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The Competition–Performance Relation: A Meta-Analytic Review and Test of the Opposing Processes Model of Competition and Performance

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What is the relation between competition and performance? The present research addresses this important multidisciplinary question by conducting a meta-analysis of existing empirical work and by proposing a new conceptual model—the opposing processes model of competition and performance. This model was tested by conducting an additional meta-analysis and 3 new empirical studies. The first meta-analysis revealed that there is no noteworthy relation between competition and performance. The second meta-analysis showed, in accord with the opposing processes model, that the absence of a direct effect is the result of inconsistent mediation via achievement goals: Competition prompts performance-approach goals which, in turn, facilitate performance; and competition also prompts performance-avoidance goals which, in turn, undermine performance. These same direct and mediational findings were also observed in the 3 new empirical studies (using 3 different conceptualizations of competition and attending to numerous control variables). Our findings provide both interpretational clarity regarding past research and conceptual guidance regarding future research on the competition–performance relation.

Keywords: rivalry, attainment, productivity, goal structure, reward structure

Competition is highly prevalent in human societies across the globe (Eibl-Eibesfelt, 1989; D. W. Johnson & Johnson, 1989; McClelland, 1961; cf. Bonta, 1997). In their vocational and avocational activities alike, individuals compete with one another in myriad ways. The present research addresses a basic and important question regarding competition, namely: What is the relation between competition and performance?

Not surprisingly, theorists have long been interested in whether competition helps or hinders performance. Surprisingly, little consensus has been reached on this issue over the years. Many theorists, such as Scottish philosopher and economist Adam Smith (1776/1937), have contended that competition enhances motivation and is beneficial for performance, thereby broadly embracing the Roman poet Ovid's dictum, "A horse never runs so fast as when he has other horses to catch up and outpace" (Ovid, *The Art of Love: Book III,* p. 173; Abra, 1993; Festinger, 1954; Locke, 1968; McClelland, Atkinson, Clark, & Lowell, 1953; Michaels, 1977; Parker, 1998; Schumpeter, 1934; Sherif, 1978; Shields & Bredemier, 2009; Smith, 1776/1937; Spencer, 1860/1969). Many other theorists, however, such as English philosopher and political theorist Thomas Hobbes (1651/1994), have espoused the opposite view, arguing that competition undermines motivation and is detrimental to performance; these theorists would be more likely to concur with the Hungarian composer Bella Bartok's quip, "Competitions are for horses, not artists" (Covington, 1992; Deci & Ryan, 1985; Deutsch, 1949; Forsyth, 1999; Frank & Cook, 1995; Johnson & Johnson, 2003; Kohn, 1986; Maehr & Midgley, 1991; Mead, 1937; Montagu, 1952; Ulrich, 2008). Both of these contrasting positions on the competition–performance relation continue to be espoused within broad and diverse areas of the contemporary psychological literature, including educational psychology, industrial–organizational psychology, social–personality psychology, and sport and exercise psychology (for reviews, see Sambolec, Kerr, & Messé, 2007; Tauer & Harackiewicz, 2004; Tjosvold, Johnson, Johnson, & Sun, 2006).

The present work has four foci. First, we conduct a meta-analysis of the existing empirical work on the competition–performance relation. Second, we propose a motivationally based model of competition and performance that is consistent with the extant research and that accommodates both of the contrasting positions on the competition–performance relation. Third, we conduct an additional meta-analysis (using meta-analytic structural equation modeling) that tests the central tenets of the proposed model. Fourth, we present three new empirical studies designed to further test the proposed model.

Existing Research on the Competition–Performance Relation: A Meta-Analysis

Competition may be conceptualized in three distinct ways (Brown, Cron, & Slocum, 1998): As a characteristic of the person (*trait competitiveness*), as a characteristic of the perceived situation (*perceived environmental competitiveness*), and as a characteristic of the actual situation (*structural competition*). All of these conceptualizations focus on interpersonal competition—that is,

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competition between individuals. Competition may involve other aspects, such as intrapersonal competition (i.e., competition with oneself) and intergroup competition (i.e., competition between groups). We limit our focus to interpersonal competition herein, because this aspect of competition has received the vast majority of the conceptual and empirical attention, especially with regard to the competition–performance relation. Furthermore, the other aspects of competition are quite distinct from interpersonal competition, emphasizing different types and levels of psychological processes (Albert, 1977; Elliot, Murayama, & Pekrun, 2011; Mehta, Wuehrmann, & Josephs, 2009; Tajfel & Turner, 1979), and researchers have compellingly argued that the different aspects of competition should be studied separately (see Tauer & Harackiewicz, 2004). In the following, we define each of the three conceptualizations of competition and describe the state of the literature for each with regard to systematic empirical reviews.

Trait competitiveness represents a dispositional preference to compete with others in achievement situations (Spence & Helmreich, 1983). Research on competitiveness as a personality trait has several different conceptual roots (e.g., Helmreich & Spence, 1978; Jenkins, Zyzanski, & Rosenman, 1979; Ryckman, Hammer, Kaczor, & Gold, 1990), and trait competitiveness has been an important personality construct in several different subdisciplines of psychology, especially educational psychology (e.g., Wigfield & Guthrie, 1997) and industrial–organizational psychology (e.g., Fletcher, Major, & Davis, 2008). The existing research has typically used the competitiveness subscale of the Work and Family Orientation (WOFO) scale (Helmreich & Spence, 1978) to assess trait competitiveness in a brief, face valid manner (sample item: "I feel that winning is important in both work and games"). Although research on trait competitiveness and performance has been conducted for over 30 years, not a single systematic empirical review (i.e., meta-analysis) has been published.

Perceived environmental competitiveness represents an individual's cognitive construal of the competitive nature of the achievement setting. Deutsch (1949) and others (e.g., Kristof, 1996) have argued that participants' subjective perceptions of the competitiveness of the achievement environment are critical to understanding competition effects. Perceived environmental competitiveness has been considered a particularly important construct in educational settings (Astin, 1968; Maehr & Midgley, 1996). However, most of the studies that have been conducted in the education domain have focused on perceived environmental competitiveness as a group-level variable (i.e., classroom or school), rather than an individual-level variable (i.e., student; e.g., Fraser & Fisher, 1982; Moos, 1979; Walberg & Anderson, 1972). This type of design allows researchers to investigate group-level effects of competition ("Do competitive groups do better than noncompetitive groups?") but cannot address the focal question herein, which is "Do individual's perceptions of the competitiveness of the environment influence their individual outcomes?" (see Robinson, 1950). A systematic empirical review of the link between perceived environmental competitiveness and performance has yet to be conducted. One article that appears to be relevant to this question at first glance (Haertel, Walberg, & Haertel, 1981) is not pertinent upon closer investigation, as the only studies that were examined with regard to perceived environmental competitiveness focus on group-level effects and composite, omnibus outcome variables that include motivation, self-concept, and attendance in addition to performance.

Structural competition represents an actual situation in which two or more people vie for a mutually exclusive achievement outcome (Johnson & Johnson, 1989).[1] Traditionally, research on competition and performance has conceptualized competition in this manner. Unlike the aforementioned research on trait competitiveness and perceived environmental competition, several systematic empirical reviews have been conducted over the years on structural competition and performance. However, most of these reviews have been constrained in one of several ways as a function of the precise research question under consideration. Qin, Johnson, and Johnson (1995) and Stanne, Johnson, & Johnson (1999) compared the influence of competitive structures to cooperative structures on performance. This comparison is clearly of theoretical and practical importance, but it does not address structural competition per se. To test whether structural competition per se is beneficial or deleterious for performance, it is necessary to compare competitive structures to neutral controls (sometimes labeled "individualistic structures"). In addition, some meta-analyses have restricted their focus to a specific type of performance (e.g., motor performance; Stanne et al., 1999) or a specific age group (e.g., 12–15 years; Roseth, Johnson, & Johnson, 2008). The only peer reviewed meta-analysis that compares the influence of competitive structures to neutral controls on all types of performance across age groups was conducted by Johnson, Maruyama, Johnson, Nelson, and Skon (1981).[2] These researchers found no significant difference between competitive structures and neutral controls on performance attainment. Given that 30 years have passed since this research was published, an update of this important work is clearly overdue.

In sum, despite long-term and widespread interest in the competition–performance relation, systematic evaluation of the existing empirical yield has been lacking. This is particularly the case with regard to trait competitiveness and perceived environmental competitiveness, although an updating of meta-analytic work on structural competitiveness is also clearly needed. In the following, we provide a meta-analytic review that focuses on the relation between each of the three conceptualizations of competi-

[1] Perceived environmental competitiveness and structural competition are related with regard to their influence on performance; in both instances, it is one's perception of the situation that (ultimately) guides behavior (Ames & Archer, 1988; Deutsch, 1949; Lewin, 1935). Nevertheless, distinguishing between these two conceptualizations of competition has practical value, because researchers have investigated them with very different methodologies (i.e., research on perceived environmental competitiveness uses self-report questionnaires, whereas research on structural competition relies on experimental manipulation).

[2] In a book chapter, Johnson and Johnson (1989) also reported meta-analytic data that compared the influence of competitive structures to neutral controls on all types of performance across age groups. The results showed a performance increment for competitive structures in initial analyses, but this finding became null when the analysis was restricted to high quality studies. It should also be noted that the Stanne et al. (1999) meta-analysis contains an error in Table 2; it is clear from the narrative text that "competition vs. individualistic" should read "cooperation vs. individualistic." Stanne et al. (1999) did not include a comparison of competitive structures and neutral controls.

tion and performance. No restrictions are made with regard to type of performance or age group, and the structural competition analyses focus on competition per se (i.e., competitive structures vs. neutral controls).

Sample of Studies

The studies included in our meta-analysis were identified via a thorough search of the literature for studies written in English and published by April 2011 that investigated the relation between competition (trait competitiveness, perceived environmental competitiveness, or structural competition) and performance with human participants. First, we searched PsycINFO and ERIC using pairs of keywords, one representing competition and the other representing performance. The search terms representing competition included *competition*, *competitive*, *competitiveness*, *hypercompetition*, *hypercompetitive*, *reward structure*, *goal structure,* and *motivational climate*. The search terms representing performance included *performance*, *achievement*, *attainment*, *accomplishment*, and *productivity*. More than 7,000 references were retrieved. Second, we checked to ensure that all studies used in the prior published meta-analyses on structural competition and performance (e.g., Johnson et al., 1981; Roseth et al., 2008) were retrieved. Third, we searched for additional studies citing any of the major scales used to assess trait competitiveness or perceived environmental competitiveness (e.g., Midgley et al., 1998; Smither & Houston, 1992). Fourth, we searched for additional studies by major contributors to the literature on the competition–performance relation (e.g., David Johnson, Roger Johnson, Robert Helmreich). Finally, we searched the reference sections of all of the relevant retrieved studies for additional relevant studies. We reviewed the abstracts of these retrieved studies and eliminated those that were clearly not relevant to the competition–performance relation.

We then screened the resulting pool of studies on the following inclusion criteria. With regard to trait competitiveness and perceived environmental competitiveness, studies were included if (a) the study dealt specifically with the relation between self-reports of competitiveness (trait or perceived environmental) and performance and (b) the study contained sample sizes and at least one zero-order correlation for the variables of interest. Studies in which only path coefficients (from multiple regression or structural equation modeling) or partial correlations were reported without accompanying zero-order correlations were not included, because these values do not provide a comparative metric across studies (Lipsey & Wilson, 2001). With regard to structural competition, studies were included if (a) the study dealt specifically with the experimental effect of competition on performance, (b) the study compared a competition condition with a neutral control condition (as opposed to a cooperation condition), and (c) the study contained information to calculate an effect size for the dependent variable or variables (see the Calculating and Integrating Effect Sizes section, below).

For all three conceptualizations of competition, competition was operationally defined as normative comparison between individuals, and we included all studies in which this definitional aspect of competition was salient (e.g., the trait competitiveness measure included items focused on normative comparison, or the structural competition manipulation focused on interpersonal comparison). Performance was operationally defined as a score obtained on a task, with measures including graded performance (e.g., exam scores, grade point averages), quality and quantity of job productivity (e.g., sales performance, professors' scholastic achievements), sport performance, quality of and accuracy on cognitive/motor/sensory tasks, time to obtain solutions to problems, level of cognitive reasoning and critical thinking, creativity, recall, and retention. Studies using only self-perceived performance measures were not included. As delineated earlier, the focus of the present research is on the relation between competition and performance at the individual level of analysis; as such, studies on intergroup competition or using groups rather than individuals as the focal unit of data analysis were not included. If a relevant study did not report information to compute an effect size and was published since 2000, we attempted to contact the author(s) to obtain the pertinent data.

In all, our search produced the following number of studies for meta-analytic review. For trait competitiveness, 56 articles were identified, yielding a final sample of 65 studies using 14,721 participants. For perceived environmental competitiveness, 33 articles were identified, yielding a final sample of 33 studies using 11,439 participants. For structural competition, 59 articles were identified, yielding a final sample of 81 studies using 5,887 participants. The studies included in the meta-analysis are listed in the Appendix.

Coding Study Characteristics

The variables coded in the meta-analysis for each conceptualization of competition were as follows: (a) outlier status (outlier or not); (b) gender composition (female dominant, if female ratio is more than 75%; male dominant, if male ratio is more than 75%; or mixed); (c) age group (nonadult [≤ 18] or adult; we also coded mean age for further analysis); (d) nationality (U.S. or non-U.S.); and (e) year of publication (1980s and before, 1990s, or 2000 and after). For trait competitiveness and perceived environmental competitiveness, the type of performance domain was coded (school, work, or sport), while for structural competition, the type of performance task was coded (cognitive or motor/perceptual/sensory).

Calculating and Integrating Effect Sizes

The studies on trait competitiveness and perceived environmental competitiveness provide correlation coefficients, whereas those on structural competition provide mean differences. Given this inconsistency, we used different computation methods (described below) to compute effect sizes for each type of data. All data analyses were conducted using Comprehensive Meta-Analysis (Version 2.2.; Borenstein, Hedges, Higgins, & Rothstein, 2008; for technical details, see Borenstein, Hedges, Higgins, & Rothstein, 2009).

Trait competitiveness and perceived environmental competitiveness. As recommended in the literature (Hedges & Vevea, 1998; see also Hafdahl & Williams, 2009), we converted all correlations to Fisher's z using the following formula:

$$z_j = \frac{1}{2} \times \log \frac{(1 + r_j)}{(1 - r_j)}, \quad (1)$$

where r_j, and z_j denote the sample correlation and Fisher's z of study j, respectively. We computed v_j, the variance of z_j, as follows:

$$v_j = \frac{1}{n_j - 3}, \tag{2}$$

where n_j is the sample size of study j. A few studies used dichotomous dependent variables. In such cases we computed the standardized mean difference between the groups and used it as an estimate of z_j. All results are presented using correlation coefficients to facilitate ease of interpretation of the findings. Effect size estimates were reconverted to correlations by the inverse of the Fisher transformation.

Structural competition. Standardized mean differences between the experimental and control conditions were calculated. We computed effect sizes using Hedges and Olkin's (1985) unbiased estimator g_j, given by

$$g_j = \left(\frac{\bar{Y}_j^E - \bar{Y}_j^C}{S_j}\right) \times \left(1 - \frac{3}{4(n_j^E + n_j^C) - 9}\right), \tag{3}$$

where $\bar{Y}_j^E$, $\bar{Y}_j^C$, n_j^E, n_j^C are the experimental and control group sample means and sample sizes for the jth study, and S_j is the pooled standard deviation of the two groups. As can be seen, the effect sizes were calculated so that a positive effect size indicated a favorable outcome for the experimental (i.e., competition) group. We computed v_j, the variance of g_j, as follows:

$$v_j = \left[\frac{n_j^E + n_j^C}{n_j^E n_j^C} + \frac{1}{2(n_j^E + n_j^C)}\left(\frac{\bar{Y}_j^E - \bar{Y}_j^C}{S_j}\right)^2\right]\left(1 - \frac{3}{4(n_j^E + n_j^C) - 9}\right)^2. \tag{4}$$

In the structural competition studies, not all investigations reported the information in Equations 3 and 4. When two groups were compared and only t values were reported, it is straightforward to transform the t values to effect sizes g (see Lipsey & Wilson, 2001). In some studies, a one-way analysis of variance with more than two groups or a factorial analysis of variance was conducted and only the means and sample sizes of each condition and omnibus F values were reported. In such cases, we used the available information to estimate the mean-square error of the analysis of variance, computed the square-root of this estimate, and then inserted this value for S_j. A few studies conducted analysis of covariance but did not report the correlation between the covariate and the outcome variable; a few other studies did not report the sample size of each condition but reported the overall sample size. In such cases, precise estimation of effect sizes is not possible, so we estimated the effect size by assuming that (a) the correlation between the covariate and the outcome variable was 0.5, or (b) the sample sizes were equal across the groups.

Integration of the effect sizes. For each conceptualization of competition, we adopted a random-effects framework to integrate the computed effect sizes (Hedges & Vevea, 1998). In this approach, the overall point estimate of the effect sizes is obtained by computing the weighted average of the effect sizes (i.e., z_j for trait competitiveness or perceived environmental competitiveness and g_j for structural competition) with the weight of jth study w_j given by

$$w_j = \frac{1}{v_j + \tau^2}, \tag{5}$$

where τ^2 is the between-studies variance (the variance of the effect size parameters across the population of studies), estimated by the method of moments method. The standard error of the averaged effect sizes V is estimated as follows:

$$V = \frac{1}{\sum_{i=1}^{K} w_i},$$

where K is the total number of studies. This value is used to construct a 95% confidence interval (CI) of the average effect size.

When a study included multiple effect sizes, the average effect size within the study was computed and used in the meta-analysis. This allowed us to avoid nonindependence of the data.

Meta-Analytic Results

Trait competitiveness. Table 1 reports the meta-analytic results for trait competitiveness. Overall, the average effect size is $r = .05$ (95% CI [.02, .08]). Although this effect is statistically significant (as indicated by the 95% CI that does not include 0), it is clearly of extremely small magnitude. Indeed, the .05 value falls considerably below a small effect size ($r = .10$; see Cohen, 1988).

Next, we conducted additional analyses to investigate the robustness of this finding (see Table 1). First, we excluded studies that had statistically significant standardized residuals (i.e., potential outlier studies; see Hedges & Olkin, 1985). The average effect size remained very small with these studies omitted ($r = .03$; 95% CI [.02, .05]). We then examined whether the effect size was moderated by the study characteristics that we coded. Specifically, we computed the effect size separately for each of the following categories: gender composition, age group, nationality, year of publication, and type of performance domain. As indicated in Table 1, none of the study characteristics may be seen as strongly moderating the relation between trait competitiveness and performance. The average effect size remained small to nonexistent (ranging from $r = .00$ to .11) within each category. We also conducted a meta-regression analysis (Borenstein et al., 2008) using the random-effects model (method of moments) to further test the linear or quadratic effects of age in the relationship between trait competitiveness and performance. The results showed no significant effects ($ps > .61$).

Perceived environmental competitiveness. Table 2 reports the meta-analytic results for perceived environmental competitiveness. Overall, the average effect size is extremely small and not statistically significant ($r = -.01$; 95% CI [–.06, .04]). Thus, perceived environmental competitiveness has no discernible influence on performance, and even if the observed effect were significant, it would be considered very small relative to a small effect size of $r = .10$.

As with trait competitiveness, we next conducted additional analyses to investigate the robustness of this finding (see Table 2). First, we excluded potential outlier studies (on the basis of statistically significant standardized residuals). The average effect size did not change as a function of these omissions ($r = -.02$; 95% CI [–.07, .03]). We then examined whether the effect size was moderated by the study characteristics that we coded. Again, as with

Table 1
Meta-Analysis on Trait Competitiveness

Analysis	*k* (total *N*)	Mean weighted *r*	95% CI	τ^2
Overall effect size	65 (14,721)	.05	[.02, .08]	.01**
Overall effect sizes excluding outliers	52 (12,246)	.03	[.02, .05]	.00
Effect sized based on gender composition				
Female dominant (male ratio is < .25)	8 (1,255)	.09	[−.01, .20]	.01
Male dominant (male ratio is > .75)	13 (1,959)	.10	[.03, .17]	.01
Mixed (male ratio is between .25 and .75)	40 (10,956)	.02	[−.01, .06]	.01*
Effect sizes for different age groups				
Non-adults (18 years old or younger)	10 (4,064)	.00	[−.05, .05]	.00
Adults (older than 18 years)	55 (10,657)	.06	[.03, .10]	.01**
Effect sizes inside and outside the U.S.				
U.S.	51 (10,665)	.05	[.02, .09]	.01**
Non-U.S.	9 (3,511)	.07	[−.01, .14]	.01
Effect sizes based on year of publication				
1980s and before	13 (3,044)	.04	[−.01, .09]	.00
1990s	21 (4,851)	.08	[.02, .15]	.01
2000s and after	31 (6,826)	.04	[−.00, .08]	.01*
Effect sizes for type of performance domain				
School	28 (8,879)	.03	[−.01, .06]	.00
Work	23 (3,958)	.10	[.04, .16]	.01*
Sports	3 (382)	.11	[−.09, .30]	.02

* $p < .05$. ** $p < .01$.

trait competitiveness, we computed the effect sizes separately for each of the different categories, namely, gender composition, age group, nationality, year of publication, and type of performance domain. As indicated in Table 2, none of the study characteristics may be seen as strongly moderating the link between perceived environmental competitiveness and performance. The average effect size remained small to nonexistent (ranging from $r = -.10$ to .11) within each category. We also conducted a meta-regression analysis to further test the linear or quadratic effects of age in the relationship between perceived environmental competitiveness and performance. The results showed no significant effects (*p*s > .28).

