhancement bias and self-protection bias indexes. Prior to reverse scoring, we summed (across IM and SDE subscales) the number of participants' extreme (6 or 7) responses to the desirable statements and the number of their extreme (1 or 2) responses to the undesirable statements. The first 20-item measure, self-enhancement response bias, represents a tendency to agree with positive statements about oneself that are uncommon, whereas the second 20-item measure, self-protection response bias, represents a tendency to disagree with negative statements about oneself that are common. Cronbach's αs for these indexes, computed using the tetrachoric correlation matrices, are .78 and .80, respectively.

In addition to the BIDR, the 33-item Marlowe-Crowne Social Desirability Scale (MCSDS; Crowne & Marlowe, 1960) was also used to assess overall social desirability (e.g., "I'm always willing to admit it when I make a mistake"). Participants responded *true* (1) or *false* (0); after reverse scoring 15 negatively worded items, the items were summed to form the MCSDS index. Cronbach's α, computed using the tetrachoric correlation matrix, is .86.

Exam performance. Participants' exam grades were used as a measure of performance attainment. Grades were based on participants' total score on the exam, and each possible grade was assigned a numerical value from 0 to 10 ($F = 0$, $D = 1$, $D+ = 2$, $C- = 3$, $C = 4$, $C+ = 5$, $B- = 6$, $B = 7$, $B+ = 8$, $A- = 9$, $A = 10$). Using total score rather than exam grade as the indicator of performance yielded results essentially identical to those reported in this article.

SAT scores. A total SAT score combining the Verbal and Quantitative subscales was used as an index of ability. SAT scores have been shown to predict performance attainment and have been used accordingly as control variables in prior research (Church, Elliot, & Gable, 2001; Elliot & McGregor, 1999).

Results

Factorial Structure of Achievement Goals

Confirmatory factor analyses (CFAs) were conducted on the achievement goal items using AMOS 5.0 (SPSS; Chicago, IL). The analyses were conducted on covariance matrices, and the solutions were generated on the basis of maximum-likelihood estimation. As recommended by Hoyle and Panter (1995), we used several different indexes to evaluate the fit of the models to the data, including chi-square degree of freedom ratio (χ^2/df), comparative fit index (CFI), incremental fit index (IFI), and root-mean-square error of approximation (RMSEA). The following criteria were used to evaluate the adequacy of model fit: $\chi^2/df \leq 2.0$ (Hair, Anderson, Tatham, & Black, 1995), CFI $\geq$ .90, IFI $\geq$ .90, and RMSEA $\leq$ .08 (Browne & Cudeck, 1993). When multiple models were compared, the Akaike information criterion and Bayesian information criterion were used as well (the lower those values are, the better the fit is).

Basic CFAs and internal consistencies. The first CFA examined the hypothesized model, which designated that the items for each goal load on their respective latent factors. To identify the model, the variance of each latent factor was fixed to 1 (Bollen, 1989). The results from this analysis strongly supported the hypothesized model, as not only were all factor loadings quite high (ranging from .93 to .73), but each fit statistic met the criteria for a good fitting model: $\chi^2(48, N = 229) = 78.32$, $p < .01$, $\chi^2/df = 1.63$, CFI = .99, IFI = .99, RMSEA = .053. All of the subscales demonstrated high levels of internal consistency: For mastery-approach goals, mastery-avoidance goals, performance-approach goals, and performance-avoidance goals, Cronbach's α = .84, .88, .92, and .94, respectively.

Comparison with alternative models. Additional CFAs investigated the fit of alternative models and compared the fit of the hypothesized and alternative models (see Elliot & McGregor, 2001). Six alternative models were tested: (a) trichotomous model A, in which the performance-approach and performance-avoidance items load on their respective latent factors, and the mastery-approach and mastery-avoidance items load together on a third latent factor; (b) trichotomous model B, in which the mastery-approach and mastery-avoidance items load on their respective latent factors, and the performance-approach and performance-avoidance items load together on a third latent factor; (c) trichotomous model C, in which the mastery-approach and performance-approach items load on their respective latent factors, and the mastery-avoidance and performance-avoidance items load together on a third latent factor; (d) trichotomous model D, in which the mastery-avoidance and performance-avoidance items load on their respective latent factors and the mastery-approach and performance-approach items load together on a third factor; (e) a mastery–performance model in which the mastery-approach and mastery-avoidance items load together on one latent variable, and the performance-approach and performance-avoidance items load together on another; and (f) an approach–avoidance model in which the mastery-approach and performance-approach items load together on one latent variable, and the mastery-avoidance and performance-avoidance items load together on another.

As may be seen in Table 2, the fit indexes indicate that none of the alternative models provided a good fit to the data, and log-likelihood ratio tests show that the hypothesized model provided a far better fit than any of the alternative models. It is worth noting that although the Pearson product moment correlations between some pairs of goal subscales were rather high (i.e., mastery-approach and mastery-avoidance, r = .51; mastery-avoidance and performance-avoidance, r = .46; performance-approach and performance-avoidance, r = .68), our data clearly show that the goals within these pairings are not equivalent.

CFAs controlling for response bias. To examine response bias, we created five data sets from the original data set by

Table 2
Comparison With the 2 × 2 Model and Alternative Models

	Overall fit indices					
Variable	χ^2/df	CFI	IFI	RMSEA	AIC	BIC
Hypothesized model	1.63	.99	.99	.053	138.3	241.3
Trichotomous Model A	5.81	.89	.89	.145	350.2	442.9
Trichotomous Model B	7.45	.85	.85	.168	433.8	526.5
Trichotomous Model C	10.10	.78	.78	.200	568.9	661.6
Trichotomous Model D	8.52	.82	.82	.182	488.6	581.3
Mastery–performance model	10.75	.76	.76	.207	619.6	705.6
Approach–avoidance model	14.89	.66	.66	.247	879.2	925.0

	Log-likelihood ratio test (model comparison)		
	df	χ^2	p
Hypothesized model versus			
Trichotomous Model A	3	217.9	< .001
Trichotomous Model B	3	301.6	< .001
Trichotomous Model C	3	436.5	< .001
Trichotomous Model D	3	356.2	< .001
Mastery–performance model	5	491.3	< .001
Approach–avoidance model	5	710.8	< .001

Note. CFI = comparative fit index; IFI = incremental fit index; RMSEA = root-mean-square error of approximation; AIC = Akaike information criterion; BIC = Bayesian information criterion.

residualizing various forms of response bias out of each achievement goal item. These new data sets are: (a) an approach–avoidance residualization data set, in which self-enhancement bias scores were residualized out of each mastery-approach and performance-approach item, whereas self-protection bias scores were residualized out of each mastery-avoidance and performance-avoidance item; (b) an SDE residualization data set, in which SDE scores were residualized out of each achievement goal item; (c) an IM residualization data set, in which IM scores were residualized out of each achievement goal item; (d) an overall BIDR residualization data set, in which overall BIDR scores were residualized out of each achievement goal item; and (e) an MCSDS residualization data set, in which MCSDS scores were residualized out of each achievement goal item.

CFAs using each of these data sets indicated that the data were a good fit to the model (Table 3); all factor loadings were highly significant and nearly identical with those from the original data set. These results suggest that the four-factor structure of achievement goals is not an artifact of response bias.

To address the response bias issue more extensively, we examined whether achievement goals and response bias form a common factor (Beretvas, Meyers, & Leite, 2002). First, we constructed a CFA model with five factors: four achievement goal factors and one response bias factor. The achievement goal piece of the model was identical to the CFA model reported above. The response bias factor represented one of six types of response bias (SDE, IM, self-enhancing response bias, self-protecting response bias, overall BIDR, or MCSDS). When the response bias factor reflected SDE, IM, self-enhancement response bias, or self-protection response bias, the response bias latent factor was comprised of two 10-item parcels, randomly selected from their corresponding measures. When response bias reflected overall BIDR, two randomly selected 20-item parcels were used as indicators of the latent factor; and when response bias reflected MCSDS, two randomly selected 16-item and 17-item parcels were used as indicators of the latent factor. These five-factor models were compared with their corresponding four-factor models, created by collapsing one achievement goal factor and the response bias factor into a single factor. With four achievement goals and six response bias indicators, a total of 24 model comparisons were conducted using the log-likelihood ratio test. In each comparison, the five-factor model was found to fit significantly better than the four-factor model, $\chi^2_{\text{diff}}(4, N = 221) \geq 54.61$, $ps < .001$, indicating that each of the achievement goal variables is clearly distinct from response bias.

Table 3
Fit Indices for the 2 × 2 Model After Residualizing Response Bias

Data set	χ^2/df	CFI	IFI	RMSEA
Original data set	1.63	.99	.99	.053
App-av residualization data set	1.66	.99	.99	.055
SDE residualization data set	1.68	.99	.99	.054
IM residualization data set	1.65	.99	.99	.054
Overall BIDR residualization data set	1.65	.98	.98	.056
Overall MCSDS residualization data set	1.70	.98	.98	.056

Note. CFI = comparative fit index; IFI = incremental fit index; RMSEA = root-mean-square error of approximation; app-av = approach–avoidance; SDE = self-deceptive enhancement; IM = impression management; BIDR = Paulhus's (1991) Balanced Inventory of Desirable Responding; MCSDS = Marlowe-Crowne Social Desirability Scale.

Investigation of the effect of prefix similarity. As stated earlier, our achievement goal measure uses three prefixes for each achievement goal, and these prefixes are the same across the four goals. As such, it is possible to control for extraneous phrasing effects, which may afford a more precise assessment of each achievement goal construct. On the other hand, it is possible that items using the same phrase have substantial correlated errors, which would distort our results.

To address this issue, we examined whether assuming a correlation between error variables using the same prefix would improve model fit. Eighteen error correlations (for each prefix, six pairs of items can be made) were investigated one by one with log-likelihood ratio tests. The critical ratio was set to .01 to prevent the inflation of Type I error. The results indicated that none of the 18 correlations between error variables significantly improved the fit of the model. Moreover, in all models, each factor loading remained highly significant and was nearly identical to that with the original model. Therefore, it is clear that our results are not contaminated by systematic error attributable to the common wording of the items.