Structural competition. Table 3 reports the meta-analytic results for structural competition. Note that the effect size in this analysis is represented by *g*, a standardized mean difference. Overall, the average effect size is extremely small and not statistically significant ($g = .04$; 95% CI [−.08, .16]). Thus, structural competition has no discernible influence on performance, and even

Table 2
Meta-Analysis on Perceived Environmental Competitiveness

Analysis	*k* (total *N*)	Mean weighted *r*	95% CI	τ^2
Overall effect size	33 (11,439)	−.01	[−.06, .04]	.02**
Overall effect sizes excluding outliers	30 (10,646)	−.02	[−.07, .03]	.01**
Effect sized based on gender composition				
Female dominant (male ratio is < .25)	1 (508)	−.06	[−.23, .11]	n/a
Male dominant (male ratio is > .75)	1 (262)	−.10	[−.22, .02]	n/a
Mixed (male ratio is between .25 and .75)	27 (10,081)	−.01	[−.06, .05]	.02**
Effect sizes for age groups				
Non-adults (18 years old or younger)	23 (8,558)	−.04	[−.10, .02]	.02*
Adults (older than 18 years)	10 (2,881)	.05	[−.02, .13]	.01
Effect sizes inside and outside the U.S.				
U.S.	24 (9,271)	−.04	[−.10, .03]	.02**
Non-U.S.	9 (2,168)	.06	[−.02, .14]	.01
Effect sizes based on year of publication				
1980s and before	5 (1,469)	.07	[−.01, .15]	.00
1990s	9 (4,452)	−.07	[−.17, .03]	.02
2000s and after	19 (5,518)	−.00	[−.07, .07]	.02*
Effect sizes for type of performance domain				
School	20 (8,545)	−.06	[−.12, .01]	.02*
Work	6 (1,374)	.05	[−.07, .16]	.02
Sports	6 (1,225)	.11	[−.02, .23]	.02

* $p < .05$. ** $p < .01$.

Table 3
Meta-Analysis on Structural Competition

Analysis	*k* (total *N*)	Mean weighted *g*	95% CI	τ^2
Overall effect size	81 (5,887)	.04	[−.08, .16]	.22**
Overall effect sizes excluding outliers	69 (4,885)	.08	[−.02, .18]	.08**
Effect sized based on gender composition				
Female dominant (male ratio is < .25)	20 (844)	.03	[−.19, .25]	.10
Male dominant (male ratio is > .75)	20 (826)	−.01	[−.25, .22]	.16
Mixed (male ratio is between .25 and .75)	29 (2,391)	−.07	[−.32, .17]	.38*
Effect sizes for age groups				
Non-adults (18 years old or younger)	41 (2,930)	.00	[−.20, .20]	.34*
Adults (older than 18 years)	40 (2,957)	.09	[−.05, .22]	.12*
Effect sizes inside and outside the U.S.				
U.S.	61 (3,529)	.05	[−.07, .16]	.10**
Non-U.S.	20 (2,358)	.05	[−.25, .34]	.38*
Effect sizes based on year of publication				
1980s and before	52 (3,680)	.05	[−.13, .22]	.29**
1990s	17 (1,294)	−.01	[−.20, .19]	.09
2000s and after	12 (913)	.11	[−.14, .36]	.13
Effect sizes for type of performance task				
Motor/perceptual/sensory	33 (1,406)	−.10	[−.32, .11]	.27**
Cognitive	48 (4,481)	.13	[−.01, .27]	.17**

* $p < .05$. ** $p < .01$.

if the observed effect were significant, it would be considered very small (falling considerably below a small effect size of $g = .20$; see also Lipsey & Wilson, 2001). To establish comparability of the results across competition conceptualizations, we also transformed the effect size *g* into *r* (Hedges & Olkin, 1985) and integrated the results with a random effects model. This yielded a very small average effect size of $r = .02$ (95% CI [−.04, .08]).

As with trait competitiveness and perceived environmental competitiveness, we next conducted additional analyses to investigate the robustness of this finding (see Table 3). First, we excluded potential outlier studies (on the basis of statistically significant standardized residuals). The average effect size did not change as a function of these omissions ($g = .08$; 95% CI [−.02, .18]). We then examined whether the effect size was moderated by the study characteristics that we coded. Again, as with the preceding conceptualizations of competition, we computed the effect sizes separately for the categories gender composition, age group, nationality, and year of publication. We also investigated possible moderation by type of performance task. As indicated in Table 3, none of the study characteristics may be seen as strongly moderating the effect of structural competition on performance. The average effect size remained small to nonexistent (ranging from $g = -.10$ to .13) within each category. We also conducted a meta regression analysis to further test the linear or quadratic effects of age in the relationship between structural competition and performance. The results showed no significant effects (*p*s > .63).

Summary and integration. In sum, the meta-analytic results indicate that there is no discernible relation or, at very most, an extremely weak relation between competition and performance. Two of the three overall analyses exhibited a nonsignificant effect, and the one significant effect (for trait competitiveness) was so small as to be of trivial importance. This null or extremely small relation was also observed in the ancillary analyses omitting outlier studies, as well as the ancillary analyses focused on coded study characteristics.

In a final analysis, we combined all of the studies together, regardless of conceptualization of competition, to examine the omnibus competition–performance relation.

Specifically, we converted all of the *g* effect sizes into the *r* metric and applied a random effects model; care must be taken in interpreting the result from such an analysis, given the combining of different effect size metrics. The analysis ($k = 174$) revealed that the omnibus average effect size is extremely small and not statistically significant ($r = .03$; 95% CI [–.00, .06]). In short, the existing data lead to the conclusion that competition has no noteworthy relation with performance.

The Opposing Processes Model of Competition and Performance

As noted at the beginning of this article, there is a widespread belief among scholars that competition influences performance, with some theorists contending that the influence is positive and others contending that it is negative. Both sides of this argument are espoused vigorously, and this has been the case not just for decades but for centuries. In this context, our meta-analytic results are quite sobering, as they seem to suggest that neither side is correct; instead, they indicate that competition has no noteworthy relation with performance.

Although this finding may come as a surprise to some, it will likely resonate with others, such as those who have tried to review research on the competition–performance relation in narrative fashion. Surveying the literature in this way, one is struck by the preponderance of null results, coupled with occasional (often weak) findings in a positive or negative direction. Narrative reviewers have struggled with how to characterize the literature accordingly; for example, Chertkoff and Mesch (1997) stated the following: "Given the mixed research results, drawing conclusions about this literature has presented a difficult challenge" (p. 2; see also Hinsz, 2005; Lewis & Cooney, 1987). Our meta-analysis

provides an empirical basis for addressing this challenge, and our findings lead to the firm conclusion that there is no noteworthy relation between competition and performance.

Inconsistent Mediation

One possible response to our meta-analytic results is to declare that both sides of the argument regarding the competition–performance relation are wrong. An alternative response, however, is to recognize that our meta-analysis focuses on just one type of relation between competence and performance—the direct effect. It is possible to move beyond a focus on this direct effect to a consideration of the psychological processes evoked by competition that influence performance attainment. At present, there is a decided absence of theoretical and empirical work on mediational processes in this area of inquiry, and we believe that attending to such mediational processes will help illuminate the nature of the competition–performance relation. Indeed, we believe that a careful examination of mediation will reveal that both sides of the ongoing argument are not wrong, as the meta-analytic results might seem to suggest, but rather that both sides of the argument are actually right.

The lack of clarity to date regarding the direct effect between competition and performance is undoubtedly responsible for the absence of attention to mediational processes. The conventional wisdom on mediation in the psychological literature has long been that a direct effect between an independent and dependent variable must be documented before a mediational process can be considered (Baron & Kenny, 1986; Judd & Kenny, 1981; see also Hyman, 1955). In the past several years, however, this conventional wisdom has been refuted by methodologists who have identified a number of cases in which mediational analysis is valid in the absence of a direct effect (e.g., inconsistent mediation, distal mediation; Collins, Graham, & Flaherty, 1998; Kenny, Kashy, & Bolger, 1998; MacKinnon, Krull, & Lockwood, 2000; Shrout & Bolger, 2002). The emerging consensus in the literature is that the analysis of indirect effects can bear considerable fruit, regardless of the presence or absence of a direct effect (Judd & Kenny, 2010; MacKinnon, 2008; Preacher & Hayes, 2008b; Zhao, Lynch, & Chen, 2010).

In the present research, we argue that inconsistent mediation is operative in the competition–performance relation and that attending to this form of mediation will explain, both conceptually and empirically, the absence of a direct effect between competition and performance. Inconsistent mediation occurs "in multiple mediator models where mediated effects have different signs"; in such instances, "the overall relation . . . may actually be zero, yet there are two opposing mediational processes" (MacKinnon, Fairchild, & Fritz, 2007, p. 602). That is, in inconsistent mediation, a null direct effect masks the operation of two different mediational processes: one that has a positive influence on the dependent variable and another that has a negative influence on the dependent variable. Here we propose that competition evokes two distinct mediational processes, one that facilitates performance and one that undermines performance. Specifically, we posit performance-approach and performance-avoidance achievement goals as joint mediators of the competition–performance relation.

Performance-Approach and Performance-Avoidance Achievement Goals

In achievement settings, general appetitive or aversive concerns are evoked by dispositional tendencies and situational construals/affordances. These desires or fears are presumed to energize behavior but do not provide specific guidelines for how one may accomplish or address the desire or fear that has been activated (Elliot, 1999). Individuals commonly adopt more concrete aims or goals that help them guide and direct their behavior with regard to more specific competence-relevant possibilities (Elliot & Church, 1997). These achievement goals function as concrete tools that individuals use to strategically regulate their general desires and fears about success and failure. In prior work, we have conceptualized achievement goals as proximal predictors of achievement-relevant outcomes (Elliot & Church, 1997); here we take the additional step of casting them as mediator variables that explain the indirect influence of dispositional tendencies and situational construals/affordances on achievement-relevant outcomes.

Achievement goals vary with regard to two basic aspects of competence—definition and valence (Elliot & McGregor, 2001). Competence is defined by its standard of evaluation, and three standards may be identified: a task-based standard (how one is doing compared to what the task demands), a self-based standard (how one is doing compared to one's own intrapersonal trajectory), and an other-based standard (how one is doing compared to others). Competence is valenced by its positive focus on success or its negative focus on failure. The two achievement goals most pertinent to the present research, performance-approach goals and performance-avoidance goals, are both grounded in an other-based standard and focus on a positive or negative normative possibility, respectively. That is, performance-approach goals represent trying to do well relative to others, and performance-avoidance goals represent trying to avoid doing poorly compared to others.

In the present research, we conceptualize performance-approach and performance-avoidance goals as mediator variables in an explanatory account of the competition–performance relation that we call the opposing processes model of competition and performance (see Figure 1b). Research indicates that competition activates social comparison processes and shifts attention to normative standards of evaluation (Ames & Ames, 1984; Mussweiler, 2003; Tesser, 1988). In addition, there are hints in the literature that competition is associated with both appetitive and aversive processes such as excitement and anxiety (Ames, Ames, & Felker, 1977; Fletcher & Nusbaum, 2008; Heggestad & Kanfer, 2000; Ross, Rausch, & Canada, 2003). Accordingly, we posit that competition positively predicts the adoption of both performance-approach and performance-avoidance goals (Paths 1 and 3 in Figure 1b). That is, individuals are posited to regulate their competitive concerns—whether evoked by dispositional tendencies, situational construals, or structural features of the achievement environment—by adopting and pursuing specific aims focused on outperforming or not being outperformed by their peers.

Performance-approach goals have been shown to be associated with challenge-based affect, cognition, and behavior (e.g., eagerness, task-absorption, persistence) that tend to facilitate performance, whereas performance-avoidance goals have been linked with threat-based affect, cognition, and behavior (e.g., worry, task distraction, self-handicapping) that tend to undermine performance

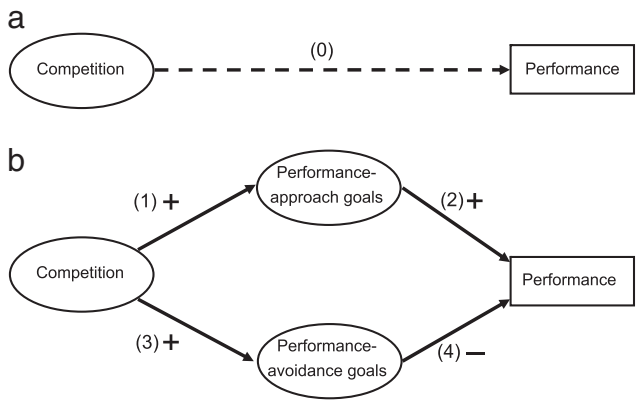

Figure 1. A schematic of our hypothesized model linking competition and performance. Competition does not have a direct effect on performance (a), but this is due to the positive indirect effect of performance-approach goals and the negative indirect effect of performance-avoidance goals (b; the opposing processes model of competition and performance). The dashed line represents a null (or weak) effect; the solid lines represent a positive (+) or negative (–) effect.

(Brodish & Devine, 2009; Darnon, Butera, Mugny, Quiamzade, & Hulleman, 2009; Elliot, McGregor, & Gable, 1999; Sideridis, 2005; Urdan & Midgley, 2001; Vallerand et al., 2007). As such, it is not surprising that a considerable amount of research has documented performance-approach goals as a positive predictor of performance outcomes and performance-avoidance goals as a negative predictor (for reviews, see Elliot, 2005; Hulleman, Schrager, Bodmann, & Harackiewicz, 2010; Kaplan & Maehr, 2007). In accord with this research, in the proposed model we posit performance-approach and performance-avoidance goals as positive and negative predictors of performance, respectively (Paths 2 and 4 of Figure 1b). Furthermore, we posit that these two achievement goals jointly mediate the relation between competition and performance and that these joint processes explain the absence of a direct effect revealed in our meta-analytic review (Figure 1a). Thus, competition is viewed as facilitating performance to the extent that it prompts performance-approach goal pursuit and is viewed as undermining performance to the extent that it prompts performance-avoidance goal pursuit; the combination of these mutually opposing processes is posited to mask the fact that competition actually has an important impact on performance outcomes. Note that this model is not only consistent with the extant research revealing no overall, direct influence of competition on performance but also accommodates both of the contrasting positions on the competition–performance relation described at the outset of this article. In the following, we present an additional meta-analysis (using meta-analytic structural equation modeling) and three new empirical studies that are designed to test the opposing processes model of competition and performance.

Meta-Analytic Structural Equation Modeling

Meta-analysis is commonly used to synthesize prior empirical research on the relation between two variables (as in the meta-analysis reported above), but it is also possible to use meta-analysis to test a new theoretical model (N. Miller & Pollock, 1995). Herein we used meta-analytic structural equation modeling (MASEM; Cheung & Chan, 2005; Viswesvaran & Ones, 1995) to test the validity of the opposing processes model of competition and performance as represented in the extant data on the variables in the model: competition, performance-approach goals, performance-avoidance goals, and performance. In our MASEM analysis, we first meta-analyzed the correlations of all of the possible pairs of these variables (i.e., competition and performance-approach goals, competition and performance-avoidance goals, competition and performance, performance-approach goals and performance-avoidance goals, performance-approach goals and performance, performance-avoidance goals and performance) to compute a pooled correlation matrix. Then, we applied a structural equation model to the obtained pooled correlation matrix to test our model (Figure 1b). MASEM allows us to not only estimate path coefficients but also evaluate the fit of the model to the meta-analytic data. If all of the path coefficients in Figure 1b (Paths 1–4) were statistically significant and model fit were good, this would provide supportive evidence that the observed weak relation between competition and performance in the previous meta-analysis could be explained by inconsistent mediational processes involving performance-approach and performance-avoidance goals. Note that even if all of the path coefficients were statistically significant, model fit could be bad (Kline, 2005); this would indicate that the weak competition–performance relation is not well accounted for by the proposed inconsistent mediation (e.g., the magnitude of one indirect effect may be substantially larger than that of the other indirect effect, making the cancelation effect incomplete).

Sample of Studies

The studies included in this meta-analysis were identified via a thorough search of the literature for studies written in English and published by April 2011 that investigated the relations of at least two variables of interest in our model (i.e., competition, performance-approach goals, performance-avoidance goals, and performance) with human participants. Our previous meta-analysis already sampled the studies on the relation between competition and performance; accordingly, our literature search focused on the remaining five relations (i.e., competition and performance-approach goals, competition and performance-avoidance goals, performance-approach goals and performance-avoidance goals, performance-approach goals and performance, performance-avoidance goals and performance).

The study collection procedure was analogous to that used for our previous meta-analysis. First, we searched PsycINFO and ERIC using pairs of keywords, each of which represents the variables of interest in our model. As in the previous meta-analysis, the search terms representing competition included *competition*, *competitive*, *competitiveness*, *hypercompetition*, *hypercompetitive*, *reward structure*, *goal structure*, and *motivational climate*; likewise, the search terms representing performance included *performance*, *achievement*, *attainment*, *accomplishment*, and *productivity*. The search terms representing achievement goals were those used in Hulleman et al.'s (2010) recent meta-analysis on achievement goals and performance: *performance-approach, performance approach, performance-avoidance, performance avoidance, performance*, and *achievement goals*. Second, there is

no prior comprehensive meta-analysis on competition and performance-approach goals or competition and performance-avoidance goals, so all studies for these relations were retrieved anew. For the relations between performance-approach goals, performance-avoidance goals, and performance, we ensured that all published studies used in the most recent comprehensive meta-analysis on achievement goals and performance (Hulleman et al., 2010) were retrieved. Indeed, we were able to acquire the actual database from this meta-analysis to use as a foundation for our study collection;[3] this database stopped at 2006, so we continued the study collection process to add all applicable studies published in 2007 and thereafter in accord with the search criteria delineated above. As noted above, the database for the competition and performance relation was the same as that used in our prior meta-analysis. Third, we searched for additional studies citing any of the major scales used to assess trait competitiveness, perceived environmental competitiveness, or achievement goals (e.g., Elliot & McGregor, 2001; Midgley et al., 1998; Smither & Houston, 1992). Fourth, we searched for additional studies by major contributors to the literatures on the relations under consideration (e.g., Andrew Elliot, Judith Harakiewicz, Robert Helmreich, David Johnson, Roger Johnson, Carol Midgley). Finally, we searched the reference sections of the relevant retrieved studies for additional relevant studies. We reviewed the abstracts of these retrieved studies and eliminated those that were clearly not relevant to the relations under consideration.

We then screened the resulting pool of studies on the following inclusion criteria. Studies were included if (a) the study dealt specifically with the relation between the variables of interest (competition, performance-approach goals, performance-avoidance goals, and performance), and (b) the study contained sample sizes and at least one zero-order correlation for the variables of interest at the individual level. There were a few studies that experimentally manipulated achievement goals with a neutral control condition; these studies were included after converting the *g* effect sizes into the *r* metric. The operational definitions of competition and performance were the same as those used in the previous meta-analysis. For performance-approach and performance-avoidance goals, we included all studies in which authors explicitly distinguished between these two types of goals (regardless of the labels used); studies that focused only on omnibus performance goals (i.e., studies not separating the approach and avoidance components of performance goals) were excluded. Following Hulleman et al. (2010), to retain a precise focus on studies of achievement goals defined as representations of desired or undesired end states (Austin & Vancouver, 1996; Elliot & Fryer, 2008; Harackiewicz & Sansone, 1991; Kruglanski, 1996), we excluded studies in which goals were measured with statements of positive affect rather than goal-relevant language (e.g., "I feel successful when . . ."; Duda & Nicholls, 1992).

Our search produced the following number of studies for the MASEM. For the competition and performance-approach goal relation, 35 articles were identified, yielding a final sample of 36 studies using 17,669 participants. For the competition and performance-avoidance goal relation, 31 articles were identified, yielding a final sample of 32 studies using 14,794 participants. For the performance-approach goal and performance-avoidance goal relation, 233 articles were identified, yielding a final sample of 287 studies using 103,263 participants. For the performance-approach goal and performance relation, 113 articles were identified, yielding a final sample of 136 studies using 42,749 participants. For the performance-avoidance goal and performance relation, 101 articles were identified, yielding a final sample of 123 studies using 36,622 participants. For the competition and performance relation, the sample is the same as that in the previous meta-analysis. In all, our MASEM has a total sample of 474 studies with 139,464 participants. In the current MASEM, we did not distinguish between the three conceptualizations of competition (i.e., trait competitiveness, perceived environmental competitiveness, and structural competition), because it is not possible to apply this distinction to the studies that assessed only performance-approach goals, performance-avoidance goals, and performance (or any two of these variables). The studies included in the MASEM are listed in the Appendix.

MASEM Procedure

MASEM is generally conducted in two steps. First, all correlations are meta-analyzed to compute a pooled correlation matrix. Second, structural equation modeling (SEM) is applied to this pooled correlation matrix to test a model. In conducting our MASEM analysis, we used a recently developed technique called two-stage structural equation modeling (Cheung & Chan, 2005). In this approach, the pooled correlation matrix is estimated by multivariate meta-analysis (see Gleser & Olkin, 2000) within the framework of SEM (Cheung, in press; see also Cheung, 2008). In this process, if a study does not have all relevant correlations, these nonexisting correlations are treated as missing data. Then, the obtained pooled correlation matrix is placed into an asymptotic distribution-free SEM to test the model, using an asymptotic covariance matrix of the pooled correlations as the weight matrix. This approach has a number of advantages over traditional MASEM methods (e.g., Viswesvaran & Ones, 1995). For example, because this approach simultaneously estimates pooled correlations with a full information maximum likelihood function, parameter estimates are much less biased than they are with traditional methods, especially when there are substantial missing correlations (see Enders, 2006). This is of particular importance in our context, given that there are only a few studies that included all of the variables of interest (none of which tested the proposed model). In addition, because an asymptotic covariance matrix of the pooled correlations is used as the weight matrix, we are able to estimate standard errors precisely. Traditional methods simply use the point estimate of the pooled correlation matrix and the sample size is determined by an arbitrary criterion (Cheung & Chan, 2005); as such, variations of the estimated correlations are ignored.

All data analyses were conducted using metaSEM (Cheung, 2011) and OpenMx (Boker et al., 2011) packages in R. A random effects model was used. When a study included multiple effect sizes, the average effect size within the study was computed and used in the meta-analysis.

MASEM Results

The pooled correlation matrix obtained from multivariate meta-analysis is reported in Table 4. Consistent with the previous

[3] We thank Christopher Hulleman for allowing us access to the database.

Table 4
Multivariate Meta-Analysis Results on the Correlations Between Competition, Performance-Approach Goals, Performance-Avoidance Goals, and Performance

Variable	1	2	3	4
1. Competition	—			
2. Performance-approach goals	.41 [.36, .46]	—		
3. Performance-avoidance goals	.30 [.25, .35]	.41 [.38, .43]	—	
4. Performance	.03 [−.00, .06]	.10 [.08, .12]	−.12 [−.14, −.10]	—

Note. $k = 472$ ($N = 139{,}388$). Numbers in square brackets represent 95% confidence intervals.

(univariate) meta-analysis, the correlation between competition and performance is very weak and not statistically significant ($r = .03$; 95% CI [−.00, .06]). Note that the values are slightly different from the previous meta-analysis, because multivariate meta-analysis takes into account the covariation with the other correlations (see Gleser & Olkin, 2000). The other correlations are all statistically significant.

Of central importance, MASEM supported our hypothesized model (Figure 1b). As predicted, competition was positively associated with performance-approach goals ($\beta = .41$; 95% CI [.36, .47]) and performance-avoidance goals ($\beta = .29$; 95% CI [.24, .34]). In addition, performance-approach goals were positively associated with performance ($\beta = .15$; 95% CI [.12, .17]), whereas performance-avoidance goals were negatively associated with performance ($\beta = -.17$; 95% CI [−.19, −.15]). Importantly, the model provided a good fit to the data: $\chi^2(1) = 1.03$, $p = .31$, CFI = 1.00, TLI = 1.00, RMSEA = 0.000. This suggests that the weak relationship between competition and performance is explained by an inconsistent mediational process involving performance-approach and performance-avoidance goals.

Next, we used a (parametric) bootstrapping approach to test the significance of the indirect effects (see MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002). The analyses showed that both the positive indirect effect (competition → performance-approach goals → performance) and the negative indirect effect (competition → performance-avoidance goals → performance) were significant (estimates = .06 and –.05, respectively, ps $< .01$). Table 5 summarizes the obtained results.

Summary

The MASEM results indicated that competition is not directly related to performance but is indirectly related via achievement goals. Performance-approach and performance-avoidance goals were validated as mutually opposing mediators of the competition–performance relation, and it is these opposing processes that produced the weak direct relation between competition and performance observed in the previous meta-analysis.

New Empirical Studies

MASEM is a flexible and powerful data analytic tool, and our use of MASEM herein yielded clear support for the validity of our hypothesized opposing processes model of competition and performance. Our original meta-analytic results were included within the MASEM analysis; thus, the MASEM results effectively documented that the weak competition–performance relation observed in our original meta-analysis can be explained by the opposing processes model. However, the MASEM approach to testing our model is post hoc and indirect, and there are some inherent limitations to using this approach to test the specific research questions under consideration.

First, as noted earlier, it is not possible to distinguish between the three conceptualizations of competition (i.e., trait competitiveness, perceived environmental competitiveness, and structural competition) in our MASEM analysis, because this distinction cannot be applied to the many studies that assessed only perfor-

Table 5
Path Coefficients and Indirect Effects in MASEM and Studies 1–3

	Direct effect model (Figure 1a)	Opposing processes model of competition and performance (Figure 1b)					
		Effect via performance-approach goals			Effect via performance-avoidance goals		
	(0) Competition to performance	(1) Competition to Pap goals	(2) Pap goals to performance	Indirect effect	(3) Competition to Pav goals	(4) Pav goals to performance	Indirect effect
MASEM	0.03	0.41**	0.15**	0.06**	0.29**	−0.17**	−0.05**
Study 1	0.03	0.50**	0.42**	0.21**	0.33**	−0.46**	−0.15**
Study 2	0.09	0.35**	0.44**	0.15*	0.25**	−0.45**	−0.11**
Study 3	−0.13	0.39**	0.44*	0.17*	0.46**	−0.45*	−0.20*

Note. Numbers in parentheses correspond to those in Figure 1. MASEM = meta-analytic structural equation modeling; Pap = performance-approach; Pav = performance-avoidance.
* $p < .05$. ** $p < .01$.

mance-approach goals, performance-avoidance goals, and performance (or two of these variables). Second, some of the relations in the MASEM model may be seen as susceptible to confounding variables that could inflate the observed relation. For example, prior research has shown that perceptions of competence are positively associated with both performance-approach goals and performance (e.g., Elliot & Church, 1997; Marsh & Craven, 2006); as such, the observed link between performance-approach goals and performance in the MASEM analyses could be inflated or even spurious. MASEM focuses on simple zero-order correlations and cannot address this possibility. Third, in many, if not most, of the studies contributing to the MASEM analysis, the data were collected in a single session, which can also lead to covariate inflation. The temporal separation of construct assessments is recommended to address this problem (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). Fourth, there is considerable variation in the achievement goal assessments included in our MASEM analysis, and some measures include content unrelated to the performance-approach and performance-avoidance goal constructs (e.g., self-presentation concerns, self-worth concerns; Elliot & Murayama, 2008; Elliot et al., 2011). Hulleman et al. (2010) have shown that these nuisance factors in achievement goal measures artificially depress relations between achievement goals and performance.

In light of these limitations, we deemed it important to supplement our MASEM findings with new empirical studies designed to put the opposing processes model to direct empirical test while also attending to the aforementioned issues. In the following, we present three such studies, each of which tested the model using a different conceptualization of competition—trait competitiveness (Study 1), perceived environmental competitiveness (Study 2), and structural competition (Study 3). In each of the studies, we included measures of perceived or prior competence and other possible confounding variables to examine the robustness of the focal relations. Furthermore, we designed Studies 1 and 2 to include considerable temporal separation between the competition, achievement goal, and performance assessments to minimize the likelihood of covariation inflation. Finally, we used recently developed achievement goal assessments that were explicitly designed to eliminate construct contamination. Supportive data from these new studies would nicely complement our MASEM results, and the two sets of findings together would represent a particularly powerful validation of the opposing processes model of competition and performance. Table 6 lists the primary variables focused on in each of the three studies and provides descriptive statistics for these variables.

Study 1

In Study 1, we tested the hypothesized model in the context of a college classroom using trait competitiveness as the independent variable, exam performance as the dependent variable, and classroom achievement goals as mediator variables. We expected a null relation between trait competitiveness and exam performance but anticipated that this null effect would be explained by the opposing influences of performance-approach goals (positive) and performance-avoidance goals (negative). We examined the focal relations controlling for possible confounding variables to ensure that any observed findings were not mere artifacts of these other variables. Control variables included participants' general ability (SAT scores), perceived ability (general perceived competence and specific competence expectancies), and response bias (impression management and self-deceptive enhancement).

Method

Participants. A total of 301 (110 male, 191 female) students at a U.S. university participated in return for extra course credit. In this and all subsequent studies, participation was restricted to native English speakers. Participants were enrolled in an introductory-level psychology course where evaluation was based on a normative grading structure. The mean age of participants was 19.60; ethnicity was as follows: 216 Caucasian, 26 African American, 28 Asian, 17 Hispanic, and 14 unspecified.

Procedure. Participants reported their demographic information and their verbal SAT score in a large group session during the first week of the semester. Later that same week, they completed measures of trait competitiveness and general perceived competence in a take-home questionnaire packet. The following week, they completed a measure of response bias in another take-home

Table 6
Descriptive Statistics and Internal Consistencies of the Main Variables in Studies 1–3

Variable	*M*	*SD*	Observed range	Cronbach's α
Study 1				
Trait competitiveness	3.39	0.82	1.00–5.00	.77
Performance-approach goals	4.71	1.51	1.00–7.00	.93
Performance-avoidance goals	4.57	1.47	1.00–7.00	.89
Exam performance	77.4	13.0	31–100	
Study 2				
Perceived class competitiveness	2.59	1.05	1.00–5.00	.91
Performance-approach goals	3.72	1.08	1.00–5.00	.94
Performance-avoidance goals	3.40	1.20	1.00–5.00	.94
Exam performance	83.6	11.1	44–100	
Study 3				
Performance-approach goals	6.43	1.80	2.33–9.00	.92
Performance-avoidance goals	6.22	1.90	1.33–9.00	.86
Baseline anagram performance	5.16	2.96	0–15	
Postmanipulation anagram performance	6.02	3.14	0–14	

questionnaire packet. Participants reported their performance-approach and performance-avoidance goals for the class, as well as their competence expectancy for the class, in a large group session approximately 3 weeks later (1 week prior to their first exam). Exam performance data (possible range = 0–100) were acquired from the course instructor. For all assessments, participants were assured that their responses would remain confidential and would in no way influence their course grade.

Measures. Spence and Helmreich's (1983) five-item competitiveness measure from the WOFO scale was used to assess trait competitiveness (e.g., "I feel that winning is important in both work and games"). Participants responded on a 1 (*strongly disagree*) to 5 (*strongly agree*) scale ($\alpha = .77$). Elliot et al.'s (2011) achievement goal measure was used to assess participants' performance-approach goals (three items, e.g., "[My goal is] to do better than my classmates on the exams in this class") and performance-avoidance goals (three items, e.g., "[My goal is] to avoid doing worse than other students on the exams in this class"). Participants responded on a 1 (*strongly disagree*) to 7 (*strongly agree*) scale (αs = .93 and .89, respectively).

Several measures were used to assess control variables (in addition to participants' verbal SAT score). Law, Elliot, and Murayama's (2012) four-item General Perceived Competence measure was used to assess broad perceptions of ability (e.g., "I do well at most things I try"). Participants responded on a 1 (*strongly disagree*) to 5 (*strongly agree*) scale ($\alpha = .82$). Elliot and Church's (1997) two-item measure was used to assess competence expectancies for the class (e.g., "I expect to do well in this class"). Participants responded on a 1 (*strongly disagree*) to 7 (*strongly agree*) scale ($\alpha = .85$). Response bias was assessed with two 20-item subscales from Paulhus's (1991) Balanced Inventory of Desirable Responding. The subscales include impression management (IM) and self-deceptive enhancement (SDE). Participants responded on a 1 (*not true*) to 7 (*very true*) scale; half of the items for each subscale represent desirable statements (IM, e.g., "I always obey laws, even if I'm unlikely to get caught"; SDE, e.g., "I always know why I like things"), and half represent undesirable statements (IM, e.g., "When I was young I sometimes stole things"; SDE, e.g., "I have not always been honest with myself"). Participants received one point for each extreme response (αs = .68 and .72 for IM and SDE, respectively).

Results and Discussion

In this and all subsequent studies, the full information maximum likelihood method was used to avoid loss of information due to missing data (Enders, 2006; Schafer & Graham, 2002).

Trait competitiveness as a direct predictor of exam performance. First, we examined trait competitiveness as a direct predictor of exam performance (see Figure 1a). We used a latent variable model to prevent false negative (i.e., null) effects due to attenuation caused by measurement error (Bollen, 1989). Trait competitiveness was represented as a latent variable (with individual items as indicators), whereas exam performance was represented as an observed variable. As expected, trait competitiveness was not a significant predictor of exam performance ($\beta = .03$, $p = .63$).

The mediational model. We then investigated the hypothesized opposing processes model in which performance-approach and performance-avoidance goals serve as joint mediators of the indirect relation between trait competitiveness and exam performance (see Figure 1b). Trait competitiveness, performance-approach goals, and performance-avoidance goals were modeled as latent variables (with individual items as indicators), whereas exam performance was represented as an observed variable. In this and all subsequent studies, we allowed for correlated errors of the performance-approach and performance-avoidance goal variable, as recommended in multiple mediator models (Preacher & Hayes, 2008a).

As predicted, trait competitiveness was a positive predictor of both performance-approach goals ($\beta = .50$, $p < .01$) and performance-avoidance goals ($\beta = .33$, $p < .01$). In addition, performance-approach goals were a positive predictor of exam performance ($\beta = .42$, $p < .01$), whereas performance-avoidance goals were a negative predictor ($\beta = -.46$, $p < .01$). The model provided a good fit to the data: $\chi^2(50) = 114.23$, $p < .01$, CFI = .95, TLI = .93, RMSEA = .065, indicating that the weak direct effect can be explained by the opposing effects of performance-approach and performance-avoidance goals. We used a bootstrapping approach to test the significance of the indirect effects (MacKinnon et al., 2002). The analyses showed that both the positive indirect effect (trait competitiveness → performance-approach goals → exam performance) and the negative indirect effect (trait competitiveness → performance-avoidance goals → exam performance) were significant (standardized estimates = .21 and –.15, respectively, ps < .01). Table 5 summarizes the obtained results.

Control variable analyses. Next, we repeated each of the above analyses controlling for variables that could influence the focal relations. Specifically, we (independently) controlled for SAT score, general perceived competence, competence expectancies for the class, and IM and SDE response biases. As may be seen in Table 7, each of the nonsignificant (direct effect) and significant (indirect effect) findings from the primary analyses remained the same in these analyses.

In sum, the results indicate that trait competitiveness is not a direct predictor of exam performance but is an indirect predictor via achievement goals. Performance-approach and performance-avoidance goals were validated as mutually opposing mediators of the trait competitiveness-performance relation, and it is these opposing processes that produced the null direct relation between trait competitiveness and performance. The obtained results were not a function of participants' general ability (SAT score), perceived ability (general perceived competence and specific competence expectancies), or response bias (impression management and self-deceptive enhancement).

Study 2

Study 2 sought to conceptually replicate Study 1 using perceptions of class competitiveness, rather than trait competitiveness, as the independent variable. Again we examined the focal relations controlling for the possible confounding variables used in Study 1.

Method

Participants. A total of 240 (75 male, 165 female) students at a U.S. university participated in return for extra course credit.

Table 7
Path Coefficients and Indirect Effects With Controlling Variables in Studies 1 and 2

	Direct effect model (Figure 1a)	Opposing processes model of competition and performance (Figure 1b)					
		Effect via performance-approach goals			Effect via performance-avoidance goals		
	(0) Competition to performance	(1) Competition to Pap goals	(2) Pap goals to performance	Indirect effect	(3) Competition to Pav goals	(4) Pav goals to performance	Indirect effect
Study 1	0.03/−0.02	0.50**/0.51**	0.42**/0.35**	0.21**/0.18**	0.33**/0.36**	−0.46**/−0.36**	−0.15**/−0.13**
	0.04/0.01	0.50**/0.48**	0.42**/0.35**	0.21**/0.17**	0.35**/0.33**	−0.46**/−0.41**	−0.17**/−0.14**
	0.05/0.05	0.50**/0.50**	0.42**/0.41**	0.21**/0.20**	0.32**/0.34**	−0.44**/−0.45**	−0.14**/−0.15**
Study 2	0.09/0.11	0.35**/0.34**	0.44*/0.45**	0.15**/0.15**	0.25**/0.24**	−0.45**/−0.44**	−0.11**/−0.10**
	0.08/0.06	0.35**/0.32**	0.43**/0.32**	0.15**/0.10*	0.25**/0.25**	−0.44**/−0.36**	−0.11**/−0.09*
	0.09/0.08	0.35**/0.36**	0.45**/0.50**	0.16**/0.18**	0.24**/0.24**	−0.46**/−0.52**	−0.11**/−0.12**

Note. Numbers in parentheses correspond to those in Figure 1. For each column and variable, the first value is from the initial analysis, the second value is from the analysis controlling for SAT score, the third value is from the analysis controlling for general perceived competence, the fourth value is from the analysis controlling for competence expectancies for the class, the fifth value is from the analysis controlling for impression management, and the sixth value is from the analysis controlling for self-deceptive enhancement. Pap = performance-approach; Pav = performance-avoidance.
* $p < .05$. ** $p < .01$.

Participants were enrolled in an introductory-level psychology course where evaluation was based on a normative grading structure. The mean age of participants was 19.15; ethnicity was as follows: 176 Caucasian, 10 African American, 32 Asian, 11 Hispanic, and 11 unspecified.

Procedure. As in Study 1, participants reported their demographic information and their verbal SAT score in a large group session at the beginning of the first week of the semester. At the end of the first week, they completed a measure of general perceived competence in a take-home questionnaire packet. During the second week of the semester, participants completed a perceived class competitiveness measure and a response bias measure in another take-home questionnaire packet. Participants reported their performance-approach and performance-avoidance goals for their midterm exam, as well as their competence expectancy for the exam, in a large group session approximately 2 months later (1 week prior to the exam). Exam performance data were acquired from the course professor (possible range = 0–100). For all assessments, participants were assured that their responses would remain confidential and would in no way influence their course grade.

Measures. To assess perceived class competitiveness, we created a five-item face valid measure for this study (e.g., "In this class, it seems that students are competing with each other"). Participants responded on a 1 (*strongly disagree*) to 5 (*strongly agree*) scale ($\alpha = .91$). Elliot and Murayama's (2008) achievement goal measure was used to assess participants' performance-approach goals (three items, e.g., "My goal is to perform better than the other students on the exam") and performance-avoidance goals (three items, e.g., "My goal is to avoid performing poorly compared to others on the exam"). Participants responded on a 1 (*strongly disagree*) to 5 (*strongly agree*) scale (αs = .94 and .84, respectively).

For control variables, in addition to participants' verbal SAT score, we assessed their general perceived competence ($\alpha = .82$) and response bias (IM and SDE; αs = .67 and .70) with the same measures used in Study 1. Competence expectancies were assessed with the same measure used in Study 1 ($\alpha = .87$) but focused on the exam, not the class.

Results and Discussion

Perceived class competitiveness as a direct predictor of exam performance. Analogous to Study 1, we first examined perceived class competitiveness as a direct predictor of exam performance. We used a latent variable model; perceived class competitiveness was represented as a latent variable (with individual items as indicators), whereas exam performance was represented as an observed variable. As expected, perceived class competitiveness was not a significant predictor of exam performance ($\beta = .09$, $p = .15$).

The mediational model. We then investigated the hypothesized opposing processes model in which performance-approach and performance-avoidance goals serve as joint mediators of the indirect relation between perceived class competitiveness and exam performance. Perceived class competitiveness, as well as performance-approach and performance-avoidance goals, were modeled as latent variables with individual items as indicators, whereas exam performance was represented as an observed variable.

As predicted, perceived class competitiveness was a positive predictor of both performance-approach goals ($\beta = .35$, $p < .01$) and performance-avoidance goals ($\beta = .25$, $p < .01$). In addition, performance-approach goals were a positive predictor of exam performance ($\beta = .44$, $p < .01$), whereas performance-avoidance goals were a negative predictor ($\beta = -.45$, $p < .01$). Again, the model provided a good fit to the data: $\chi^2(50) = 110.95$, $p < .01$, CFI = .96, TLI = .95, RMSEA = .071, indicating that the weak direct effect can be explained by the opposing effects of performance-approach and performance-avoidance goals. Testing the significance of the indirect effects (as in Study 1) showed that both the positive indirect effect (perceived class competitiveness → performance-approach goals → exam performance) and the negative indirect effect (perceived class competitiveness → perfor-

mance-avoidance goals → exam performance) were significant (standardized estimates = .15 and –.11, respectively, *p*s < .01). The results are summarized in Table 5.

Control variable analyses. Again, we repeated each of the above analyses controlling for variables that could influence the focal relations. Specifically, we (independently) controlled for SAT score, general perceived competence, competence expectancies for the exam, and IM and SDE response biases. As may be seen in Table 7, each of the nonsignificant (direct effect) and significant (indirect effect) findings from the primary analyses remained the same in these analyses.

In sum, the results indicate that perceived class competitiveness is not a direct predictor of exam performance but is an indirect predictor via achievement goals. Performance-approach and performance-avoidance goals were validated as mutually opposing mediators of the perceived class competitiveness-performance relation, and it is these opposing processes that produced the null direct relation. The obtained results were not a function of participants' general ability (SAT score), perceived ability (general perceived competence and specific competence expectancies), or response bias (impression management and self-deceptive enhancement).

Study 3

In Study 3, we sought to conceptually replicate Studies 1 and 2 using structural competition, rather than trait competitiveness or perceptions of competitiveness, as the independent variable, and anagram performance as the dependent variable. That is, we manipulated competition in the lab and examined the effect of this manipulation on anagram performance both directly and via task-specific performance-approach and performance-avoidance goals. We included a baseline performance measure to ensure that any observed relations with task performance would not be a mere artifact of preexisting differences in ability.

Method

Participants and experimental design. Fifty-six (14 male, 42 female) students at a U.S. university participated in return for extra course credit. The mean age of participants was 19.83, and ethnicity was as follows: 43 Caucasian, 11 Asian, 1 Hispanic, and 1 unspecified. Participants were randomly assigned to either a competition condition or a control condition.

Procedure and materials. The experiment was run with two participants at a time; the participants were placed in adjoining lab rooms but never saw or interacted with each other in any way. Once both participants arrived, the experimenter opened the doors to the individual lab rooms and stood between the rooms to provide instructions to the two participants simultaneously.

First, participants were instructed to complete the practice (baseline) anagram task for 5 min. Then, participants in the competition condition were informed that they would complete another version of the 5-min anagram task but that this time they would do so in competition with the person in the other room. They were asked to try their best in competing against the other person and were told that they would receive information regarding their score and whether they had won, lost, or tied after completion of the task. Participants in the control condition were simply informed that they would complete another version of the 5-min anagram task. They were asked to try their best in solving the anagrams and were told that they would receive information regarding their score after completion of the task (see Tauer & Harackiewicz, 1999, for a similar manipulation). Immediately following the manipulation, participants reported their performance-approach and performance-avoidance goals for the upcoming anagram task using Elliot and Murayama's (2008) achievement goal measure on a 1 (*strongly disagree*) to 9 (*strongly agree*) scale (αs = .92 and .86, respectively). Then participants completed the (postmanipulation) anagram task.