In sum, the results reported above provide strong support for the four-factor model of achievement goals. Alternative factor models could not explain the data better than the four-factor model. Neither response bias nor prefix similarity distorted the results. Given the good fit of the four-factor model and the high internal consistency of the achievement goal subscales, participants' responses on the items for each hypothesized factor were averaged to form the four achievement goal indexes. Table 4 reports the descriptive statistics of the main variables in this study.

The Dimensional Structure of Achievement Goals

The multiple-indicator correlated trait–correlated method (MI CT-CM) model. Although the preceding analyses showed that the four-factor model is highly robust, they do not address the 2 × 2 structure of achievement goals per se. That is, from a theoretical perspective, the valence of competence (positive for approach or negative for avoidance) should be crossed with the definition of competence (mastery or performance), resulting in four separate factors. CFA alone is silent with regard to this dimensional structure. To test the two-dimensional nature of achievement goals, we applied an MI CT-CM model (Marsh & Hocevar, 1988; see also Eid, Lischetzke, Nussbeck, & Trierweiler, 2003) to the data.

An MI CT-CM model is a model typically applied to the multitrait multimethod (MTMM) matrix (Campbell & Fiske, 1959) and is a simple extension of a CT-CM model (Jöreskog, 1974; Marsh & Grayson, 1995). Although our data are not in MTMM format, this model provides us with a way to confirm the dimensionality of the hypothesized constructs. In this model (Figure 1), which can be regarded as akin to a second-order factor analysis model, both the valence and definition dimensions of competence are expected to have additive effects on an achievement goal factor. The valence dimension consists of an approach factor and an avoidance factor, only one of which is applicable to any given goal factor; likewise, the definition dimension consists of a mastery factor and a performance factor, only one of which is applicable to any given goal factor. For example, the mastery-approach factor is posited to be explained by both the mastery factor and the approach factor. Although factors within each dimension can correlate with each other, it is assumed that factors across dimensions (e.g., the approach factor and the performance factor) are uncorrelated. Thus, the valence and definition dimensions each contribute independently to the achievement goal factors, which allows the achievement goal factor to be decomposed into valence, definition, and unique residual components. This type of model is sometimes called an *additive model*, because each component additively contributes to the construct.

The model was fit to the data using maximum likelihood estimation (Figure 1). To identify the model, we constrained paths from the same second factors to be equal and fixed the covariance between the mastery and performance factors to 0.[2] The model provided a good fit to the data: $\chi^2(49, N = 229) = 78.54$, $p < .01$, $\chi^2/df = 1.60$, CFI = .99, IFI = .99, RMSEA = .051, and all path coefficients were significant. These results nicely support the 2 × 2 dimensionality of the four achievement goals.

Other alternative models. Although the MI CT-CM model provided a good fit to the data, other types of models may be examined with regard to the precise structure of achievement goals. Here we describe some plausible alternative models and compare them with the MI CT-CM model.

The first alternative model is a form of two-level model, an example of which is depicted in Figure 2. In this model, the four achievement goal factors themselves make up a two-factor structure. There are two possible types of two-level structures: (a) a mastery–performance two-level model, in which a mastery factor (consisting of mastery-approach and mastery-avoidance factors) and a performance factor (consisting of performance-approach and performance-avoidance factors) are formed as second-order factors; and (b) an approach–avoidance two-level model, in which an approach factor (consisting of mastery-approach and performance-approach factors) and an avoidance factor (consisting of mastery-avoidance and performance-avoidance factors) are formed as second-order factors. The critical difference between the MI CT-CM model and these two-level models is that the two-level models derive factors out of only one dimension of the 2 × 2 model.

We constrained paths from the same second factors to be equal because freeing those parameter estimates makes the solution very unstable (i.e., showing an improper solution and abnormally high standardized factor loadings). Fitting these models to the data, we obtained a worse fit than the MI CT-CM model (Table 5). Moreover, in the approach–avoidance two-level model, the correlation between the approach and avoidance factors exceeded 1.0.

Table 4
Descriptive Statistics

Variable	*M*	*SD*	Observed range	Possible range
Need for achievement	9.63	3.47	1.00–16.00	0.00–16.00
Fear of failure	2.99	0.89	1.00–5.00	1.00–5.00
Mastery-approach goals	4.23	0.67	1.67–5.00	1.00–5.00
Mastery-avoidance goals	3.61	0.95	1.00–5.00	1.00–5.00
Performance-approach goals	4.05	0.94	1.00–5.00	1.00–5.00
Performance-avoidance goals	3.83	1.06	1.00–5.00	1.00–5.00
Intrinsic motivation	5.59	1.09	1.00–7.00	1.00–7.00
Exam performance	6.37	2.00	1.00–10.00	0.00–10.00

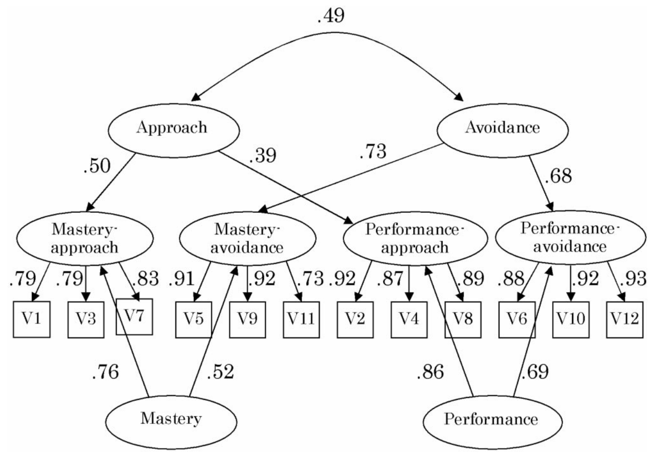

Figure 1. MI CT-CM model of achievement goals. Estimates are standardized. All coefficients are significant ($p < .01$). Error variables are not represented in order to simplify the presentation. V1–V12 represent the individual items of the scale (numbers indicate the order of items in the questionnaire; see Table 1).

The second alternative model is a direct product model (Browne, 1989; Wothke & Browne, 1990), which is also typically applied to an MTMM matrix. Whereas a CT-CM model assumes additive (independent) effects of two dimensions, the direct product model assumes only multiplicative effects. That is, the effect of one dimension is posited to completely be a function of the other dimension. For example, the effect of approach factor on mastery-approach factor is assumed to change depending on the strength of the mastery factor. This model is sometimes called a *multiplicative model*, and is compared with an additive model (for further discussion on these two types of model, see Goffin & Jackson, 1992; Hernandez & Gonzalez-Roma, 2002). When there are $m \times n$ variables comprising the $m \times n$ dimensional structure, the direct product model expresses the covariance matrix as

$$\mathbf{\Sigma} = \mathbf{D}(\mathbf{\Sigma}_{D1} \otimes \mathbf{\Sigma}_{D2} + \mathbf{\Delta})\mathbf{D},$$

where $\mathbf{\Sigma}_{D1}$ is a $(m \times m)$ latent variable score correlation matrix of Dimension 1, and $\mathbf{\Sigma}_{D2}$ is a $(n \times n)$ latent variable score correlation matrix of Dimension 2. $\mathbf{D}$ is a $(mn \times mn)$ positive definite diagonal matrix of scale constants. $\mathbf{\Delta}$ is a $(mn \times mn)$ diagonal matrix of nonnegative unique error components. We set $m = n = 2$ and applied this covariance structure to the factor correlations of our CFA model. Accordingly, the covariance matrix of our 12 items can be expressed as

$$\mathbf{\Sigma}_{\nu} = \mathbf{AD}(\mathbf{\Sigma}_{D1} \otimes \mathbf{\Sigma}_{D2} + \mathbf{\Delta})\mathbf{DA}' + \mathbf{\Sigma}_E,$$

where $\mathbf{A}$ is a (12×4) matrix of factor loadings in the CFA, and $\mathbf{\Sigma}_E$ is a (12×12) nonnegative diagonal matrix of error variances for the CFA. In our analysis, $\mathbf{D}$ was set as an identity matrix to identify the model. Maximum likelihood estimates were obtained

[2] This restriction is reasonable because much empirical research has revealed that mastery and performance goals are independent of each other.

using Mx (Neale, Boker, Xie, & Maes, 1999). As may be seen in Table 5, this model evidenced a worse fit to the data than the MI CT-CM model; furthermore, three variance components were negative (i.e., the model yielded an improper solution).

In sum, two types of alternative models (a two-level model and a direct product model) were compared with our proposed MI CT-CM model to further explore the nature of the structure of achievement goals. The results were clear: Neither of these alternative models was superior to the MI CT-CM model, both in terms of fit indexes and acceptability of solutions. In other words, our results indicate that achievement goals are comprised of two independent dimensions. Focusing on one of the dimensions (a two-level model) or on the multiplicative effects of the dimensions (a direct product model) cannot precisely capture the structure of achievement goals.

Table 5
Fit Indices of CT-CM Model and Other Alternative Models

Model	χ^2/df	CFI	IFI	RMSEA	AIC	BIC
MI CT-CM model	1.60	.99	.99	.051	136.5	236.1
Mastery–performance two-level model	3.18	.95	.95	.098	216.2	308.9
Approach–avoidance two-level model	4.60	.91	.91	.126	290.4	383.1
Direct product model	3.06	—	—	.095	211.2	300.4

Note. CFI = comparative fit index; IFI = incremental fit index; RMSEA = root-mean-square error of approximation; AIC = Akaike information criterion; BIC = Bayesian information criterion; MI CT-CM = multiple-indicator correlated trait–correlated method. Dashes indicate that data were not obtained.

Testing the Hierarchical Model

We used structural equation modeling (SEM) to test the hierarchical model of approach–avoidance achievement motivation, in which achievement goals are posited to represent intermediate variables between motive dispositions and outcome variables such as performance attainment and intrinsic motivation (Elliot, 2006; Elliot & Church, 1997). We began by establishing the measurement portion of our model within a CFA framework (cf. Anderson and Gerbing, 1988) and then proceeded to the full SEM model.