We used anagrams for the experimental task, because previous research has shown that anagrams are sensitive to motivational manipulations (e.g., Elliot, Maier, Moller, Friedman, & Meinhardt, 2007; A. Miller & Hom, 1990). We developed two different sets of anagram tasks (one for baseline and one for postmanipulation), both of which involved solving 16 five-letter, single-solution anagrams over a 5-min period. The anagram sets were derived from a published list (Mayzner & Tresselt, 1966), and the anagram items were selected on the basis of average solution time to ensure that each set would represent a moderate level of difficulty.

Results and Discussion

Competition manipulation as a direct predictor of anagram performance. First, we examined the direct effect of the competition manipulation on postmanipulation anagram performance controlling for baseline anagram performance (to increase the statistical power to detect the direct effect). We used structural equation modeling; the competition manipulation (competition = +1, control = 0), baseline anagram performance, and postmanipulation anagram performance were all represented as observed variables. Baseline anagram performance was a positive predictor of postmanipulation anagram performance (β = .61, $p < .01$); as expected, the competition manipulation did not have a significant effect on postmanipulation anagram performance (β = –.13, $p = .32$).

The mediational model. We then investigated the hypothesized opposing processes model in which performance-approach and performance-avoidance goals serve as joint mediators of the indirect relation between the competition manipulation and postmanipulation anagram performance (controlling for baseline anagram performance). Given the modest sample size in the experiment, performance-approach and performance-avoidance goals, as well as the competition manipulation, baseline anagram performance, and postmanipulation anagram performance, were represented as observed variables.

As predicted, the competition manipulation had a positive influence on both performance-approach goals (β = .39, $p < .01$) and performance-avoidance goals (β = .46, $p < .01$). Baseline anagram performance was a positive predictor of postmanipulation anagram performance (β = .58, $p < .01$) and, more important, performance-approach goals were a positive predictor of postmanipulation anagram performance (β = .44, $p < .05$), whereas performance-avoidance goals were a negative predictor (β = –.45, $p < .05$). The model provided a good fit to the data: $\chi^2(1, N = 56) = 0.00$, $p = .95$, CFI = 1.00, TLI = 1.08, RMSEA = .00, indicating that the weak direct effect can be explained by the opposing effects of performance-approach and performance-

avoidance goals. Testing the significance of the indirect effects (as in the prior studies) showed that both the positive indirect effect (competition manipulation → performance-approach goals → anagram performance) and the negative indirect effect (competition manipulation → performance-avoidance goals → anagram performance) were significant (standardized estimates = .17 and –.20, respectively, $ps < .05$). The results are summarized in Table 5.

In sum, the results indicate that structural competition is not a direct predictor of anagram performance but is an indirect predictor via achievement goals. Performance-approach and performance-avoidance goals were validated as mutually opposing mediators of the structural competition–performance relation, and it is these opposing processes that produced the null direct relation. The obtained results were not a function of preexisting differences in ability.

Sex Effects in Studies 1–3

We conducted multigroup analyses for each study to test for possible sex differences in our data. Specifically, we used a log-likelihood ratio test to examine if the effects observed in the preceding analyses were invariant across males and females (Bollen, 1989). The analyses indicated that for Studies 1, 2, and 3 the path coefficients were not significantly different across sex for both the direct effect and mediational models ($ps > .10$). Each of the nonsignificant (direct effect) and significant (indirect effect) findings from the primary analyses remained the same in these analyses.

General Discussion

The relation between competition and performance is an important topic of inquiry, integral to conceptual and practical issues in many different psychological disciplines. Despite considerable research activity addressing this relation, little clarity or agreement has been reached to date, and polarizing debate is the norm in this literature. It is in this context that we carried out the present work, designed to systematically review prior empirical research and to propose and test a new model of the competition–performance relation.

Overview of Results

We commenced our research with a meta-analysis that focused on each of the three basic conceptualizations of competition—trait competitiveness, perceived environmental competitiveness, and structural competition. For trait competitiveness and perceived environmental competitiveness, the meta-analysis represents the first of its kind; for structural competition, it represents a much needed updating of the last comprehensive meta-analysis conducted 30 years ago. In two of the three instances (i.e., perceived environmental competitiveness and structural competition), the meta-analysis revealed a nonsignificant relation, and in the other (i.e., trait competitiveness), the significant relation was so small ($r = .05$) as to be of trivial importance. These results held across ancillary analyses focused on omitting outliers and attending to various study characteristics. An omnibus meta-analysis collapsing across the three conceptualizations also yielded a nonsignificant relation. Given the prevalence of competition in daily life and the multitude of theorists positing the existence of a competition-performance relation (be it negative or positive), these results may seem disappointing, if not disconcerting. A straightforward interpretation of these results would lead to the conclusion that competition has no noteworthy influence on performance. We refute this straightforward interpretation herein, providing, in its stead, a conceptual model that explains the reason for the null relation.

Our model, the opposing processes model of competition and performance, posits that the observed null relation is actually the result of antagonistic appetitive and aversive processes that cancel each other out (Figure 1b). We conducted an additional meta-analysis to put this model to test, and the results yielded clear support for the model. The MASEM analysis revealed that opposing indirect effects involving performance-approach and performance-avoidance achievement goals explained the null competition–performance link observed in the original meta-analysis. Furthermore, we also conducted three new empirical studies to directly test our model and address the limitations inherent in the MASEM analysis. The results consistently yielded clear support for the opposing processes model. These studies revealed no effect for the direct relation between competition and performance (consistent with our initial meta-analytic results) but revealed inconsistent mediation via performance-approach and performance-avoidance achievement goals (consistent with our MASEM results). Importantly, our findings supported the proposed model for each of the three different conceptualizations of competition, across participants' sex and a variety of different control variables (general perceived competence, specific competence expectancies, impression management, self-deceptive enhancement, SAT score, and baseline performance), and with achievement goal assessments that exclude theoretically extraneous components. Taken together, the findings from our MASEM analysis and our three new studies provide extremely strong evidence for the validity of the opposing processes model of competition and performance.

Connection to Existing Theoretical Work

Given the conceptual and practical importance of the competition–performance relation and its relevance across multiple disciplines, it is not surprising that many scholars over the years have offered theories or approaches that either directly address or are clearly relevant to this topic. In the following, we give an overview of the most prominent of these theories and approaches, with an eye toward delineating how they explain the competition–performance relation and how their account is similar to or different from that offered by the opposing processes model.

Social facilitation theories. In a famous social–psychological experiment, Triplett (1898; see also Féré, 1887) demonstrated that children do better on a simple fishing reel task when they perform alongside another child. This research spawned a voluminous and still active literature on social facilitation (for reviews, see Aiello & Douthitt, 2001; Bond & Titus, 1983; Guerin, 1993). Although the initial experiment indicated that performance was enhanced in the presence of others, subsequent research showed that performance could be impaired in such instances as well; both performance enhancement and impairment in the presence of others now fall under the rubric of social facilitation. A basic premise of social facilitation research is that performance is enhanced on simple tasks but is impaired on complex tasks (Za-

jonc, 1965). Many explanations have been offered for this task difficulty moderation, none of which have risen to the level of consensus (Aiello & Douthitt, 2001).

Although the initial impetus for social facilitation research was a desire to understand the competition–performance relation (see Triplett, 1898), researchers soon separated competition from social presence per se and explicitly focused on the latter (Allport, 1920). As such, social facilitation theories are not directly relevant to the opposing processes model. Nevertheless, a few observations may be offered in comparative fashion. First, we think the opposing processes model can be straightforwardly extended to apply to social facilitation effects and, more specifically, to account for task difficulty moderation. The presence of others should enhance competence valuation, the degree to which individuals care about doing well or poorly (Harackiewicz, Manderlink, & Sansone, 1984), thereby enhancing goal commitment (Elliot & McGregor, 2001). Facing a simple or well-learned task under such circumstances should promote challenge appraisals and a focus on success, which are known to foster performance-approach goals (McGregor & Elliot, 2002), whereas facing a complex or difficult task should prompt threat appraisals and a focus on failure, which are known to evoke performance-avoidance goals (Chalabaev, Major, Cury, & Sarrazin, 2009). Performance-approach and performance-avoidance goals, in turn, have beneficial and detrimental effects on performance, respectively (as documented in our MASEM analysis and new empirical studies; for a compatible account within the social facilitation literature focused on cardiovascular responses to stressors, see Blascovich, Mendes, Hunter, & Salomon, 1999).

Second, meta-analytic research has implicated approach and avoidance relevant personality constructs as moderators of social facilitation effects, independent of any influence of task difficulty. Specifically, Uziel (2007) has shown that social presence facilitates the performance of individuals with a "positive orientation" (i.e., extraverts and those high in self-esteem), but debilitates the performance of individuals with a "negative orientation" (i.e., those who are highly anxious and have low self-esteem); these patterns held across levels of task difficulty. Again, an extended opposing processes model can straightforwardly account for such findings. The positive dispositions in question have been shown to be strongly associated with performance-approach goals, whereas the negative dispositions have been shown to be strongly associated with performance-avoidance goals (Elliot & Thrash, 2002; Heimpel, Elliot, & Wood, 2006). It is likely that these dispositions prompt their corresponding goals in achievement situations, which, in turn, influence performance outcomes as specified in our MASEM analysis. To reiterate, the social facilitation literature does not focus on the competition–performance relation per se, but the opposing processes model seems easy to apply to the effects documented in this literature.

Social interdependence theory. From Deutsch's (1949, 1962) original formulation to the present, social interdependence theory has played an important role in explaining the effects of competition and cooperation on various outcomes, including performance (Deutsch, 1949; Johnson & Johnson, 1989, 2005). In social interdependence theory, competition is defined as the existence of negative interdependence, where individuals perceive that they can obtain their objectives only if the other individuals with whom they are competitively linked fail to obtain their objectives. Cooperation, on the other hand, is defined as the existence of positive interdependence, where individuals perceive that they can reach their objectives only if the other individuals with whom they are cooperatively linked also reach their objectives. A third category of interdependence, labeled individualistic, is said to exist when individuals perceive that they can reach their objectives regardless of whether others reach their objectives (Deutsch, 1962). In the main, competitive relations among individuals are posited to reduce effective behavior, increase negative emotional attachment to others, and undermine task performance (Johnson & Johnson, 1989, 2005).

Importantly, both conceptually and empirically, the primary focus of social interdependence theory is on cooperation among individuals and its beneficial effects on psychological functioning (including performance); competitive and individualistic relations between individuals get relatively little attention and are essentially used as comparisons for the central focus, cooperation (Johnson & Johnson, 2005). Meta-analytic research on performance outcomes clearly supports the central premise of social interdependence theory—that cooperative relations lead to more positive outcomes than competitive and individualistic relations (Johnson et al., 1981; Qin et al., 1995; Roseth et al., 2008; Stanne et al., 1999). However, a close reading of the published meta-analytic results reveals that the competitive versus individualistic contrast is null for performance outcomes, not favoring individualistic relations as one might anticipate on the basis of the theory. Researchers in this tradition have begun to allocate attention to the possibility (initially suggested as early as 1987 by Johnson and Johnson), that some types of competition may lead to positive performance outcomes (Stanne et al., 1999; Tjosvold et al., 2006). Specifically, competition may be beneficial when individuals are explicitly assured that everyone has a chance to win (i.e., constructive competition). Preliminary supportive data for this premise have been reported (Stanne et al., 1999; Tjosvold et al., 2006), but little research has been conducted to date.

Interdependence theory proposes that the way independence is structured determines how individuals interact with each other which, in turn, influences performance outcomes (Deutsch, 1962; Johnson, 2003). Thus, with regard to mediation, interpersonal rather than intrapersonal, constructs are the main focus. Occasional reference is made to achievement goals—mastery and performance goals—but only as approach-based "desired outcomes" (Roseth et al., 2008, p. 224). Furthermore, these goals are either construed as analogous to forms of interdependence (with cooperation and competition mapping onto mastery and performance goals, respectively; Roseth et al., 2008) or cast as broad motives that dictate the degree to which individuals compete in a constructive manner (Tjosvold et al., 2006). Thus, the foci of social interdependence theory and the opposing processes model are clearly very different. In contrast to social interdependence theory, the opposing processes model focuses on competition per se, posits that the overall effect of competition on performance is null, proposes two mutually canceling approach and avoidance processes that account for this null relation, and uses performance-approach and performance-avoidance goals as situation-specific mediators of competition effects. The two models do not contradict or conflict with one another, but rather have different emphases and may be viewed as complementary analyses of competition–performance relation. Social interdependence theory is broader in

focus and attends to cooperation as well as competition, while the opposing processes model delves more deeply into competition per se and delineates the intrapersonal processes through which competition has beneficial or detrimental effects.

Cognitive evaluation theory. Cognitive evaluation theory (Deci & Ryan, 1985) specifies how social and environmental factors, including competitive structures, help or hinder human motivation. From the perspective of this framework, competition typically engenders a controlling rather than an autonomy supportive environment, and this shifts the perceived locus of causality from internal to external, resulting in decreased intrinsic motivation (Deci & Ryan, 1985). A number of studies have provided data consistent with this perspective, although competitive outcome (i.e., win vs. lose) has been identified as a critical moderator variable (Deci, Betley, Kahle, Abrams, & Porac, 1981; Reeve & Deci, 1996; Vallerand & Reid, 1984; Vansteenkiste & Deci, 2003).

With regard to competition, this theory focuses primarily on intrinsic motivation and makes no explicit predictions regarding the competition–performance relation. Intrinsic motivation is presumed to be an important energizer of behavior that facilitates optimal functioning; intrinsic motivation and task performance are thought to be related in some instances but not others (Deci, Koestner, & Ryan, 1999; Deci & Ryan, 1985). Cognitive evaluation theory explains competition effects at the level of needs and motives, rather than goals. Competition is posited to undermine intrinsic motivation (in most instances) because it interferes with one's basic need to feel autonomous (Deci & Ryan, 1985).

Although the opposing processes model does not address the competition-intrinsic motivation relation, it seems straightforward to extend the model to account for this link. Research on the competition-intrinsic motivation relation has yielded somewhat inconsistent results, with some studies showing negative effects, but others showing null or even positive effects (see Reeve & Deci, 1996; Tauer & Harackiewicz, 2004); we suspect that a meta-analysis of the literature would reveal a small negative effect. Our MASEM analysis clearly showed that competition is a positive predictor of both performance-approach and performance-avoidance goals, so the first component of the extended model is already in place. Achievement goal research indicates that performance-avoidance goals are a clear negative predictor of intrinsic motivation, whereas performance-approach goals tend to be unrelated or show a positive relation (Elliot & Moller, 2003; Finney, Pieper, & Barron, 2004; Harackiewicz, Barron, Pintrich, Elliot, & Thrash, 2002; Lopez, 1999; Van Yperen, 2006). Thus, the nature of the direct competition-intrinsic motivation relation seen in the literature may be a function of the opposing influences of performance-approach and performance-avoidance goals, with the somewhat negative overall relation being a function of the somewhat stronger negative influence of performance-avoidance goals. Given that performance and intrinsic motivation are widely regarded as two of the most important outcomes in competition settings, we have already commenced meta-analytic work on the competition-intrinsic motivation relation to test these possibilities.

Motivational traits approach. Kanfer and Heggestad (1997; see also Kanfer & Ackerman, 2000) proposed a taxonomic framework of motivational traits and skills in an attempt to organize theory and research on work motivation. They identify two superordinate, integrative motivational traits—achievement and anxiety—as well as two lower level motivational skills—emotion control and motivation control—as important variables in work motivation contexts. Achievement is conceptualized as an appetitive construct that encompasses competitive excellence and mastery, whereas anxiety is conceptualized as an aversive construct that encompasses fear of failure and test anxiety. Achievement and anxiety are posited to influence the development of emotional and motivational skills, with those high in achievement selecting themselves into challenging situations that facilitate skill development and those high in anxiety avoiding challenging situations, which leads to poor skill development (Kanfer & Heggestad, 1997). In general, motivational skills are posited to have a proximal influence on behavior and motivational traits are posited to have a distal influence on behavior; no specific predictions with regard to performance are proffered.

The opposing processes model shares some surface similarities with the motivational traits approach, in that both focus (in part) on trait competitiveness, both use the approach-avoidance distinction, and both posit two levels of constructs that have differential effects (proximal and distal) on behavior. Aside from these general commonalities, however, the two perspectives are very different. First, the purpose of the motivational traits approach is to provide an integrative taxonomy of individual differences in work motivation, whereas the purpose of the opposing processes model is to provide a motivational account of the competition–performance relation. Second, the motivational traits approach conceptualizes competition entirely in dispositional terms, whereas the opposing processes model incorporates other, nondispositional, aspects of competition as well. Third, the motivational traits approach does not incorporate a situation-specific goal construct, whereas such goals are at the centerpiece of the opposing processes model. Fourth, the motivational traits approach identifies constructs that may be involved in the competition–performance relation but does not delineate any specific hypothesis about this relation, whereas the opposing processes model both identifies the relevant constructs and proposes specific hypotheses about how they work in concert to predict and explain performance outcomes.

Goal-setting theory. Locke and Latham's (1990, 2002) goal setting theory is a well-established framework that focuses on the goal-performance relation. The basic premise of the theory is that commitment to specific, challenging goals enhances task performance (Locke & Latham, 1990). Although competition is not a central aspect of goal-setting theory, Locke and Latham (Locke, 1968; Locke & Latham, 1990) have offered a clear, specific prediction regarding the competition–performance relation. Specifically, they posit that competition is an incentive that facilitates performance attainment; competition is thought to foster positive goal-setting processes (e.g., enhanced goal commitment, adoption of more challenging goals) which, in turn, are beneficial for performance.

Goal-setting theory and the opposing processes model share a central premise, namely, that goals mediate the relation between competition and performance. In addition, in both approaches, the qualitative nature of goals is important in predicting performance outcomes. However, there are several important differences between the two frameworks. Unlike the opposing processes model, goal-setting theory construes competition in exclusively appetitive terms as a positive incentive that has a direct positive influence on performance (Hinsz, 2005). Also unlike the opposing processes model, goal-setting theory conceptualizes goals entirely in appet-

itive terms; no mention is made of the approach–avoidance distinction or the possibility that goals may focus on the avoidance of negative possibilities. A final difference between the two approaches concerns the performance-mastery distinction: the opposing processes model makes use of this distinction and focuses on performance-based goals per se; Lock and Latham (2002) have made reference to the performance–mastery distinction in some of their work, but not within the context of competition. Thus, although the opposing processes model and goal-setting theory share some important features, goal-setting theory is limited in the context of the competition–performance relation, in that it can account for neither the null direct effect found in our meta-analysis nor the undermining of performance via the performance-avoidance goal process.

Choking under pressure. Baumeister and Showers (1986) noted that individuals sometimes "choke under pressure," defined as performing suboptimally under pressure conditions. They defined pressure as the presence of situational incentives or cues for optimal or superior performance, with competition identified as one important form of pressure situation. Competition, whether explicitly established or implicitly encouraged, is posited to increase the probability that choking will occur. Baumeister and Showers also identified three types of variables that increase the likelihood of choking under pressure: task complexity (more choking is predicted on difficult or complex tasks); efficacy expectancies (more choking is predicted when efficacy expectancies are low); and individual differences in anxiety (a high level leading to more choking), self-consciousness (a high level leading to more choking), and skill level (a low level leading to more choking).

The choking under pressure analysis of competition is compatible with the opposing processes model in that both approaches predict that competition can undermine performance attainment. Indeed, it is likely that performance-avoidance goals are at least one mediator of the choking under pressure effect (for relevant empirical research, see Brodish & Devine, 2009: Cury, Elliot, Da Fonseca, & Moller, 2006). However, there are clear and important differences between the two approaches. Unlike the opposing processes model, the emphasis in the choking under pressure analysis is primarily on the aversive implications of competition and its negative influence on performance. In this respect, it is essentially the avoidance-based analog of goal-setting theory, as detailed above. In addition, unlike the opposing processes model, the choking under pressure analysis does not make use of the goal construct in accounting for performance in competition settings. Thus, much like goal-setting theory, the choking under pressure analysis is limited with regard to the competition–performance relation, in that it can account for neither the null direct effect found in our meta-analysis nor the bolstering of performance via the performance-approach goal process.

In sum, there are several different theories and approaches available that address or are relevant to the competition–performance relation. What is perhaps most striking about our overview of these theories and approaches is how few of them focus directly and specifically on competition per se, much less on the competition–performance relation. In most, competition is one of several foci, and even the impressive, well-developed theories that seem dedicated to explicating competition effects at first glance prove on closer examination to be more focused on other phenomena (e.g., social presence for social facilitation theory, cooperation for social interdependence theory). It is also important to note that none of the existing theories or approaches contradict or are incompatible with the opposing processes model in any way. In several instances, independent nonoverlapping ground is covered (e.g., cognitive evaluation theory). In others, contradiction may seem apparent (e.g., goal-setting theory's stance that competition enhances performance or the prediction from the choking under pressure analysis that competition undermines performance), but in these instances the existing explanations are best seen as accurate but incomplete accounts that are entirely compatible with the specific components of the broader, more comprehensive opposing processes model. Indeed, the opposing processes model offers a more comprehensive and precise account of the competition–performance relation than any of the other existing theories and approaches.