Measurement model. The measurement model consisted of the need for achievement, fear of failure, the four achievement goals, intrinsic motivation, and exam performance. Fear of failure and each achievement goal latent variable were represented by the individual items from their respective scales. The need for achievement latent variable was represented by four parcels randomly selected from the 16 items of the scale. Likewise, the intrinsic motivation latent variable was represented by four parcels randomly selected from the 8 items of the scale. Exam performance was an observed variable; SAT scores were residualized out of the exam performance variable to control for the influence of ability.[3] In this model, the loadings between the indicators and the latent factors were freely estimated, and all exogenous variables were free to correlate with each other. The model was a good fit to the data: $\chi^2(272, N = 229) = 442.16$, $p < .01$, $\chi^2/df = 1.62$, CFI = .95, IFI = .95, RMSEA = .052, and all factor loadings were highly significant ($p < .001$).

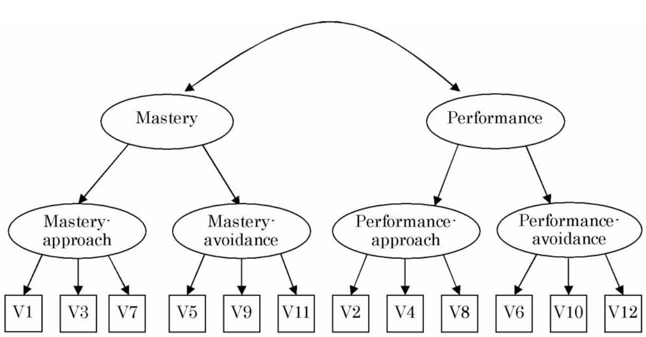

Figure 2. An example of a two-level model of achievement goals. Error variables are not represented in order to simplify the presentation. V1–V12 represent the individual items of the scale (numbers indicate the order of items in the questionnaire; see Table 1).

Full SEM model. In the full SEM model, we posited that the achievement motives would lead to achievement goals that, in turn, would directly predict the outcome variables. Specifically, the need for achievement was hypothesized to positively predict mastery-approach goals, performance-approach goals, and, tentatively, mastery-avoidance goals; fear of failure was hypothesized to positively predict mastery-avoidance goals, performance-avoidance goals, and performance-approach goals. Mastery-approach goals were hypothesized to be positive predictors of intrinsic motivation, whereas mastery-avoidance goals were posited to be negative predictors of intrinsic motivation. Performance-approach goals were hypothesized to be positive predictors of exam performance, whereas performance-avoidance goals were posited to be negative predictors of both intrinsic motivation and exam performance. Given the similar wording of the performance-approach and performance-avoidance goal items and the mastery-approach and mastery-avoidance goal items, we allowed for correlated errors between these two latent variables (Elliot & Church, 1997).

In an initial test of the model, all hypothesized paths were significant with the single exception of that between mastery-avoidance goals and intrinsic motivation. The model was thus tested in the final analysis with this path removed. The model provided a good fit to the data: $\chi^2(288, N = 229) = 550.73$, $p < .01$, $\chi^2/df = 1.91$, CFI = .92, IFI = .92, RMSEA = .063, and all factor loadings were highly significant ($p < .001$). Regarding the antecedents of achievement goals, the need for achievement was a positive predictor of mastery-approach goals ($\beta = .34$, $p < .01$), performance-approach goals ($\beta = .22$, $p < .01$), and mastery-avoidance goals ($\beta = .21$, $p < .01$), whereas fear of failure was a positive predictor of performance-avoidance goals ($\beta = .31$, $p < .01$), mastery-avoidance goals ($\beta = .15$, $p < .05$), and performance-approach goals ($\beta = .24$, $p < .01$). Regarding the consequences of achievement goals, mastery-approach goals were a positive predictor of intrinsic motivation ($\beta = .28$, $p < .01$), performance-approach goals were a positive predictor of exam

[3] Given that there are some missing values for the SAT scores, the full information maximum likelihood method was used to avoid loss of information due to the missing data (Arbuckle, 1996; Schafer & Graham, 2002).

performance ($\beta = .46$, $p < .01$), and performance-avoidance goals were a negative predictor of both intrinsic motivation ($\beta = -.15$, $p < .05$) and exam performance ($\beta = -.48$, $p < .01$). See Figure 3 for a pictorial summary of these findings.

In sum, SEM analyses yielded data that strongly supported the hierarchical model of approach–avoidance achievement motivation. Both the measurement model and the full SEM model provided a good fit to the data, and the path results in the full SEM model were nearly perfectly consistent with predictions.

Comparing the Present Data and the Elliot and McGregor (2001) Data

Finally, we thought it would be informative to compare the data from the present study with that from the original research with the AGQ (see Elliot & McGregor, 2001). First, we considered the achievement goal reliabilities and the intercorrelations among the achievement goal variables (see Table 6). The internal consistencies for all four goals were strong (greater than .80) in both the present research and the Elliot and McGregor (2001) research. The one noticeable difference was that the α for performance-avoidance goals was .83 with the AGQ, whereas the α was .94 for performance-avoidance goals with the AGQ-R. This enhanced reliability is likely due to the explicit normative focus included in all three performance-avoidance goal items in the AGQ-R. The achievement goal intercorrelations were the same in the present research and in the Elliot and McGregor (2001) research, except that mastery-approach and performance-approach goals were significantly positively correlated in the AGQ-R, whereas in the AGQ they were not. This positive correlation is in line with predictions because these two goals share a competence dimension (both are approach goals).

Second, we considered achievement motives as simultaneous predictors of achievement goal adoption (see Table 7). The predictive patterns were the same in the present research and in the Elliot and McGregor (2001) research, with one exception: Need for achievement was a significant positive predictor of AGQ-R mastery-avoidance goals, but not AGQ mastery-avoidance goals. This positive relation is in line with our predictions regarding mastery-avoidance goals as strategic tools that are sometimes put to effective use by highly achievement-oriented individuals.

Third, we considered the achievement goals as simultaneous predictors of exam performance (see Table 8; intrinsic motivation was not examined in the Elliot & McGregor [2001] research). The predictive patterns were the same in the present research and in the Elliot and McGregor (2001) research.

In sum, comparison of the present data and the Elliot and McGregor (2001) data highlights the value of the AGQ-R measure. This new measure yielded results that replicated all of the important findings from the original research; when the results from the present and prior research diverged, it was the present results that were more in line with our theoretical model. Thus, the AGQ-R appears to illustrate that it is indeed possible to address the measurement problems highlighted at the beginning of this article without sacrificing structural validity and predictive utility.

Discussion

Sustained progress within a psychological literature requires clear operationalization of the focal constructs in the literature that is consistent with the way that the constructs are conceptualized. In the present research, we have identified several problems with existing measures in the achievement goal literature; some of them seem relatively minor (e.g., some performance-based goal items focus on extreme groups), but others seem to be of considerable importance (e.g., some achievement goal items may not actually focus on goals per se). These problems tend to go unnoticed by researchers or, when noticed, tend to simply be acknowledged in

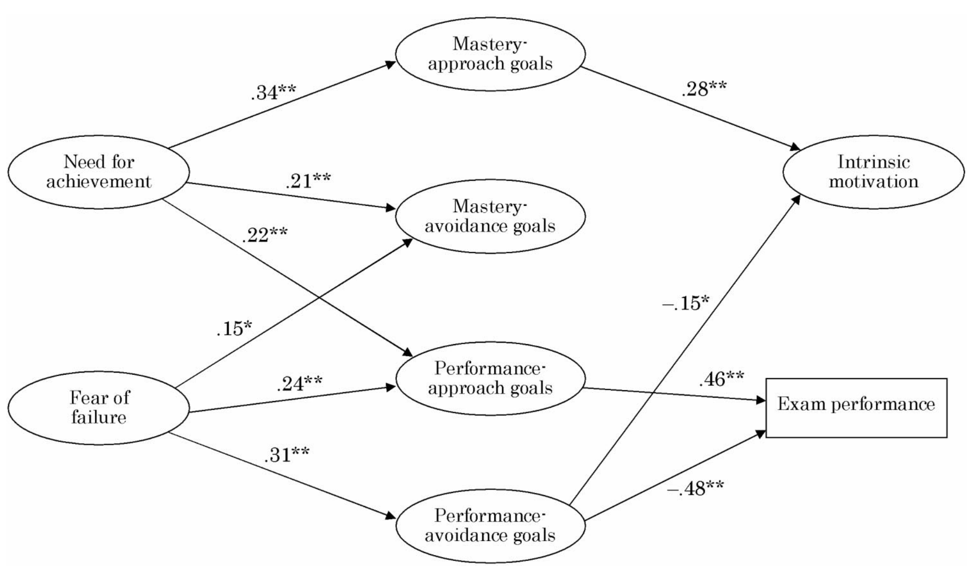

Figure 3. Hierarchical model of achievement goals. Estimates are standardized. Indicator variables, error variables, and correlations between error variables are not represented in order to simplify the presentation. $^{*}p < .05$. $^{**}p < .01$.

Table 6
Comparison of Present Results with Elliot and McGregor (2001): Achievement Goal Reliabilities and Intercorrelations

Goal	1	2	3	4
1. Mastery-approach goals	.84/.88			
2. Mastery-avoidance goals	.51**/.36**	.88/.87		
3. Performance-approach goals	.16*/.07	.15*/.13**	.92/.94	
4. Performance-avoidance goals	.13/−.06	.46**/.29**	.68**/.27**	.94/.83

Note. Results from the present study are presented before the slash; results from Elliot and McGregor (2001) are presented after the slash. Results from Elliot and McGregor are aggregated across three studies and examined via meta-analysis (Rosenthal & Rosnow, 1991). Values in the diagonal represent Cronbach's alphas; values in the remainder of the table are Pearson product moment correlation coefficients.
$^{*}p < .05$. $^{**}p < .01$.

the discussion section of empirical articles or noted as an issue to attend to in future research. Our work herein was designed to make these problems salient and to illustrate them by critiquing a commonly used achievement goal measure—the AGQ (Elliot & McGregor, 2001). In addition, our work was designed to attend to these problems in a direct and concrete way by revising the AGQ accordingly. The resulting measure—the AGQ-R—was then put to the test to examine both its structural validity and its predictive utility.