Model Expansion

The present research demonstrates the validity and utility of the opposing processes model of competition and performance, and a logical next step is to consider how the model may be expanded and further developed in future research. One promising avenue would be to extend the model to incorporate different types of competition. At present, competition is considered in terms of its presence/absence or high/low amount, albeit with regard to three different conceptualizations (trait, perceived environment, environmental structure). It would be helpful to extend the model to consider the performance implications of different qualitative types of competition such as zero-sum, face to face, and intergroup (Deutsch, 1949; Stanne et al., 1999; Tauer & Harackiewicz, 2004). Another possibility would be to extend the model beyond competition to include cooperation, following the lead of social interdependence theory. It is likely that the positive influence of cooperation on performance outcomes, so clearly documented by Johnson and Johnson (1989, 2005) and their colleagues (Roseth et al., 2008; Stanne et al., 1999; Tjosvold et al., 2006), is mediated by mastery-approach goals. Unlike performance-based goals, which are rooted in social comparison, mastery-approach goals focus on attaining task-based or intrapersonal competence (Dweck, 1986; Nicholls, 1984). These goals have an inconsistent relation with performance, but theorists have hypothesized that they are beneficial for performance outcomes in several instances (Elliot, 2005; Midgley, Kaplan, & Middleton, 2001). We think cooperative contexts are one such instance, as the task–intrapersonal focus of mastery-approach goals seems highly compatible with the interdependent emphasis of these settings (Poortvliet, Janssen, Van Yperen, & Van de Vliert, 2009; Tossman, Kaplan, & Assor, 2008).

Future work on the opposing processes model would also do well to adopt a more expansive focus with regard to performance outcomes, and outcomes more generally. In the present empirical investigations, we examined the influence of competition on two different performance variables—exam performance and anagram performance. Achievement tasks vary considerably in terms of the types of skills and abilities required (e.g., motor, perceptual, cognitive, etc.) and the domain in which the performance takes place (the classroom, the workplace, the ball field, etc.). Our meta-analytic data indicated that the competition–performance relation was the same (null or very weak) in each of these instances, suggesting that comparable mutually opposing processes were

operative accordingly. Nevertheless, subsequent work directly examining this issue would be welcomed. In addition, other outcomes beyond performance, such as intrinsic motivation (as discussed earlier), control beliefs, subjective well-being, and physical health are also worthy of empirical attention. To the extent that subsequent research yields supportive findings for outcomes beyond performance, the label of our model should be broadened accordingly to the opposing processes model of competition (per se).

Expansion is also possible with regard to the mediator variables in the model. We focused on achievement goals as mediators in the present research, because they have been shown to have tremendous explanatory and predictive utility in prior work on achievement motivation (Dweck, 1999; Elliot, 2005; Nicholls, 1989). Indeed, we view achievement goals as integral to a motivationally based conceptualization of competition and have difficultly envisioning a satisfactory account of competition and performance absent this construct. As such, when considering other mediational candidates, we view them as complements to rather than replacements for performance-approach and performance-avoidance goals. Regarding the link between competition and achievement goals, we think challenge and threat appraisals (or their corresponding cardiovascular activity; Blascovich & Mendes, 2000) are good candidates for inclusion, as they represent dynamic appetitive and aversive evaluations of the potential for gain or loss in the achievement context (Lazarus, 1991; see our earlier discussion on social facilitation) that have been linked to achievement goal pursuit in prior work (see Chalabaev et al., 2009; Elliot & Reis, 2003; McGregor & Elliot, 2002). To the extent that competition evokes challenge appraisals, the pursuit of performance-approach goals is likely, and to the extent that that competition evokes threat appraisals, the pursuit of performance-avoidance goals is likely. Regarding the link between achievement goals and performance, we think that task absorption and task distraction are good candidates for inclusion, as prior research has shown that these indicators of cognitive immersion carry important information about the quality and effectiveness of achievement goal pursuit (Cury, Elliot, Sarrazin, Da Fonseca, & Rufo, 2002; Harackiewicz & Sansone, 1991; Lee, Sheldon, & Turban, 2003). Task absorption likely mediates the positive influence of performance-approach goals on performance, whereas task distraction likely mediates the negative influence of performance-avoidance goals on performance. Examination of these relations in future research promises to yield a more detailed and complete understanding of the way in which performance-approach and performance-avoidance goals themselves operate as mediators of the competition–performance relation (and beyond).

Our model posits that competition evokes both performance-approach and performance-avoidance goal pursuit and that these appetitive and aversive processes have a mutually antagonistic influence on performance. The fact that our meta-analytic and new empirical results revealed a null effect suggests that these appetitive and aversive processes are usually of similar strength. This need not always be the case; in instances when one process is considerably stronger than the other, a positive or negative influence of competition on performance might be witnessed. That is, moderator variables undoubtedly exist that affect the relative weights of appetitive or aversive mediation effects. In fact, our previous overview of other relevant theoretical perspectives may be consulted to derive promising moderator variable candidates, such as task difficulty, evaluative pressure, self-esteem, and self-consciousness. A systematic investigation of moderation would be welcomed in future research, as it is relevant to both theory and practice.

Broader Considerations and Contributions

Competition is a topic of widespread interest across scholarly disciplines and levels of analysis. Views on competition not only vary with regard to individual psychological processes, our focus herein but also with regard to educational and occupational structures, economic and political systems, and broad metatheoretical assumptions about human nature and the purpose of life. Given this intellectual context, we think it is important to highlight that our analysis of competition and performance is meant to be descriptive and explanatory, not prescriptive. By documenting that competition, when accompanied by performance-approach goals, facilitates performance outcomes, we are not advocating for competitive traits or structures or for the use of normatively focused forms of self-regulation. Likewise, by documenting that competition, when accompanied by performance-avoidance goals, undermines performance outcomes, we are not advocating against competitive traits or structures or against the use of normatively focused forms of self-regulation. On the basis of the present conceptual and empirical research, it is possible to state in emphatic terms that competition can be both beneficial for and detrimental to performance. However, formulating a position on the relative merits or demerits of competition for individuals, organizations, and societies is a complex and variegated task well beyond the present scope.

The opposing processes model fits nicely into the rich tradition of hierarchical models in achievement motivation literature that integrate both general motivational orientations and more specific forms of self-regulation, such as strategies, tactics, and goals (Cattell, 1957; Elliot, 1997; Emmons, 1989; Lewin, 1935; Little, 1989; McClelland, 1951; McDougal, 1908; Murray, 1938; Nuttin, 1984; Rotter, 1954; Sheldon, 2004). In the opposing processes model, performance-approach and performance-avoidance goals represent specific forms of self-regulation, and competition (in its various forms) is presumed to prompt a general motivational concern about normative competence that is then regulated by the two goals. A noteworthy strength of this and other hierarchically based models is that they, unlike many motivation frameworks, are able to account for both the energization (i.e., initial instigation) and direction of behavior.

In addition to contributing to the competition literature, and the achievement motivation literature more generally, the present research also provides a much needed illustration of the importance of attending to inconsistent mediation in social science research (MacKinnon, 2008). Despite a clear declaration by contemporary methodologists that mediation can be present in the absence of a direct effect (Kenny et al., 1998; MacKinnon et al., 2000), empirical work exhibiting this type of pattern remains rare, suggesting a continuing reticence to embrace this perspective. This is unfortunate, as inconsistent mediational processes are likely quite commonplace (Zhao et al., 2010); if so, failing to explore such processes can only retard theoretical and empirical progress. Accordingly, we hope that the present documentation of a highly

robust (replicated several different ways), conceptually sensible form of inconsistent mediation will help coax potentially reticent researchers to move past the now outdated convention of waiting for establishment of a direct effect before examining mediation.

Conclusion

Summary statements about the benefits and ills of competition are often quite strident, and this seems true regardless of whether they come from the person on the street, the pundit or politician on television, or the scholar in academia. The take-home message from the present research is that at the level of individual psychological processes, competition appears to be neither entirely beneficial nor entirely detrimental to performance. Rather, our work indicates that the competition–performance relation varies as a function of the type of achievement goals pursued. Accordingly, our research highlights the need for a nuanced, integrative approach to this important area of inquiry.

References

References marked with an asterisk indicate studies used in the meta-analysis.

Abra, J. C. (1993). Competition: Creativity's vilified motive. *Genetic, Social, and General Psychology Monographs, 119,* 289–342.

Aiello, J. R., & Douthitt, E. A. (2001). Social facilitation from Triplett to electronic performance monitoring. *Group Dynamics: Theory, Research, and Practice, 5,* 163–180. doi:10.1037/1089-2699.5.3.163

Albert, S. (1977). Temporal comparison theory. *Psychological Review, 84,* 485–503. doi:10.1037/0033-295X.84.6.485

Allport, F. H. (1920). The influence of the group upon association and thought. *Journal of Experimental Psychology, 3,* 159–182. doi:10.1037/h0067891

Ames, C., & Ames, R. (1984). System of student and teacher motivation: Toward a qualitative definition. *Journal of Educational Psychology, 76,* 535–556. doi:10.1037/0022-0663.76.4.535

Ames, C., & Archer, J. (1988). Achievement goals in the classroom: Students' learning strategies and motivation processes. *Journal of Educational Psychology, 80,* 260–267.

Anderman, E. M., & Midgley, C. (1997). Changes in achievement goal orientations, perceived academic competence, and grades across the transition to middle-level schools. *Contemporary Educational Psychology, 22,* 269–298.

*Astin, A. W. (1968). Undergraduate achievement and institutional "excellence." *Science, 161,* 661–668. doi:10.1126/science.161.3842.661

Austin, J. T., & Vancouver, J. B. (1996). Goal constructs in psychology: Structure, process, and content. *Psychological Bulletin, 120,* 338–375. doi:10.1037/0033-2909.120.3.338

Baron, R. M., & Kenny, D. A. (1986). The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology, 51,* 1173–1182. doi:10.1037/0022-3514.51.6.1173

Baumeister, R. F., & Showers, C. J. (1986). A review of paradoxical performance effects: Choking under pressure in sports and mental tests. *European Journal of Social Psychology, 16,* 361–383. doi:10.1002/ejsp.2420160405

Blascovich, J., Mendes, W., Hunter, S., & Salomon, K. (1999). Social "facilitation" as challenge and threat. *Journal of Personality and Social Psychology, 77,* 68–77. doi:10.1037/0022-3514.77.1.68

Blascovich, J., & Mendes, W. B. (2000). Challenge and threat appraisals: The role of affective cues. In J. P. Forgas (Ed.), *Feeling and thinking: The role of affect in social cognition* (pp. 59–82). New York, NY: Cambridge University Press.

Boker, S., Neale, M., Maes, H., Wilde, M., Spiegel, M., Brick, T., . . . Fox, J. (2011). OpenMx: An open source extended structural equation modeling framework. *Psychometrika, 76,* 306–317. doi:10.1007/s11336-010-9200-6

Bollen, K. A. (1989). *Structural equations with latent variables.* New York, NY: Wiley.

Bond, C. F., & Titus, L. J. (1983). Social facilitation: A meta-analysis of 241 studies. *Psychological Bulletin, 94,* 265–292. doi:10.1037/0033-2909.94.2.265

Bonta, B. D. (1997). Cooperation and competition in peaceful societies. *Psychological Bulletin, 121,* 299–320. doi:10.1037/0033-2909.121.2.299

Borenstein, M., Hedges, L. V., Higgins, J. P. T., & Rothstein, H. R. (2008). Comprehensive Meta-analysis (Version 2.2.048) [Computer software]. Englewood, NJ: Biostat.

Borenstein, M., Hedges, L. V., Higgins, J. P. T., & Rothstein, H. R. (2009). *Introduction to meta-analysis.* Chichester, United Kingdom: Wiley. doi:10.1002/9780470743386

*Brodish, A. B., & Devine, P. G. (2009). The role of performance-avoidance goals and worry in mediating the relationship between stereotype threat and performance. *Journal of Experimental Social Psychology, 45,* 180–185. doi:10.1016/j.jesp.2008.08.005

*Brown, S. P., Cron, W. L., & Slocum, J. W., Jr. (1998). Effects of trait competitiveness and perceived intraorganizational competition on salesperson goal setting and performance. *Journal of Marketing, 62,* 88–98. doi:10.2307/1252289

Cattell, R. B. (1957). *Personality and motivation: Structure and measurement.* New York, NY: World Book.

Chalabaev, A., Major, B., Cury, F., & Sarrazin, P. (2009). Physiological markers of challenge and threat mediate the effects of performance-based goals on performance. *Journal of Experimental Social Psychology, 45,* 991–994. doi:10.1016/j.jesp.2009.04.009

Chertkoff, J. M., & Mesch, D. J. (1997). Performance under different contingent reward systems: A reconceptualization of the cooperative-competitive-individualistic literature. In B. Markovsky, M. J. Lovaglia, & L. Troyer (Eds.), *Advances in group processes* (Vol. 14, pp. 1–27). Greenwich, CT: JAI Press.

Cheung, M. W. L. (2008). A model for integrating fixed-, random-, and mixed-effects meta-analyses into structural equation modeling. *Psychological Methods, 13,* 182–202. doi:10.1037/a0013163

Cheung, M. W. L. (2011). metaSEM: Meta-Analysis Using Structural Equation Modeling (R package, Version 0.7.0) [Computer software]. Retrieved from http://courses.nus.edu.sg/course/psycwlm/Internet/metaSEM/

Cheung, M. W. L. (in press). Multivariate meta-analysis as structural equation models. *Structural Equation Modeling.*

Cheung, M. W. L., & Chan, W. (2005). Meta-analytic structural equation modeling: A two-stage approach. *Psychological Methods, 10,* 40–64. doi:10.1037/1082-989X.10.1.40

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Erlbaum.

Collins, L. M., Graham, J. W., & Flaherty, B. P. (1998). An alternative framework for defining mediation. *Multivariate Behavioral Research, 33,* 295–312. doi:10.1207/s15327906mbr3302_5

Covington, M. V. (1992). *Making the grade: A self-worth perspective on motivation and school reform.* New York, NY: Cambridge University Press.

*Cury, F., Elliot, A. J., Da Fonseca, D., & Moller, A. C. (2006). The social–cognitive model of achievement motivation and the 2 × 2 achievement goal framework. *Journal of Personality and Social Psychology, 90,* 666–679. doi:10.1037/0022-3514.90.4.666

Cury, F., Elliot, A., Sarrazin, P., Da Fonseca, D., & Rufo, M. (2002). The trichotomous achievement goal model and intrinsic motivation: A se-

quential mediational analysis. *Journal of Experimental Social Psychology, 38,* 473–481. doi:10.1016/S0022-1031(02)00017-3

*Darnon, C., Butera, F., Mugny, G., Quiamzade, A., & Hulleman, C. (2009). "Too complex for me!" Why do performance-approach and performance-avoidance goals predict performance? *European Journal of Psychology of Education, 24,* 423–434. doi:10.1007/BF03178759

Deci, E. L., Betley, G., Kahle, J., Abrams, L., & Porac, J. (1981). When trying to win: Competition and intrinsic motivation. *Personality and Social Psychology Bulletin, 7,* 79–83. doi:10.1177/014616728171012

Deci, E. L., Koestner, R., & Ryan, R. M. (1999). A meta-analytic review of experiments examining the effects of extrinsic rewards on intrinsic motivation. *Psychological Bulletin, 125,* 627–668. doi:10.1037/0033-2909.125.6.627

Deci, E. L., & Ryan, R. M. (1985). *Intrinsic motivation and self-determination in human behavior.* New York, NY: Plenum Press.

Deutsch, M. (1949). A theory of cooperation and competition. *Human Relations, 2,* 129–152. doi:10.1177/001872674900200204

Deutsch, M. (1962). Cooperation and trust: Some theoretical notes. In M. Jones (Ed.), *Nebraska Symposium on Motivation* (pp. 275–320). Lincoln: University of Nebraska Press.

Duda, J. L., & Nicholls, J. G. (1992). Dimensions of achievement motivation in schoolwork and sport. *Journal of Educational Psychology, 84,* 290–299. doi:10.1037/0022-0663.84.3.290

Dweck, C. S. (1986). Motivational process affects learning. *American Psychologist, 41,* 1040–1048. doi:10.1037/0003-066X.41.10.1040

Dweck, C. S. (1999). *Self-theories: Their role in motivation, personality, and development.* New York, NY: Psychology Press.

Eibl-Eibesfelt, I. (1989). *Human ethology.* New York, NY: Aldine de Gruyter.

Elliot, A. J. (1997). Integrating "classic" and "contemporary" approaches to achievement motivation: A hierarchical model of approach and avoidance achievement motivation. In P. R. Pintrich & M. L. Maehr (Eds.), *Advances in motivation and achievement* (Vol. 10, pp. 143–179). Greenwich, CT: JAI Press.

Elliot, A. J. (1999). Approach and avoidance motivation and achievement goals. *Educational Psychologist, 34,* 169–189. doi:10.1207/s15326985ep3403_3

Elliot, A. J. (2005). A conceptual history of the achievement goal construct. In A. J. Elliot & C. S. Dweck (Eds.), *Handbook of competence and motivation* (pp. 52–72). New York, NY: Guilford Press.

Elliot, A. J., & Church, M. A. (1997). A hierarchical model of approach and avoidance achievement motivation. *Journal of Personality and Social Psychology, 72,* 218–232. doi:10.1037/0022-3514.72.1.218

Elliot, A. J., & Fryer, J. W. (2008). The goal concept in psychology. In J. Shah & W. Gardner (Eds.), *Handbook of motivational science* (pp. 235–250). New York, NY: Guilford Press.

Elliot, A. J., Maier, M. A., Moller, A. C., Friedman, R., & Meinhardt, J. (2007). Color and psychological functioning: The effect of red on performance attainment. *Journal of Experimental Psychology: General, 136,* 154–168. doi:10.1037/0096-3445.136.1.154

*Elliot, A. J., & McGregor, H. A. (2001). A 2 × 2 achievement goal framework. *Journal of Personality and Social Psychology, 80,* 501–519. doi:10.1037/0022-3514.80.3.501

*Elliot, A. J., McGregor, H. A., & Gable, S. (1999). Achievement goals, study strategies, and exam performance: A mediational analysis. *Journal of Educational Psychology, 91,* 549–563. doi:10.1037/0022-0663.91.3.549

Elliot, A. J., & Moller, A. C. (2003). Performance-approach goals: Good or bad forms of regulation? *International Journal of Educational Research, 39,* 339–356. doi:10.1016/j.ijer.2004.06.003

*Elliot, A. J., & Murayama, K. (2008). On the measurement of achievement goals: Critique, illustration, and application. *Journal of Educational Psychology, 100,* 613–628. doi:10.1037/0022-0663.100.3.613

Elliot, A. J., Murayama, K., & Pekrun, R. (2011). A 3 × 2 achievement goal model. *Journal of Educational Psychology, 103,* 632–648. doi:10.1037/a0023952

*Elliot, A. J., & Reis, H. T. (2003). Attachment and exploration in adulthood. *Journal of Personality and Social Psychology, 85,* 317–331. doi:10.1037/0022-3514.85.2.317

*Elliot, A. J., & Thrash, T. M. (2002). Approach–avoidance motivation in personality: Approach and avoidance temperaments and goals. *Journal of Personality and Social Psychology, 82,* 804–818. doi:10.1037/0022-3514.82.5.804

Emmons, R. A. (1989). The personal striving approach to personality. In L. Pervin (Ed.), *Goal concepts in personality and social psychology* (pp. 87–126). Hillsdale, NJ: Erlbaum.

Enders, C. K. (2006). A primer on the use of modern missing-data methods in psychosomatic medicine research. *Psychosomatic Medicine, 68,* 427–436. doi:10.1097/01.psy.0000221275.75056.d8

Féré, C. (1887). *Sensation et movement: Etudes expérimentales de psychomécanique* [Sensation and movement: Experimental lessons of psychomechanics]. Paris, France: Alcan.

Festinger, L. (1954). A theory of social comparison processes. *Human Relations, 7,* 117–140. doi:10.1177/001872675400700202

*Finney, S. J., Pieper, S. L., & Barron, K. E. (2004). Examining the psychometric properties of the Achievement Goal Questionnaire in a general academic context. *Educational and Psychological Measurement, 64,* 365–382. doi:10.1177/0013164403258465

Fletcher, T. D., & Nusbaum, D. N. (2008). Trait competitiveness as a composite variable: Linkages with facets of the big-five. *Personality and Individual Differences, 45,* 312–317. doi:10.1016/j.paid.2008.04.020

Forsyth, D. R. (1999). *Group dynamics* (3rd ed.). Belmont, CA: Wadsworth.

Frank, R. H., & Cook, P. J. (1995). *The winner-take-all society: Why the few at the top get so much more than the rest of us.* New York, NY: Penguin Books.

Fraser, B. J., & Fisher, D. L. (1982). Predicting students' outcomes from their perceptions of classroom psychosocial environment. *American Educational Research Journal, 19,* 498–518.

Gleser, L. J., & Olkin, I. (2000). Meta-analysis for 2 × 2 tables with multiple treatment groups. In D. A. Berry & D. K. Stangl (Eds.), *Meta-analysis in medicine and health policy* (pp. 339–355). New York, NY: Marcel Dekker. doi:10.1201/9780203909935.ch7

Guerin, B. (1993). *Social facilitation.* Cambridge, United Kingdom: Cambridge University Press. doi:10.1017/CBO9780511628214

Haertel, G. D., Walberg, H. J., & Haertel, E. H. (1981). Social-psychological environments and learning: A quantitative synthesis. *British Educational Research Journal, 7,* 27–36. doi:10.1080/0141192810070103

Hafdahl, A. R., & Williams, M. A. (2009). Meta-analysis of correlations revisited: Attempted replication and extension of Field's (2001) simulation studies. *Psychological Methods, 14,* 24–42. doi:10.1037/a0014697

Harackiewicz, J. M., Barron, K. E., Pintrich, P. R., Elliot, A. J., & Thrash, T. M. (2002). Revision of achievement goal theory: Necessary and illuminating. *Journal of Educational Psychology, 94,* 638–645.