With regard to structural validity, the measure fared extremely well when subjected to a highly rigorous set of analyses. The hypothesized four-factor structure of the achievement goal items was confirmed, and this four-factor structure was found to be a better fit to the data than a series of alternative models with three- and two-factor structures. Additional analyses demonstrated that the four-factor structure was not a mere artifact of self-enhancement, self-protection, self-deception, impression management, or general social desirability. Each of the four achievement goal factors had a high degree of internal consistency. We not only confirmed the four-factor structure in our analyses but also confirmed the two-dimensional structure posited by the 2 (definition) × 2 (valence) achievement goal model. This two-dimensional model also was shown to fit the data better than two types of alternative models.

Table 8
Comparison of Present Results With Elliot and McGregor (2001): Achievement Goals as Predictors of Exam Performance

Achievement goal	Exam performance
Mastery-approach goals	−.06/.10
Mastery-avoidance goals	−.07/−.05
Performance-approach goals	.36**/.20*
Performance-avoidance goals	−.33**/−.31**

Note. Results from the present study are presented before the slash; results from Elliot and McGregor (2001) are presented after the slash. All values represent standardized simultaneous regression coefficients estimated from Pearson product moment correlation coefficients.
$^{*}p < .05$. $^{**}p < .01$.

With regard to predictive utility, results from SEM analyses were strongly supportive. The measurement model was a good fit to the data, as was the path model in which achievement motives were posited as predictors of achievement goals and the goals, in turn, were posited as direct predictors of achievement-relevant outcomes. Mastery-approach and performance-avoidance goals were shown to emerge from a single antecedent, the need for achievement and fear of failure, respectively, whereas performance-approach and mastery-avoidance goals were shown to emerge from both of these achievement motives. Mastery-approach goals were positive predictors and performance-avoidance goals were negative predictors of intrinsic motivation; performance-approach goals were positive predictors and performance-avoidance goals were negative predictors of exam performance. These results were nearly perfectly in accord with our hypotheses; the only hypothesized relation that was not supported was that between mastery-avoidance goals and intrinsic motivation (to be discussed in more detail below). In short, analyses focused on both structural validity and predictive utility yielded strong support for the AGQ-R; the measure appears to be empirically as well as conceptually sound. In addition, comparison of the AGQ-R data from the present research with the AGQ data from prior research casts the AGQ-R in a very positive light.

An important feature of the present research was our examination of the dimensional as well as factorial structure of achievement goals. Our dimensional findings are noteworthy because they are the first empirical evidence indicating that each of the four goals of the 2 × 2 model indeed represents a combination of two underlying competence dimensions. Thus, although each of the

Table 7
Comparison of Present Results with Elliot and McGregor (2001): Achievement Motives as Predictors of Achievement Goals

Achievement motive	Mastery-approach goals	Mastery-avoidance goals	Performance-approach goals	Performance-avoidance goals
Need for achievement	.28**/.17*	.14*/.00	.27**/.38**	.12/−.02
Fear of failure	.07/−.12	.15*/.28**	.18*/.32**	.26**/.31**

Note. Results from the present study are presented before the slash; results from Elliot and McGregor (2001) are presented after the slash. All values represent standardized simultaneous regression coefficients estimated from Pearson product moment correlation coefficients.
$^{*}p < .05$. $^{**}p < .01$.

goals is a unique combination of dimensions and therefore is distinct, some goals share a dimension and therefore are conceptually related, whereas others do not share a dimension and therefore are conceptually unrelated. The two goals that are composed of completely different dimensions—mastery-approach and performance-avoidance goals—exhibited starkly different empirical profiles in our research. This is true with regard to both antecedents (they emerged from completely different achievement motives) and consequences (they had completely different effects on intrinsic motivation and exam performance).

It is interesting that even among achievement goals that share a dimension there is variability in the strength of relation between them. For example, in our research, performance-approach and performance-avoidance goals were strongly correlated ($r = .68$), whereas mastery-approach and performance-approach goals were not ($r = .16$). One observation on the observed pattern of correlations is that goals sharing a common definition dimension appear to be more closely related than goals sharing a common valence dimension. Another observation is that the strongest link between any two goals appears to be that between performance-approach and performance-avoidance goals. This link is of particular interest because it has led some to question whether these two forms of regulation can truly be separated at the phenomenological level (Roeser, 2004; Urdan & Mestas, 2006) and has led others to fear that performance-approach goals quickly transform into performance-avoidance goals once failure or difficulty is encountered (Brophy, 2005; Midgley et al., 2001). It is possible, however, that the adoption of performance-approach goals evokes perceptual–cognitive processes that are not only functionally and experientially separate from avoidance concerns (Cacioppo, Gardner, & Berntson, 1997; Elliot, 2006) but also bias information processing toward information and interpretation that sustains an approach form of regulation, even in the face of failure (Elliot & Harackiewicz, 1996; Kunda, 1990). Research is clearly needed to directly address this important issue. In addition, a fascinating avenue for research would be to explore moderators of the relation between performance-approach and performance-avoidance goal adoption. We suspect that the joint adoption of these goals is most prevalent in highly evaluative achievement environments and among people with high fear of failure or low competence perceptions.