Harackiewicz, J. M., Manderlink, G., & Sansone, C. (1984). Rewarding pinball wizardry: Effects of evaluation and cue value on intrinsic interest. *Journal of Personality and Social Psychology, 47,* 287–300. doi:10.1037/0022-3514.47.2.287

Harackiewicz, J. M., & Sansone, C. (1991). Goals and intrinsic motivation: You can get there from here. In M. L. Maehr & P. R. Pintrich (Eds.), *Advances in motivation and achievement* (Vol. 7, pp. 21–49). Greenwich, CT: JAI Press.

Hedges, L. V., & Olkin, I. (1985). *Statistical methods for meta-analysis.* Orlando, FL: Academic Press.

Hedges, L. V., & Vevea, J. L. (1998). Fixed and random-effects models in

meta-analysis. *Psychological Methods, 3,* 486–504. doi:10.1037/1082-989X.3.4.486

Heggestad, E., & Kanfer, R. (2000). Individual differences in trait motivation: Development of the Motivational Trait Questionnaire (MTQ). *International Journal of Educational Research, 33,* 751–776. doi:10.1016/S0883-0355(00)00049-5

Heimpel, S. A., Elliot, A. J., & Wood, J. V. (2006). Basic personality dispositions, self-esteem, and personal goals: An approach-avoidance analysis. *Journal of Personality, 74,* 1293–1319. doi:10.1111/j.1467-6494.2006.00410.x

Helmreich, R. L., & Spence, J. T. (1978). *Work and Family Orientation Questionnaire: An objective instrument to assess components of achievement motivation and attitudes toward family and career*. Washington, DC: American Psychological Association.

*Hinsz, V. B. (2005). The influences of social aspects of competition in goal-setting situations. *Current Psychology, 24,* 258–273. doi:10.1007/s12144-005-1027-4

Hobbes, T., & Curley E. (Ed.). (1994). *Leviathan*. Indianapolis, IN: Hackett. (Original work published 1651)

Hulleman, C. S., Schrager, S. M., Bodmann, S. M., & Harackiewicz, J. M. (2010). A meta-analytic review of achievement goal measures: Different labels for the same constructs or different constructs with similar labels? *Psychological Bulletin, 136,* 422–449. doi:10.1037/a0018947

Hymann, H. (1955). *Survey design and analysis: Principles, cases, and procedures.* Glencoe, IL: Free Press.

Jenkins, C. Q., Zyzanski, S. J., & Rosenman, R. H. (1979). *Jenkins activity survey manual.* New York, NY: Psychological Corporation.

Johnson, D. W., & Johnson, R. T. (1987). *Learning together and alone: Cooperative, competitive, and individualistic learning.* Englewood Cliffs, NJ: Prentice-Hall.

Johnson, D. W., & Johnson, R. T. (1989). *Cooperation and competition: Theory and research*. Edina, MN: Interaction Book.

Johnson, D. W., & Johnson, R. T. (2003). Student motivation in cooperative groups: Social interdependence theory. In R. M. Gillies & A. F. Ashman, *Co-operative learning: The social and intellectual outcomes of learning in groups* (pp. 136–176). New York, NY: Routledge.

Johnson, D. W., & Johnson, R. T. (2005). New developments in social interdependence theory. *Genetic, Social, and General Psychology Monographs, 131,* 285–358. doi:10.3200/MONO.131.4.285-358

Johnson, D. W., Maruyama, G., Johnson, R., Nelson, D., & Skon, L. (1981). Effects of cooperative, competitive, and individualistic goal structures on achievement: A meta-analysis. *Psychological Bulletin, 89,* 47–62. doi:10.1037/0033-2909.89.1.47

Judd, C. M., & Kenny, D. A. (1981). Process analysis: Estimating mediation in treatment evaluations. *Evaluation Review, 5,* 602–619. doi:10.1177/0193841X8100500502

Judd, C. M., & Kenny, D. A. (2010). Data analysis in social psychology: Recent and recurring issues. In S. T. Fiske, D. T. Gilbert, & G. Lindzey (Eds.), *The handbook of social psychology* (5th ed., Vol. 1, pp. 115–139). Hoboken, NJ: Wiley.

Kanfer, R., & Ackerman, P. L. (2000). Individual differences in work motivation: Further explorations of a trait framework. *Applied Psychology: An International Review, 49,* 470–482. doi:10.1111/1464-0597.00026

Kanfer, R., & Heggestad, E. D. (1997). Motivational traits and skills: A person-centered approach to work motivation. *Research in Organizational Behavior, 19,* 1–56.

Kaplan, A., & Maehr, M. L. (2007). The contributions and prospects of goal orientation theory. *Educational Psychology Review, 19,* 141–184. doi:10.1007/s10648-006-9012-5

Kenny, D. A., Kashy, D. A., & Bolger, N. (1998). Data analysis in social psychology. In D. Gilbert, S. Fiske, & G. Lindzey (Eds.), *The handbook of social psychology* (4th ed., Vol. 1, pp. 233–265). Boston, MA: McGraw-Hill.

Kline, R. B. (2005). *Principles and practice of structural equation modeling* (2nd ed.). New York, NY: Guilford Press.

Kohn, A. (1986). *No contest: The case against competition*. Boston, MA: Houghton Mifflin.

Kristof, A. L. (1996). Person–organization fit: An integrative review of its conceptualizations, measurement, and implications. *Personnel Psychology, 49,* 1–49. doi:10.1111/j.1744-6570.1996.tb01790.x

Kruglanski, A. W. (1996). Goals as knowledge structures. In P. M. Gollwitzer & J. A. Bargh (Eds.), *The psychology of action: Linking cognition and motivation to behavior* (pp. 599–618). New York, NY: Guilford Press.

Law, W., Elliot, A. J., & Murayama, K. (2012). Perceived competence moderates the relation between performance-approach and performance-avoidance goals. *Journal of Educational Psychology.* Advance online publication. doi:10.1037/a0027179

Lazarus, R. S. (1991). *Emotion and adaptation.* New York, NY: Oxford University Press.

*Lee, F. K., Sheldon, K. M., & Turban, D. B. (2003). Personality and the goal-striving process: The influence of achievement goal patterns, goal level, and mental focus on performance and enjoyment. *Journal of Applied Psychology, 88,* 256–265. doi:10.1037/0021-9010.88.2.256

Lewin, K. (1935). *A dynamic theory of personality.* New York, NY: McGraw-Hill.

*Lewis, M. A., & Cooney, J. B. (1987). Attributional and performance effects of competitive and individualistic feedback in computer-assisted mathematics instruction. *Computers in Human Behavior, 3,* 1–13. doi:10.1016/0747-5632(87)90005-7

Lipsey, M. W., & Wilson, D. B. (2001). *Practical meta-analysis.* Thousand Oaks, CA: Sage.

Little, B. R. (1989). Personal projects analysis: Trivial pursuits, magnificent obsessions, and the search for coherence In D. Buss & N. Cantor (Eds.), *Personality psychology: Recent trends and emerging directions* (pp. 15–31). New York, NY: Springer-Verlag.

Locke, E. A. (1968). Toward a theory of task motivation and incentives. *Organizational Behavior and Human Performance, 3,* 157–189. doi:10.1016/0030-5073(68)90004-4

Locke, E. A., & Latham, G. P. (1990). *A theory of goal setting and task performance.* Englewood Cliffs, NJ: Prentice-Hall.

Locke, E. A., & Latham, G. P. (2002). Building a practically useful theory of goal setting and task motivation. *American Psychologist, 57,* 705–717. doi:10.1037/0003-066X.57.9.705

Lopez, D. (1999). Social cognitive influences on self-regulated learning: The impact of action-control beliefs and academic goals on achievement related outcomes. *Learning and Individual Differences, 11,* 301–319. doi:10.1016/S1041-6080(99)80005-3

MacKinnon, D. P. (2008). *Introduction to statistical mediation analysis*. New York, NY: Taylor & Francis.

MacKinnon, D. P., Fairchild, A. J., & Fritz, M. S. (2007). Mediation analysis. *Annual Review of Psychology, 58,* 593–614. doi:10.1146/annurev.psych.58.110405.085542

MacKinnon, D. P., Krull, J. L., & Lockwood, C. M. (2000). Equivalence of the mediation, confounding and suppression effect. *Prevention Science, 1,* 173–181. doi:10.1023/A:1026595011371

MacKinnon, D. P., Lockwood, C. M., Hoffman, J. M., West, S. G., & Sheets, V. (2002). A comparison of methods to test mediation and other intervening variable effects. *Psychological Methods, 7,* 83–104. doi:10.1037/1082-989X.7.1.83

Maehr, M. L., & Midgley, C. (1991). Enhancing student motivation: A schoolwide approach. *Educational Psychologist, 26,* 399–427.

Maehr, M. L., & Midgley, C. (1996). *Transforming school cultures.* Boulder, CO: Westview Press.

Marsh, H. W., & Craven, R. G. (2006). Reciprocal effects of self-concept and performance from a multidimensional perspective beyond seductive

pleasure and unidimensional perspectives. *Perspectives on Psychological Science, 1,* 133–163. doi:10.1111/j.1745-6916.2006.00010.x

Mayzner, M. S., & Tresselt, M. E. (1966). Anagram solution times: A function of multiple-solution anagrams. *Journal of Experimental Psychology, 71,* 66–73. doi:10.1037/h0022665

McClelland, D. C. (1951). *Personality.* New York, NY: Dryden Press. doi:10.1037/10790-000

McClelland, D. C. (1961). *The achieving society.* New York, NY: Free Press.

McClelland, D. C., Atkinson, J. W., Clark, R. A., & Lowell, E. L. (1953). *The achievement motive.* Oxford, England: Irvington. doi:10.1037/11144-000

McDougal, W. (1908). *An introduction to social psychology.* Boston, MA: Luce.

*McGregor, H. A., & Elliot, A. J. (2002). Achievement goals as predictors of achievement-relevant processes prior to task engagement. *Journal of Educational Psychology, 94,* 381–395. doi:10.1037/0022-0663.94.2.381

Mead, M. (1937). *Cooperation and competition among primitive peoples.* New York, NY: McGraw-Hill.

Mehta, P., Wuehrmann, E., & Josephs, R. (2009). When are low testosterone levels advantageous? The moderating role of individual versus intergroup competition. *Hormones and Behavior, 56,* 158–162. doi:10.1016/j.yhbeh.2009.04.001

Michaels, J. W. (1977). Classroom reward structures and academic performance. *Review of Educational Research, 47,* 87–98.

Midgley, C., Kaplan, A., & Middleton, M. (2001). Performance approach goals: Good for what, for whom, under what circumstances, and at what cost? *Journal of Educational Psychology, 93,* 77–86.

Midgley, C., Kaplan, A., Middleton, M., Maehr, M. L., Urdan, T., Anderman, L. H., . . . Roeser, R. (1998). The developmental and validation of scales assessing students' achievement goal orientations. *Contemporary Educational Psychology, 23,* 113–131. doi:10.1006/ceps.1998.0965

Miller, A., & Hom, H. L. (1990). Influence of extrinsic and ego incentive value on persistence after failure and continuing motivation. *Journal of Educational Psychology, 82,* 539–545. doi:10.1037/0022-0663.82.3.539

Miller, N., & Pollock, V. E. (1995). Use of meta-analysis for testing theory. *Evaluation & the Health Professions, 18,* 370–392. doi:10.1177/016327879501800403

Montagu, A. (1952). *Darwin, competition, and cooperation.* New York, NY: Schuman.

Moos, R. H. (1979). *Evaluating educational environments: Procedures, measures, findings and policy implications.* San Francisco, CA: Jossey-Bass.

Murray, H. A. (1938). *Explorations in personality.* New York, NY: Oxford University Press

Mussweiler, T. (2003). Comparison processes in social judgment: Mechanisms and consequences. *Psychological Review, 110,* 472–489. doi:10.1037/0033-295X.110.3.472

Nicholls, J. G. (1984). Achievement motivation: Conceptions of ability, subjective experience, task choice, and performance. *Psychological Review, 91,* 328–346. doi:10.1037/0033-295X.91.3.328

Nicholls, J. G. (1989). *The competitive ethos and democratic education.* Cambridge, MA: Harvard University Press.

Nuttin, J. R. (1984). *Motivation, planning and action: A relational theory of behavior dynamics.* Hillsdale, NJ: Erlbaum.

Parker, R. E. (1998). *On competition.* Cambridge, MA: Harvard University Press.

Paulhus, D. L. (1991). Measurement and control of response bias. In J. P. Robinson, P. R. Shaver, & L. S. Wrightsman (Eds.), *Measures of personality and social psychological attitudes* (pp. 17–59). San Diego, CA: Academic Press.

Podsakoff, P. M., MacKenzie, S. B., Lee, J., & Podsakoff, N. P. (2003). Common method biases in behavioral research: A critical review of the literature and recommended remedies. *Journal of Applied Psychology, 88,* 879–903. doi:10.1037/0021-9010.88.5.879

Poortvliet, P. M., Janssen, O., Van Yperen, N., & Van de Vliert, E. (2009). Low ranks make the difference: How achievement goals and ranking information affect cooperation intentions. *Journal of Experimental Social Psychology, 45,* 1144–1147. doi:10.1016/j.jesp.2009.06.013

Preacher, K. J., & Hayes, A. F. (2008a). Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. *Behavior Research Methods, 40,* 879–891. doi:10.3758/BRM.40.3.879

Preacher, K. J., & Hayes, A. F. (2008b). Contemporary approaches to assessing mediation in communication research. In A. F. Hayes, M. D. Slater, & L. B. Snyder (Eds.), *The Sage sourcebook of advanced data analysis methods for communication research* (pp. 13–54). Thousand Oaks, CA: Sage.

Qin, Z., Johnson, D. W., & Johnson, R. T. (1995). Cooperative versus competitive efforts and problem solving. *Review of Educational Research, 65,* 129–143.

*Reeve, J., & Deci, E. L. (1996). Elements of the competitive situation that affect intrinsic motivation. *Personality and Social Psychology Bulletin, 22,* 24–33. doi:10.1177/0146167296221003

Robinson, W. S. (1950). Ecological correlations and the behavior of individuals. *American Sociological Review, 15,* 351–357. doi:10.2307/2087176

Roseth, C. J., Johnson, D. W., & Johnson, R. T. (2008). Promoting early adolescents' achievement and peer relationships: The effects of cooperative, competitive, and individualistic goal structures. *Psychological Bulletin, 134,* 223–246. doi:10.1037/0033-2909.134.2.223

Ross, S. R., Rausch, M. K., & Canada, K. E. (2003). Competition and cooperation in the five-factor model: Individual differences in achievement orientation. *Journal of Psychology: Interdisciplinary and Applied, 137,* 323–337. doi:10.1080/00223980309600617

Rotter, J. B. (1954). *Social learning and clinical psychology.* Englewood Cliffs, NJ: Prentice Hall. doi:10.1037/10788-000

Ryckman, R. M., Hammer, M., Kaczor, L. M., & Gold, J. A. (1990). Construction of a Hypercompetitive Attitude Scale. *Journal of Personality Assessment, 55,* 630–639.

Sambolec, E. J., Kerr, N. L., & Messé, L. A. (2007). The role of competitiveness at social tasks: Can indirect cues enhance performance? *Journal of Applied Sport Psychology, 19,* 160–172. doi:10.1080/10413200601185164

Schafer, J. L., & Graham, J. W. (2002). Missing data: Our view of the state of the art. *Psychological Methods, 7,* 147–177. doi:10.1037/1082-989X.7.2.147

Schumpeter, J. (1934). *The theory of economic development.* Cambridge, MA: Harvard University Press.

Sheldon, K. M. (2004). *Optimal human being: An integrated multilevel perspective.* Mahwah, NJ: Erlbaum.

Sherif, C. (1978). The social context of competition. In R. Martens (Ed.), *Joy and sadness in children's sports* (pp. 81–97). Champaign, IL: Human Kinetics.

Shields, D. L., & Bredemier, B. L. (2009). *True competition. A guide to pursuing excellence in sport and society.* Champaign, IL: Human Kinetics.

Shrout, P. E., & Bolger, N. (2002). Mediation in experimental and nonexperimental studies: New procedures and recommendations. *Psychological Methods, 7,* 422–445. doi:10.1037/1082-989X.7.4.422

*Sideridis, G. D. (2005). Goal orientation, academic achievement, and depression: Evidence in favor of a revised goal theory framework. *Journal of Educational Psychology, 97,* 366–375. doi:10.1037/0022-0663.97.3.366

Smith, A. (1937). *An inquiry into the nature and causes of the wealth of nations.* New York, NY: Random House. (Original work published 1776)

Smither, R. D., & Houston, J. M. (1992). The nature of competitiveness: The development and validation of the Competitiveness Index. *Educational and Psychological Measurement, 52,* 407–418. doi:10.1177/0013164492052002016

Spence, J. T., & Helmreich, R. L. (1983). Achievement-related motives and behaviors. In J. T. Spence (Ed.), *Achievement and achievement motives: Psychological and sociological approaches* (pp. 10–74). San Francisco, CA: Freeman.

Spencer, H. (1969). The social organism. In D. Macrae (Ed.), *The man versus the state with four essays on politics and society* (pp. 195–233). Harmondsworth, England: Penguin. ((Original work published 1860)

Stanne, M. B., Johnson, D. W., & Johnson, R. T. (1999). Does competition enhance or inhibit motor performance: A meta-analysis. *Psychological Bulletin, 125,* 133–154. doi:10.1037/0033-2909.125.1.133

Tajfel, H., & Turner, J. C. (1979). An integrative theory of intergroup conflict. In W. G. Austin & S. Worchel (Eds.), *The social psychology of intergroup relations* (pp. 33–47). Monterey, CA: Brooks/Cole.

*Tauer, J. M., & Harackiewicz, J. M. (1999). Winning isn't everything: Competition, achievement orientation, and intrinsic motivation. *Journal of Experimental Social Psychology, 35,* 209–235.

*Tauer, J. M., & Harackiewicz, J. M. (2004). The effects of cooperation and competition on intrinsic motivation and performance. *Journal of Personality and Social Psychology, 86,* 849–861. doi:10.1037/0022-3514.86.6.849

Tesser, A. (1988). Toward a self-evaluation maintenance model of social behavior. In L. Berkowitz (Ed.), *Advances in experimental social psychology: Vol. 21. Social psychological studies of the self: Perspectives and programs* (pp. 181–227). San Diego, CA: Academic Press.

Tjosvold, D., Johnson, D. W., Johnson, R. T., & Sun, H. (2006). Competitive motives and strategies: Understanding constructive competition. *Group Dynamics: Theory, Research, and Practice, 10,* 87–99. doi:10.1037/1089-2699.10.2.87

Tossman, I., Kaplan, A., & Assor, A. (2008). Academic achievement goal structures and young adolescents' biased preferences for peers as cooperation partners. *International Review of Social Psychology, 21,* 181–215.

Triplett, N. (1898). The dynamogenic factors in pacemaking and competition. *American Journal of Psychology, 9,* 507–533. doi:10.2307/1412188

Ulrich, P. (2008). *Integrative economic ethics: Foundations of a civilized market economy.* New York, NY: Cambridge University Press. doi:10.1017/CBO9780511488658

Urdan, T., & Midgley, C. (2001). Academic self-handicapping: What we know, what more there is to learn. *Educational Psychology Review, 13,* 115–138. doi:10.1023/A:1009061303214

Uziel, L. (2007). Individual differences in the social facilitation effect: A review and meta-analysis. *Journal of Research in Personality, 41,* 579–601. doi:10.1016/j.jrp.2006.06.008

Vallerand, R. J., & Reid, G. (1984). On the causal effects of perceived competence on intrinsic motivation: A test of cognitive evaluation theory. *Journal of Sport Psychology, 6,* 94–102.

*Vallerand, R. J., Salvy, S., Mageau, G. A., Elliot, A. J., Denis, P. L., Grouzet, F. M. E., & Blanchard, C. (2007). On the role of passion in performance. *Journal of Personality, 75,* 505–534. doi:10.1111/j.1467-6494.2007.00447.x

Vansteenkiste, M., & Deci, E. L. (2003). Competitively contingent rewards and intrinsic motivation: Can losers remain motivated? *Motivation and Emotion, 27,* 273–299. doi:10.1023/A:1026259005264

Van Yperen, N. W. (2006). A novel approach to assessing achievement goals in the context of the 2 × 2 framework: Identifying distinct profiles of individuals with different dominant achievement goals. *Personality and Social Psychology Bulletin, 32,* 1432–1445. doi:10.1177/0146167206292093

Viswesvaran, C., & Ones, D. S. (1995). Theory testing: Combining psychometric meta-analysis and structural equations modeling. *Personnel Psychology, 48,* 865–885. doi:10.1111/j.1744-6570.1995.tb01784.x

Walberg, H. J., & Anderson, G. J. (1972). Properties of the achieving urban classes. *Journal of Educational Psychology, 63,* 381–385. doi:10.1037/h0033588

*Wigfield, A., & Guthrie, J. T. (1997). Relations of children's motivation for reading to the amount and breadth of their reading. *Journal of Educational Psychology, 89,* 420–432. doi:10.1037/0022-0663.89.3.420

Zajonc, R. B. (1965). Social facilitation. *Science, 149,* 269–274. doi:10.1126/science.149.3681.269

Zhao, X., Lynch, J. G., & Chen, Q. (2010). Reconsidering Baron and Kenny: Myths and truths about mediation analysis. *Journal of Consumer Research, 37,* 197–206. doi:10.1086/651257

Appendix

References Used in the Meta-Analyses

Articles included in the univariate meta-analysis on competition–performance relation are marked with a dagger.