Mastery-avoidance goals are the most recent addition to the achievement goal literature and are the least researched and least understood of the four goals in the 2 × 2 model. Our antecedent results shed some light on the nature of these goals, as they were found to emerge from both the need for achievement and fear of failure. Prior research has linked mastery-avoidance goals to fear of failure alone (Conroy & Elliot, 2004; Elliot & McGregor, 2001); it took a cleansing of negative affect from the original mastery-avoidance items for the conceptually sensible link between the need for achievement and these mastery-based goals to appear. This, of course, nicely illustrates the empirical value of attending to the conceptual problems plaguing the AGQ and other existing achievement goal measures.

Although clarity was obtained regarding the antecedents of mastery-avoidance goals, clarity remained elusive regarding the consequences of these goals, as they were not negative predictors of intrinsic motivation as anticipated (see Cury et al., 2006). As a combination of the most positive component of achievement goals (mastery) and the most negative (avoidance), mastery-avoidance goals represent a puzzling motivational hybrid, and it simply is not clear how these two seemingly discordant components operate together in the process of goal regulation. Perhaps in some achievement contexts or for some persons the mastery component of the goal predominates, leading to relatively positive consequences, whereas in other contexts or for other persons the avoidance component predominates, leading to relatively negative consequences. And perhaps most often, the positive and negative components of the goal cancel each other out, leading to neither positive nor negative consequences (as found in the present work). The conceptual and empirical complexities inherent in mastery-avoidance goals can be frustrating at this early stage of study, and it appears that the adoption and pursuit of a mastery-approach goal (with accompanying persistence and task absorption) will be needed for researchers exploring this currently opaque form of regulation.

Although the revised mastery-avoidance goal scale yielded results different from those obtained with the original scale, it is important to note that the revised scales for the other three goals yielded results fully in accord with those from the original scales (and other measures focused on these goals as well). This is reassuring on two fronts. First, and most specifically, it highlights the utility of achievement goals per se as predictors of important achievement-relevant outcomes. Second, and more generally, it indicates that the problems identified herein with existing measures are not so severe as to produce a completely spurious empirical corpus. Indeed, it is difficult to imagine the achievement goal approach rising to its lofty status in the field unless the existing measures captured, to a great extent, systematic and conceptually relevant variance. However, we do think that the problems that we have identified muddy the waters by adding unsystematic and conceptually irrelevant variance to the assessment process and that this muddying of the waters has kept the achievement goal approach from developing to its full potential. It is our hope that additional clarity and precision on the measurement front will translate into additional clarity and precision on the empirical front and will help the achievement goal literature move forward.

We view our revised achievement goal measure as an improvement on the AGQ, but we in no way view the AGQ-R as some sort of final or definitive assessment tool. On the contrary, in the achievement goal literature and in psychological literatures more generally, we view measurement development as part and parcel of theory development, such that with advances or refinements in theory comes the need for revised or new measures. For example, Elliot (1999) stated that mastery-based goals may be differentiated in terms of whether a task-based or intrapersonal standard is used in competence evaluation. The AGQ-R is somewhat ambiguous on this issue, although the most straightforward reading of the items suggests a task-based focus (see Van Yperen, 2006, for mastery-based goals that use an intrapersonal focus). Embracing this 3 × 2 achievement goal framework will necessitate the development of a new measure that explicitly differentiates task-based mastery goals from intrapersonal mastery goals. We think the time has come to move in this direction, as we think it highly likely that each of the six goals in the 3 × 2 model will indeed demonstrate factorial separability and discriminant predictive utility.

It should also be highlighted that there is room for disagreement as to how achievement goals should be conceptualized, particularly with regard to the performance-mastery distinction, and this clearly has implications for achievement goal measurement. One ongoing issue is whether performance-based goal measures should include a demonstration component as well as a normative component (Elliot, 2006; Urdan & Mestas, 2006). The AGQ-R focuses exclusively on the normative component, leaving the demonstration component as an optional feature that may appear in performance-based goal complexes (see Elliot & Thrash, 2001) but need not be present in all performance-based goal pursuit. Another ongoing issue, albeit one that has received less attention, is whether the focal point of performance and mastery goals should be the same or different. The AGQ-R follows convention in having performance-based goals focus on performing and having mastery-based goals focus on learning (see Dweck, 1986), but it would be possible (although, we suspect, not desirable for most) to devise items that eliminated this distinction altogether. Finally, we should acknowledge that our research focused on college undergraduates in a classroom context; the generalizability of our results to other ages and contexts remains an open question.

One reason for explicating the measurement problems present in the achievement goal literature is to highlight the need for improved measures, the use of which, it is hoped, will improve the quality of the empirical literature and the effectiveness of applied endeavors. However, we close by noting another, broader reason for striving for improved achievement goal assessment. Achievement goals are but one of the many constructs necessary to fully account for behavior in achievement settings. Other constructs such as motives, values, emotions, and competence perceptions, to name a few, are also important to include in models of achievement motivation (for a review of constructs, see Anderman & Wolters, 2006; Elliot & Dweck, 2005). Existing measures of achievement goals often include content that more readily belongs in measures of these other constructs. As the achievement goal literature matures it will undoubtedly move more and more in the direction of linking goals to these other constructs in integrative fashion. A conceptually clean achievement goal measure would seem a prerequisite for this integration process to transpire smoothly.

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