†Ackerman, P. L., & Kanfer, R. (2009). Test length and cognitive fatigue: An empirical examination of effects on performance and test-taker reactions. *Journal of Experimental Psychology: Applied, 15,* 163–181. doi:10.1037/a0015719

†Ackerman, P. L., Kanfer, R., Shapiro, S. W., Newton, S., & Beier, M. E. (2010). Cognitive fatigue during testing: An examination of trait, time-on-task, and strategy influences. *Human Performance, 23,* 381–402. doi:10.1080/08959285.2010.517720

Adie, J. W., Duda, J. L., & Ntoumanis, N. (2008). Achievement goals, competition appraisals, and the psychological and emotional welfare of sport participants. *Journal of Sport & Exercise Psychology*, *30*, 302–322.

Adie, J. W., Duda, J. L., & Ntoumanis, N. (2010). Achievement goals, competition appraisals, and the well- and ill-being of elite youth soccer players over two competitive seasons. *Journal of Sport & Exercise Psychology*, *32*, 555–579.

Adie, J. W., & Jowett, S. (2010). Meta-perceptions of the coach–athlete relationship, achievement goals, and intrinsic motivation among sport participants. *Journal of Applied Social Psychology*, *40*, 2750–2773. doi:10.1111/j.1559-1816.2010.00679.x

Agbuga, B., & Xiang, P. (2008). Achievement goals and their relations to self-reported persistence/effort in secondary physical education: A trichotomous achievement goal framework. *Journal of Teaching in Physical Education, 27,* 179–191.

Agbuga, B., Xiang, P., & McBride, R. (2010). Achievement goals and their relations to children's disruptive behaviors in an after-school physical activity program. *Journal of Teaching in Physical Education*, *29*, 278–294.

†Alfermann, D., Lee, M. J., & Wurth, S. (2005). Perceived leadership behavior and motivational climate as antecedents of adolescent athletes' skill development. *Athletic Insight*, *7*, 14–36.

†Anderman, L. H., & Anderman, E. M. (1999). Social predictors of changes in students' achievement goal orientations. *Contemporary Educational Psychology*, *24*, 21–37. doi:10.1006/ceps.1998.0978

†Anderman, E. M., & Midgley, C. (1997). Changes in achievement goal orientations, perceived academic competence, and grades across the transition to middle-level schools. *Contemporary Educational Psychology*, *22*, 269–298. doi:10.1006/ceps.1996.0926

†Arnold, T., Flaherty, K. E., Voss, K. E., & Mowen, J. C. (2009). Role stressors and retail performance: The role of perceived competitive climate. *Journal of Retailing*, *85*, 194–205. doi:10.1016/j.jretai.2009.02.002

†Astin, A. W. (1968). Undergraduate achievement and institutional "excellence." *Science*, *161*, 661–668. doi:10.1126/science.161.3842.661

Baranik, L. E., Barron, K. E., & Finney, S. J. (2007). Measuring goal orientation in a work domain: Construct validity evidence for the 2 × 2 framework. *Educational and Psychological Measurement*, *67*, 697–718. doi:10.1177/0013164406292090

Baranik, L. E., Barron, K. E., & Finney, S. J. (2010). Examining specific versus general measures of achievement goals. *Human Performance*, *23*, 155–172. doi:10.1080/08959281003622180

†Bahr, C. M., & Rieth, H. J. (1991). Effects of cooperative, competitive, and individualistic goals on student achievement using computer-based drill-and-practice. *Journal of Special Education Technology*, *11*, 33–48.

†Barch, D. M., Yodkovik, N., Sypher-Locke, H., & Hanewinkel, M. (2008). Intrinsic motivation in schizophrenia: Relationships to cognitive function, depression, anxiety, and personality. *Journal of Abnormal Psychology*, *117*, 776–787. doi:10.1037/a0013944

Barkoukis, V., Thogersen-Ntoumani, C., Ntoumanis, N., & Nikitaras, N. (2007). Achievement goals in physical education: examining the predictive ability of five different dimensions of motivational climate. *European Physical Education Review*, *13*, 267–285. doi:10.1177/1356336X07081794

†Barron, K. E., & Harackiewicz, J. M. (2003). Revisiting the benefits of performance-approach goals in the college classroom: Exploring the role of goals in advanced college courses. *International Journal of Educational Research*, *39*, 357–374. doi:10.1016/j.ijer.2004.06.004

Bartels, J. M., & Magun-Jackson, S. (2009). Approach–avoidance motivation and metacognitive self-regulation: The role of need for achievement and fear of failure. *Learning and Individual Differences*, *19*, 459–463. doi:10.1016/j.lindif.2009.03.008

Bartels, J. M., Magun-Jackson, S., & Ryan, J. J. (2011). Achievement goals, volitional regulation and help-seeking among college students: A multiple goal analysis. *Individual Differences Research*, *9*, 41–51.

†Becker, M. A., & Suls, J. (1982). Test performance as a function of the hard-driving and speed components of the Type A coronary-prone behavior pattern. *Journal of Psychosomatic Research*, *26*, 435–440. doi:10.1016/0022-3999(82)90018-6

Beier, M. E., Campbell, M., & Crook, A. E. (2010). Developing and demonstrating knowledge*:* Ability and non-ability determinants of learning and performance. *Intelligence*, *38*, 179–186. doi:10.1016/j.intell.2009.09.007

Bell, B. S., & Kozlowski, S. W. J. (2008). Active learning: Effects of core training design elements on self-regulatory processes, learning, and adaptability. *Journal of Applied Psychology*, *93*, 296–316. doi:10.1037/0021-9010.93.2.296

†Bergan, J. R. (1967). The effects of observation and competition on performance on a programmed text. *Psychology in the Schools*, *4*, 27–29. doi:10.1002/1520-6807(196701)4:1<27::AID-PITS2310040106>3.0.CO;2-V

Berger, J.-L. (2009). The influence of achievement goals on metacognitive processes in math problem solving. *Journal of Cognitive Education and Psychology*, *8*, 165–181. doi:10.1891/1945-8959.8.2.165

†Bergin, D. A. (1995). Effects of a mastery versus competitive motivation situation on learning. *Journal of Experimental Education*, *63*, 303–314. doi:10.1080/00220973.1995.9943466

Bernardo, A. B. I. (2008). Individual and social dimensions of Filipino students' achievement goals. *International Journal of Psychology*, *43*, 886–891. doi:10.1080/00207590701837834

†Bing, M. N. (1999). Hypercompetitiveness in academia: Achieving criterion-related validity from item context specificity. *Journal of Personality Assessment*, *73*, 80–99. doi:10.1207/S15327752JPA730106

Bipp, T., Steinmayr, R., & Spinath, B. (2008). Personality and achievement motivation: Relationship among Big Five domain and facet scales, achievement goals, and intelligence. *Personality and Individual Differences*, *44*, 1454–1464. doi:10.1016/j.paid.2008.01.001

(*Appendix continues*)

Bjørnebekk, G., & Diseth, A. (2010). Approach and avoidance temperaments and achievement goals among children. *Personality and Individual Differences*, *49*, 938–943. doi:10.1016/j.paid.2010.07.034

Bodmann, S. M., Hulleman, C. S., & Harackiewicz, J. M. (2008). Achievement goal systems: An application of goal systems theory to achievement goal research. *Revue Internationale de Psychologie Sociale*, *21*, 71–96.

Bois, J. E., Sarrazin, P., Southon, J., & Boiché, J. C. S. (2009). Psychological characteristics and their relation to performance in professional golfers. *The Sport Psychologist*, *23*, 252–270.

Bong, M. (2001). Between- and within-domain relations of academic motivation among middle and high school students: Self-efficacy, task-value, and achievement goals. *Journal of Educational Psychology*, *93*, 23–34. doi:10.1037/0022-0663.93.1.23

Bong, M. (2008). Effects of parent–child relationships and classroom goal structures on motivation, help-seeking avoidance, and cheating. *Journal of Experimental Education*, *76*, 191–217. doi:10.3200/JEXE.76.2.191-217

Bong, M. (2009). Age-related differences in achievement goal differentiation. *Journal of Educational Psychology*, *101*, 879–896. doi:10.1037/a0015945

Bonneville-Roussy, A., Lavigne, G. L., & Vallerand, R. J. (2011). When passion leads to excellence: The case of musicians. *Psychology of Music*, *39*, 123–138. doi:10.1177/0305735609352441

†Bortoli, L., Bertollo, M., Comani, S., & Robazza, C. (2011). Competence, achievement goals, motivational climate, and pleasant psychobiosocial states in youth sport. *Journal of Sports Sciences*, *29*, 171–180. doi:10.1080/02640414.2010.530675

Bråten, I., Samuelstuen, M. S., & Strømsø, H. I. (2004). Do students' self-efficacy beliefs moderate the effects of performance goals on self-regulatory strategy use? *Educational Psychology*, *24*, 231–247. doi:10.1080/0144341032000160164

Bråten, I., & Strømsø, H. I. (2004). Epistemological beliefs and implicit theories of intelligence as predictors of achievement goals. *Contemporary Educational Psychology*, *29*, 371–388. doi:10.1016/j.cedpsych.2003.10.001

Bråten, I., & Strømsø, H. I. (2008). Job values in professional education: The role of achievement goals. *Scandinavian Journal of Educational Research*, *52*, 259–277. doi:10.1080/00313830802025074

Brett, J. F., & VandeWalle, D. (1999). Goal orientation and goal content as predictors of performance in a training program. *Journal of Applied Psychology*, *84*, 863–873. doi:10.1037/0021-9010.84.6.863

Brodish, A. B., & Devine, P. G. (2009). The role of performance-avoidance goals and worry in mediating the relationship between stereotype threat and performance. *Journal of Experimental Social Psychology*, *45*, 180–185. doi:10.1016/j.jesp.2008.08.005

†Brown, S. P., Cron, W. L., & Slocum, J. W., Jr. (1998). Effects of trait competitiveness and perceived intraorganizational competition on salesperson goal setting and performance. *Journal of Marketing*, *62*, 88–98. doi:10.2307/1252289

Bulus, M. (2011). Goal orientations, locus of control and academic achievement in prospective teachers: An individual differences perspective. *Educational Sciences: Theory and Practice*, *11*, 540–546.

†Butler, R. (1989). Mastery versus ability appraisal: A developmental study of children's observations of peer work. *Child Development*, *60*, 1350–1361. doi:10.2307/1130926

†Butler, R. (1990). The effects of mastery and competitive conditions on self-assessment at different ages. *Child Development*, *61*, 201–210. doi:10.2307/1131059

Butler, R. (2008). Ego-involving and frame of reference effects of tracking on elementary school students' motivational orientations and help seeking in math class. *Social Psychology of Education*, *11*, 5–23. doi:10.1007/s11218-007-9032-0

†Campbell, D. J., & Furrer, D. M. (1995). Goal setting and competition as determinants of task performance. *Journal of Organizational Behavior*, *16*, 377–389. doi:10.1002/job.4030160408

Carr, S. (2006). An examination of multiple goals in children's physical education: Motivational effects of goal profiles and the role of perceived climate in multiple goal development. *Journal of Sports Sciences*, *24*, 281–297. doi:10.1080/02640410500131886

Cecchini Estrada, J. A., González-Mesa, C. G., Méndez-Giménez, A., & Fernández-Río, J. (2011). Achievement goals, social goals, and motivational regulations in physical education settings. *Psicothema*, *23*, 51–57.

†Cervello, E., Rosa, F. J. S., Calvo, T. G., Jimenez, R., & Iglesias, D. n. (2007). Young tennis players' competitive task involvement and performance: The role of goal orientations, contextual motivational climate, and coach-initiated motivational climate. *Journal of Applied Sport Psychology, 19,* 304-321.

Chalabaev, A., Sarrazin, P., Stone, J., & Cury, F. (2008). Do achievement goals mediate stereotype threat? An investigation of females' soccer performance. *Journal of Sport & Exercise Psychology*, *30*, 143–158.

Chan, D. W. (2008). Goal orientations and achievement among Chinese gifted students in Hong Kong. *High Ability Studies*, *19*, 37–51. doi:10.1080/13598130801980307

†Chan, J. C. Y., & Lam, S.-F. (2008). Effects of competition on students' self-efficacy in vicarious learning. *British Journal of Educational Psychology*, *78*, 95–108. doi:10.1348/000709907X185509.

Chen, C., & Zhang, L.-F. (2011). Temperament, personality and achievement goals among Chinese adolescent students. *Educational Psychology*, *31*, 339–359. doi:10.1080/01443410.2011.559310

Chen, J. A., & Pajares, F. (2010). Implicit theories of ability of Grade 6 science students: Relation to epistemological beliefs and academic motivation and achievement in science. *Contemporary Educational Psychology*, *35*, 75–87. doi:10.1016/j.cedpsych.2009.10.003

Chen, L. H., Wu, C.-H., Kee, Y. H., Lin, M.-S., & Shui, S.-H. (2009). Fear of failure, 2 × 2 achievement goal and self-handicapping: An examination of the hierarchical model of achievement motivation in physical education. *Contemporary Educational Psychology*, *34*, 298–305. doi:10.1016/j.cedpsych.2009.06.006

Chia Liu, W., Wang, C. K. J., Tan, O. S., Ee, J., & Koh, C. (2009). Understanding students' motivation in project work: A 2 × 2 achievement goal approach. *British Journal of Educational Psychology, 79,* 87–106. doi:10.1348/000709908X313767

Cho, Y., Weinstein, C. E., & Wicker, F. (2011). Perceived competence and autonomy as moderators of the effects of achievement goal orientations. *Educational Psychology*, *31*, 393–411. doi:10.1080/01443410.2011.560597.

Church, M. A., Elliot, A. J., & Gable, S. L. (2001). Perceptions of classroom environment, achievement goals, and achievement outcomes. *Journal of Educational Psychology*, *93*, 43–54. doi:10.1037/0022-0663.93.1.43

†Clariana, R., & Wallace, P. (2002). Paper-based versus computer-based assessment: Key factors associated with the test mode effect. *British Journal of Educational Technology*, *33*, 593–602. doi:10.1111/1467-8535.00294

Clayton, K., Blumberg, F., & Auld, D. P. (2010). The relationship between motivation, learning strategies and choice of environment whether traditional or including an online component. *British Journal of Educational Technology*, *41*, 349–364. doi:10.1111/j.1467-8535.2009.00993.x

(*Appendix continues*)

Cole, B., Matheson, K., & Anisman, H. (2007). The moderating role of ethnic identity and social support on relations between well-being and academic performance. *Journal of Applied Social Psychology*, *37*, 592–615. doi:10.1111/j.1559-1816.2007.00176.x

Conroy, D. E., Elliot, A. J., & Hofer, S. M. (2003). A 2 × 2 achievement goals questionnaire for sport: Evidence for factorial invariance, temporal stability, and external validity. *Journal of Sport & Exercise Psychology*, *25*, 456–476.

†Conti, R., Collins, M. A., & Picariello, M. L. (2001). The impact of competition on intrinsic motivation and creativity: Considering gender, gender segregation and gender role orientation. *Personality and Individual Differences, 30,* 1273-1289.

Covington, M. V., & Omelich, C. L. (1984). Task-oriented versus competitive learning structures: Motivational and performance consequences. *Journal of Educational Psychology*, *76*, 1038–1050. doi:10.1037/0022-0663.76.6.1038

Corrion, K., D'Arripe-Longueville, F., Chalabaev, A., Schiano-Lomoriello, S., Roussel, P., & Cury, F. (2010). Effect of implicit theories on judgement of cheating acceptability in physical education: The mediating role of achievement goals. *Journal of Sports Sciences*, *28*, 909–919. doi:10.1080/02640414.2010.484065

Coutinho, S. A., & Neuman, G. (2008). A model of metacognition, achievement goal orientation, learning style and self-efficacy. *Learning Environments Research*, *11*, 131–151. doi:10.1007/s10984-008-9042-7

†Craig, R. J. (1971). Absolute and relative performance of schizophrenics under competition. *Journal of Consulting and Clinical Psychology*, *37*, 75–79. doi:10.1037/h0031298

Crippen, K. J., Biesinger, K. D., Muis, K. R., & Orgill, M. (2009). The role of goal orientation and self-efficacy in learning from Web-based worked examples. *Journal of Interactive Learning Research*, *20*, 385–403.

†Cumming, S. P., Smoll, F. L., Smith, R. E., & Grossbard, J. R. (2007). Is winning everything? The relative contributions of motivational climate and won-lost percentage in youth sports. *Journal of Applied Sport Psychology*, *19*, 322–336. doi:10.1080/10413200701342640

Cury, F., Da Fonséca, D., Rufo, M., & Sarrazin, P. (2002). Perceptions of competence, implicit theory of ability, perception of motivational climate, and achievement goals: A test of trichotomous conceptualization of endorsement of achievement motivational in the physical education setting. *Perceptual and Motor Skills*, *95*, 233–244. doi:10.2466/pms.2002.95.1.233

Cury, F., Elliot, A. J., Da Fonseca, D., & Moller, A. C. (2006). The social-cognitive model of achievement motivation and the 2 × 2 achievement goal framework. *Journal of Personality and Social Psychology*, *90*, 666–679. doi:10.1037/0022-3514.90.4.666

Daniels, L. M., Haynes, T. L., Stupnisky, R. H., Perry, R. P., Newall, N. E., & Pekrun, R. (2008). Individual differences in achievement goals: A longitudinal study of cognitive, emotional, and achievement outcomes. *Contemporary Educational Psychology*, *33*, 584–608. doi:10.1016/j.cedpsych.2007.08.002

Darnon, C., Butera, F., Mugny, G., Quiamzade, A., & Hulleman, C. S. (2009). "Too complex for me!" Why do performance-approach and performance-avoidance goals predict exam performance? *European Journal of Psychology of Education*, *24*, 423–434. doi:10.1007/BF03178759

Darnon, C., Dompnier, B., Gillieron, O., & Butera, F. (2010). The interplay of mastery and performance goals in social comparison: A multiple-goal perspective. *Journal of Educational Psychology*, *102*, 212–222. doi:10.1037/a0018161.

Darnon, C., Harackiewicz, J. M., Butera, F., Mugny, G., & Quiamzade, A. (2007). Performance-approach and performance avoidance goals: When uncertainty makes a difference. *Personality and Social Psychology Bulletin*, *33*, 813–827. doi:10.1177/0146167207301022

Day, E. A., Espejo, J., Kowollik, V., Boatman, P. R., & McEntire, L. E. (2007). Modeling the links between need for cognition and the acquisition of a complex skill. *Personality and Individual Differences*, *42*, 201–212. doi:10.1016/j.paid.2006.06.012

Day, E. A., Radosevich, D. J., & Chasteen, C. S. (2003). Construct- and criterion-related validity of four commonly used goal orientation instruments. *Contemporary Educational Psychology, 28,* 434-464. doi:10.1016/S0361-476X(02)00043-7

Deemer, E. D. (2010). Achievement goals as predictors of research self-efficacy. *Individual Differences Research*, *8*, 229–238.

Deemer, E. D., Carter, A. P., & Lobrano, M. T. (2010). Extending the 2 × 2 achievement goal framework: Development of a measure of scientific achievement goals. *Journal of Career Assessment*, *18*, 376–392. doi:10.1177/1069072710374575

Deemer, E. D., Martens, M. P., & Podchaski, E. J. (2007). Counseling psychology students' interest in research: Examining the contribution of achievement goals. *Training and Education in Professional Psychology*, *1*, 193–203. doi:10.1037/1931-3918.1.3.193

De Grez, L., Valcke, M., & Roozen, I. (2009). The impact of goal orientation, self-reflection and personal characteristics on the acquisition of oral presentation skills. *European Journal of Psychology of Education, 24,* 293–306.

†Dickstein, L. S., & Brown, N. (1974). Effect of role orientation and instructions regarding competition on cognitive performance of college females. *Psychological Reports*, *34*, 291–297. doi:10.2466/pr0.1974.34.1.291

Dierdorff, E. C., Surface, E. A., & Brown, K. G. (2010). Frame-of-reference training effectiveness: Effects of goal orientation and self-efficacy on affective, cognitive, skill-based, and transfer outcomes. *Journal of Applied Psychology*, *95*, 1181–1191. doi:10.1037/a0020856

Diseth, A., & Kobbeltvedt, T. (2010). A mediation analysis of achievement motives, goals, learning strategies, and academic achievement. *British Journal of Educational Psychology*, *80*, 671–687. doi:10.1348/000709910X492432

Duchesne, S., & Ratelle, C. (2010). Parental behaviors and adolescents' achievement goals at the beginning of middle school: Emotional problems as potential mediators. *Journal of Educational Psychology*, *102*, 497–507. doi:10.1037/a0019320

†Dunn, R. J., & Harris, L. G. (1998). Organizational dimensions of climate and the impact on school achievement. *Journal of Instructional Psychology*, *25*, 100–114.

Dupeyrat, C., & Mariné, C. (2005). Implicit theories of intelligence, goal orientation, cognitive engagement, and achievement: A test of Dweck's model with returning to school adults. *Contemporary Educational Psychology*, *30*, 43–59. doi:10.1016/j.cedpsych.2004.01.007

†Durik, A. M., Lovejoy, C. M., & Johnson, S. J. (2009). A longitudinal study of achievement goals for college in general: Predicting cumulative GPA and diversity in course selection. *Contemporary Educational Psychology*, *34*, 113–119. doi:10.1016/j.cedpsych.2008.11.002

Elliot, A. J., & Church, M. A. (1997). A hierarchical model of approach and avoidance achievement motivation. *Journal of Personality and Social Psychology*, *72*, 218–232. doi:10.1037/0022-3514.72.1.218

(*Appendix continues*)

Elliot, A. J., & McGregor, H. A. (1999). Test anxiety and the hierarchical model of approach and avoidance achievement motivation. *Journal of Personality and Social Psychology*, *76*, 628–644. doi:10.1037/0022-3514.76.4.628

†Elliot, A. J., & McGregor, H. A. (2001). A 2 × 2 achievement goal framework. *Journal of Personality and Social Psychology*, *80*, 501–519. doi:10.1037/0022-3514.80.3.501

Elliot, A. J., McGregor, H. A., & Gable, S. (1999). Achievement goals, study strategies, and exam performance: A mediational analysis. *Journal of Educational Psychology*, *91*, 549–563. doi:10.1037/0022-0663.91.3.549

Elliot, A. J., & Murayama, K. (2008). On the measurement of achievement goals: Critique, illustration, and application. *Journal of Educational Psychology*, *100*, 613–628. doi:10.1037/0022-0663.100.3.613

Elliot, A. J., & Reis, H. T. (2003). Attachment and exploration in adulthood. *Journal of Personality and Social Psychology*, *85*, 317–331. doi:10.1037/0022-3514.85.2.317

Elliot, A. J., & Thrash, T. M. (2002). Approach-avoidance motivation in personality: Approach and avoidance temperaments and goals. *Journal of Personality and Social Psychology*, *82*, 804–818. doi:10.1037/0022-3514.82.5.804

Elliot, A. J., & Thrash, T. M. (2004). The intergenerational transmission of fear of failure. *Personality and Social Psychology Bulletin*, *30*, 957–971. doi:10.1177/0146167203262024

†Ellison, C. M., & Boykin, A. W. (1994). Comparing outcomes from differential cooperative and individualistic learning methods. *Social Behavior and Personality*, *22*, 91–103. doi:10.2224/sbp.1994.22.1.91

Ely, K., Sitzmann, T., & Falkiewicz, C. (2009). The influence of goal orientation dimensions on time to train in a self-paced training environment. *Learning and Individual Differences*, *19*, 146–150. doi:10.1016/j.lindif.2008.08.003

Eum, K., & Rice, K. G. (2011). Test anxiety, perfectionism, goal orientation, and academic performance. *Anxiety, Stress & Coping, 24*, 167–178.

†Evans, J. F. (1971). Social facilitation in a competitive situation. *Canadian Journal of Behavioural Science/Revue canadienne des sciences du comportement, 3,* 276–281.

†Fabes, R. A., Moran, J. D., & McCullers, J. C. (1981). The hidden costs of reward and WAIS subscale performance. *The American Journal of Psychology*, *94*, 387–398. doi:10.2307/1422251

†Farmer, H. S. (1985). Model of career and achievement motivation for women and men. *Journal of Counseling Psychology*, *32*, 363–390. doi:10.1037/0022-0167.32.3.363

Fenollar, P., Roman, S., & Cuestas, P. J. (2007). University students' academic performance: An integrative conceptual framework and empirical analysis. *British Journal of Educational Psychology*, *77*, 873–891. doi:10.1348/000709907X189118

Ferla, J., Valcke, M., & Schuyten, G. (2010). Judgments of self-perceived academic competence and their differential impact on students' achievement motivation, learning approach, and academic performance. *European Journal of Psychology of Education*, *25*, 519–536. doi:10.1007/s10212-010-0030-9

Finney, S. J., Pieper, S. L., & Barron, K. E. (2004). Examining the psychometric properties of the achievement goal questionnaire in a general academic context. *Educational and Psychological Measurement*, *64*, 365–382. doi:10.1177/0013164403258465

†Fletcher, T. D., Major, D. A., & Davis, D. D. (2008). The interactive relationship of competitive climate and trait competitiveness with workplace attitudes, stress, and performance. *Journal of Organizational Behavior*, *29*, 899–922. doi:10.1002/job.503

†Frederick, C. M. (2000). Competitiveness: Relations with GPA, locus of control, sex and athletic status. *Perceptual and Motor Skills*, *90*, 413–414. doi:10.2466/pms.2000.90.2.413

Freudenthaler, H. H., Spinath, B., & Neubauer, A. C. (2008). Predicting school achievement in boys and girls. *European Journal of Personality*, *22*, 231–245. doi:10.1002/per.678

†Friedman, B. A., & Mandel, R. G. (2009). The prediction of college student academic performance and retention: Application of expectancy and goal setting theories. *Journal of College Student Retention: Research. Theory into Practice*, *11*, 227–246.

Fryer, J. W., & Elliot, A. J. (2007). Stability and change in achievement goals. *Journal of Educational Psychology*, *99*, 700–714. doi:10.1037/0022-0663.99.4.700

†Galini, R., & Efthymia, P. (2009). Dimensions of the classroom climate, as perceived by the students, related to their teachers' evaluation approach on their overall performance in a Greek primary school sample. *New Horizons in Education*, *57*, 109–120.

†Garibaldi, A. M. (1979). Affective contributions of cooperative and group goal structures. *Journal of Educational Psychology*, *71*, 788–794. doi:10.1037/0022-0663.71.6.788

Garn, A., Ware, D. R., & Solmon, M. A. (2011). Student engagement in high school physical education: do social motivation orientations matter? *Journal of Teaching in Physical Education*, *30*, 84–98.

†Gerrard, L. E., Poteat, G. M., & Ironsmith, M. (1996). Promoting children's creativity: Effects of competition, self-esteem, and immunization. *Creativity Research Journal*, *9*, 339–346. doi:10.1207/s15326934crj0904_5

†Giannini, J. M., Weinberg, R. S., & Jackson, A. J. (1988). The effects of mastery, competitive, and cooperative goals on the performance of simple and complex basketball skills. *Journal of Sport & Exercise Psychology*, *10*, 408–417.

Gonida, E. N., & Urdan, T. (2007). Parental influences on student motivation, affect and academic behaviour: Introduction to the special issue. *European Journal of Psychology of Education*, *22*, 3–6. doi:10.1007/BF03173685

Gonida, E. N., Voulala, K., & Kiosseoglou, G. (2009). Students' achievement goal orientations and their behavioral and emotional engagement: Co-examining the role of perceived school goal structures and parent goals during adolescence. *Learning and Individual Differences, 19,* 53-60. doi.org/10.1016/j.lindif.2008.04.002

Graham, J., Tisher, R., Ainley, M., & Kennedy, G. (2008). Staying with the text: The contribution of gender, achievement orientations, and interest to students' performance on a literacy task. *Educational Psychology*, *28*, 757–776. doi:10.1080/01443410802260988

Greene, B. A., Miller, R. B., Crowson, H. M., Duke, B. L., & Akey, K. L. (2004). Predicting high school students' cognitive engagement and achievement: Contributions of classroom perceptions and motivation. *Contemporary Educational Psychology*, *29*, 462–482. doi:10.1016/j.cedpsych.2004.01.006

Guan, J., McBride, R., & Xiang, P. (2007). Reliability and validity evidence for achievement goal models in high school physical education settings. *Measurement in Physical Education and Exercise Science*, *11*, 109–129. doi:10.1080/10913670701294104

Gucciardi, D. F. (2010). Mental toughness profiles and their relations with achievement goals and sport motivation in adolescent Australian footballers. *Journal of Sports Sciences*, *28*, 615–625. doi:10.1080/02640410903582792

†Guerin, B. (2003). Social behaviors as determined by different arrangements of social consequences: Diffusion of responsibility effects with competition. *The Journal of Social Psychology*, *143*, 313–329. doi:10.1080/00224540309598447

(*Appendix continues*)

†Guthrie, J. T., Wigfield, A., & VonSecker, C. (2000). Effects of integrated instruction on motivation and strategy use in reading. *Journal of Educational Psychology*, *92*, 331–341. doi:10.1037/0022-0663.92.2.331

†Gutman, L. M. (2006). How student and parent goal orientations and classroom goal structures influence the math achievement of African Americans during the high school transition. *Contemporary Educational Psychology*, *31*, 44–63. doi:10.1016/j.cedpsych.2005.01.004

Halvari, H., Skjesol, K., & Bagoien, T. E. (2011). Motivational climates, achievement goals, and physical education outcomes: A longitudinal test of achievement goal theory. *Scandinavian Journal of Educational Research*, *55*, 79–104. doi:10.1080/00313831.2011.539855

†Harackiewicz, J. M., Barron, K. E., Elliot, A. J., Carter, S. M., & Lehto, A. T. (1997). Predictors and consequences of achievement goals in the college classroom: Maintaining interest and making the grade. *Journal of Personality and Social Psychology*, *73*, 1284–1295. doi:10.1037/0022-3514.73.6.1284

Harackiewicz, J. M., Barron, K. E., Tauer, J. M., Carter, S. M., & Elliot, A. J. (2000). Short-term and long-term consequences of achievement goals: Predicting interest and performance over time. *Journal of Educational Psychology*, *92*, 316–330. doi:10.1037/0022-0663.92.2.316

†Harackiewicz, J. M., Barron, K. E., Tauer, J. M., & Elliot, A. J. (2002). Predicting success in college: A logitudinal study of achievement goals and ability measures as predictors of interest and performance from freshman year through graduation. *Journal of Educational Psychology*, *94*, 562–575. doi:10.1037/0022-0663.94.3.562

†Harackiewicz, J. M., Durik, A. M., Barron, K. E., Linnenbrink-Garcia, L., & Tauer, J. M. (2008). The role of achievement goals in the development of interest: Reciprocal relations between achievement goals, interest, and performance. *Journal of Educational Psychology*, *100*, 105–122. doi:10.1037/0022-0663.100.1.105

Hardré, P. L., Crowson, H. M., Debacker, T. K., & White, D. (2007). Predicting the academic motivation of rural high school students. *Journal of Experimental Education*, *75*, 247–269. doi:10.3200/JEXE.75.4.247-269

Harlow, L., DeBacker, T., & Crowson, H. M. (2011). Need for closure, achievement goals, and cognitive engagement in high school students. *The Journal of Educational Research*, *104*, 110–119. doi:10.1080/00220670903567406

†Healey, T. R., & Landers, D. M. (1973). Effect of need achievement and task difficulty on competitive and noncompetitive motor performance. *Journal of Motor Behavior*, *5*, 121–128.

†Hellandsig, E. T. (1998). Motivational predictors of high performance and discontinuation in different types of sports among talented teenage athletes. *International Journal of Sport Psychology*, *29*, 27–44.

†Helmreich, R. L., Beane, W., Lucker, G. W., & Spence, J. T. (1978). Achievement motivation and scientific attainment. *Personality and Social Psychology Bulletin*, *4*, 222–226. doi:10.1177/014616727800400209

†Helmreich, R. L., Sawin, L. L., & Carsrud, A. L. (1986). The honeymoon effect in job performance: Temporal increases in the predictive power of achievement motivation. *Journal of Applied Psychology*, *71*, 185–188. doi:10.1037/0021-9010.71.2.185

†Helmreich, R. L., Spence, J. T., Beane, W. E., Lucker, G. W., & Matthews, K. A. (1980). Making it in academic psychology: Demographic and personality correlates of attainment. *Journal of Personality and Social Psychology*, *39*, 896–908. doi:10.1037/0022-3514.39.5.896

†Helmreich, R. L., Spence, J. T., & Pred, R. S. (1988). Making it without losing it: Type A, achievement motivation, and scientific attainment revisited. *Personality and Social Psychology Bulletin*, *14*, 495–504. doi:10.1177/0146167288143008

†Hinsz, V. B. (2005). The influences of social aspects of competition in goal-setting situations. *Current Psychology, 24*, 258–273. doi:10.1007/s12144-005-1027-4.

†Hinsz, V. B., & Jundt, D. K. (2005). Exploring individual differences in a goal-setting situation using the motivational trait questionnaire. *Journal of Applied Social Psychology*, *35*, 551–571. doi:10.1111/j.1559-1816.2005.tb02135.x

Hirschfeld, R. R., & Lawson, L. (2008). Predicting individuals' interest after a performance result: The roles of motivational orientations at high and low performance. *Journal of Applied Social Psychology*, *38*, 557–584. doi:10.1111/j.1559-1816.2007.00317.x

Ho, I. T., & Hau, K.-T. (2008). Academic achievement in the Chinese context: The role of goals, strategies, and effort. *International Journal of Psychology*, *43*, 892–897. doi:10.1080/00207590701836323

†Hogan, J., Hogan, R., & Gregory, S. (1992). Validation of a sales representative selection inventory. *Journal of Business and Psychology*, *7*, 161–171. doi:10.1007/BF01013926

Horst, S. J., Finney, S. J., & Barron, K. E. (2007). Moving beyond academic achievement goal measures: A study of social achievement goals. *Contemporary Educational Psychology*, *32*, 667–698. doi:10.1016/j.cedpsych.2006.10.011

†House, W. C. (1974). Actual and perceived differences in male and female expectancies and minimal goal levels as a function of competition. *Journal of Personality*, *42*, 493–509. doi:10.1111/j.1467-6494.1974.tb00689.x

†Houston, J. M., Carter, D., & Smither, R. D. (1997). Competitiveness in elite professional athletes. *Perceptual and Motor Skills*, *84*, 1447–1454. doi:10.2466/pms.1997.84.3c.1447

Howell, A. J., & Buro, K. (2009). Implicit beliefs, achievement goals, and procrastination: a mediational analysis. *Learning and Individual Differences*, *19*, 151–154. doi:10.1016/j.lindif.2008.08.006

Howell, A. J., & Watson, D. C. (2007). Procrastination: Associations with achievement goal orientation and learning strategies. *Personality and Individual Differences*, *43*, 167–178. doi:10.1016/j.paid.2006.11.017

Hsieh, P., Cho, Y., Liu, M., & Schallert, D. L. (2008). Middle school focus: Examining the interplay between middle school students' achievement goals and self-efficacy in a technology-enhanced learning environment. *American Secondary Education*, *36*, 33–50.

Hsieh, P., Sullivan, J. R., & Guerra, N. S. (2007). A closer look at college students: Self-efficacy and goal orientation. *Journal of Advanced Academics*, *18*, 454–476.

†Huddle, D. D. (1967). Work performance of trainable adults as influenced by competition, cooperation, and monetary reward. *American Journal of Mental Deficiency*, *72*, 198–211.

Hulleman, C. S., Durik, A. M., Schweigert, S. A., & Harackiewicz, J. M. (2008). Task values, achievement goals, and interest: An integrative analysis. *Journal of Educational Psychology*, *100*, 398–416. doi:10.1037/0022-0663.100.2.398

†Humphreys, B., Johnson, R. T., & Johnson, D. W. (1982). Effects of cooperative, competitive, and individualistic learning on students' achievement in science class. *Journal of Research in Science Teaching*, *19*, 351–356. doi:10.1002/tea.3660190503

Husman, J., & Hilpert, J. (2007). The intersection of students' perceptions of instrumentality, self-efficacy, and goal orientations in an online mathematics course. *Zeitschrift für Pädagogische Psychologie/German Journal of Educational Psychology*, *21*, 229–239.

†Hwang, A., & Arbaugh, J. B. (2009). Seeking feedback in blended learning: Competitive versus cooperative student attitudes and their links to learning outcome. *Journal of Computer Assisted Learning*, *25*, 280–293. doi:10.1111/j.1365-2729.2009.00311.x

(*Appendix continues*)

†Innes, J. M. (1972). The effect of presence of co-workers and evaluative feedback on performance of a simple reaction time task. *European Journal of Social Psychology*, *2*, 466–470. doi:10.1002/ejsp.2420020413

Jackson, B., Harwood, C. G., & Grove, J. R. (2010). On the same page in sporting dyads: Does dissimilarity on 2 × 2 achievement goal constructs impair relationship functioning? *Journal of Sport & Exercise Psychology*, *32*, 805–827.

Jagacinski, C. M., Kumar, S., Boe, J. L., Lam, H., & Miller, S. A. (2010). Changes in achievement goals and competence perceptions across the college semester. *Motivation and Emotion*, *34*, 191–204. doi:10.1007/s11031-010-9165-x

Jagacinski, C. M., Kumar, S., & Kokkinou, I. (2008). Challenge seeking: The relationship of achievement goals to choice of task difficulty level in ego-involving and neutral conditions. *Motivation and Emotion*, *32*, 310–322. doi:10.1007/s11031-008-9103-3.

Jahromi, R. G., Lavasani, M. G., Rastegar, A., & Mooghali, A. (2010). Presenting a model of predicting computer anxiety in terms of epistemological beliefs and achievement goals. *Computers in Human Behavior*, *26*, 602–608. doi:10.1016/j.chb.2009.12.013

†Jamal, M. (2007). Type-A behavior in a multinational organization: A study of two countries. *Stress and Health: Journal of the International Society for the Investigation of Stress, 23*, 101–109. doi:10.1002/smi.1126

†Jamal, M., & Baba, V. V. (2001). Type-A behavior, job performance, and well-being in college teachers. *International Journal of Stress Management*, *8*, 231–240. doi:10.1023/A:1011343226440

Janssen, O., & Prins, J. (2007). Goal orientations and the seeking of different types of feedback information. *Journal of Occupational and Organizational Psychology, 80,* 235–249. doi:10.1348/096317906X103410

†Johnson, C., & Engelhard, G. (1992). Gender, academic achievement, and preferences for cooperative, competitive, and individualistic learning among African-American adolescents. *Journal of Psychology: Interdisciplinary and Applied, 126,* 385–392.

†Johnson, D. S., & Perlow, R. (1992). The impact of need for achievement components on goal commitment and performance. *Journal of Applied Social Psychology*, *22*, 1711–1720. doi:10.1111/j.1559-1816.1992.tb00972.x

†Johnson, D. W., Johnson, R. T., & Skon, L. (1979). Student achievement on different types of tasks under cooperative, competitive, and individualistic conditions. *Contemporary Educational Psychology, 4,* 99–106.

†Johnson, D. W., Skon, L., & Johnson, R. (1980). Effects of cooperative, competitive, and individualistic conditions on children's problem-solving performance. *American Educational Research Journal, 17,* 83–93. doi:10.3102/00028312017001083

†Johnson, R. T., Bjorkland, R., & Krotee, M. L. (1984). The effects of cooperative, competitive and individualistic student interaction patterns on the achievement and attitudes of students learning the golf skill of putting. *Research Quarterly for Exercise and Sport*, *55*, 129–134.

†Johnson, R. T., & Johnson, D. W. (1979). Type of task and student achievement and attitudes in interpersonal cooperation, competition, and individualization. *The Journal of Social Psychology*, *108*, 37–48. doi:10.1080/00224545.1979.9711959

†Johnson, R. T., Johnson, D. W., & Stanne, M. B. (1985). Effects of cooperative, competitive, and individualistic goal structures on computer-assisted instruction. *Journal of Educational Psychology*, *77*, 668–677. doi:10.1037/0022-0663.77.6.668

†Johnson, R. T., Johnson, D. W., & Stanne, M. B. (1986). Comparison of computer-assisted cooperative, competitive, and individualistic learning. *American Educational Research Journal*, *23*, 382–392.

Johnson, R. T., Johnson, D. W., & Tauer, M. (1979). The effects of cooperative, competitive, and individualistic goal structures on students' attitudes and achievement. *Journal of Psychology, 102,* 191–198.

†Kalaja, S., Jaakkola, T., Watt, A., Liukkonen, J., & Ommundsen, Y. (2009). The associations between seventh grade Finnish students' motivational climate, perceived competence, self-determined motivation, and fundamental movement skills. *European Physical Education Review*, *15*, 315–335. doi:10.1177/1356336X09364714.

†Kanfer, R., & Ackerman, P. L. (2000). Individual differences in work motivation: Further explorations of a trait framework. *Applied Psychology: An International Review, 49*, 470–482. doi:10.1111/1464-0597.00026

†Kanfer, R., Wolf, M. B., Kantrowitz, T. M., & Ackerman, P. L. (2010). Ability and trait complex predictors of academic and job performance: A person–situation approach. *Applied Psychology: An International Review*, *59*, 40–69. doi:10.1111/j.1464-0597.2009.00415.x

Kaplan, A., Gheen, M., & Midgley, C. (2002). Classroom goal structure and student disruptive behaviour. *British Journal of Educational Psychology*, *72,* 191–212. doi:10.1348/000709902158847

†Kaplan, A., Lichtinger, E., & Gorodetsky, M. (2009). Achievement goal orientations and self-regulation in writing: An integrative perspective. *Journal of Educational Psychology*, *101*, 51–69. doi:10.1037/a0013200

†Kaplan, A., & Maehr, M. L. (1999). Achievement goals and student well-being. *Contemporary Educational Psychology*, *24*, 330–358. doi:10.1006/ceps.1999.0993

Karabenick, S. A. (2004). Perceived achievement goal structure and college student help seeking. *Journal of Educational Psychology*, *96*, 569–581. doi:10.1037/0022-0663.96.3.569

Kaufman, A., & Dodge, T. (2009). Student perceptions and motivation in the classroom: Exploring relatedness and value. *Social Psychology of Education, 12*, 101–112. doi:10.1007/s11218-008-9070-2

Kaye, M. P., Conroy, D. E., & Fifer, A. M. (2008). Individual differences in incompetence avoidance. *Journal of Sport & Exercise Psychology, 30,* 110–132.

Ke, F., & Grabowski, B. (2007). Gameplaying for maths learning: Cooperative or not? *British Journal of Educational Technology*, *38*, 249–259.

†Kelly, R. T., Rawson, H. E., & Terry, R. L. (1973). Interaction effects of achievement need and situational press on performance. *The Journal of Social Psychology*, *89*, 141–145. doi:10.1080/00224545.1973.9922578

†Keltikangas-Järvinen, L. (1992). Type A behaviour and school achievement. *European Journal of Personality*, *6*, 71–81. doi:10.1002/per.2410060106

†Kennedy, E. (1997). A study of students' fears of seeking academic help from teachers. *Journal of Classroom Interaction*, *32*, 11–17.

†Khaleque, A. (1992). Work values, attitudes and performance of industrial workers in Bangladesh. *Social Indicators Research*, *27*, 187–195. doi:10.1007/BF00300561

Kharrazi, A., & Kareshki, H. (2010). Self-regulated learning: The role of environmental perceptions and motivational beliefs. *Psychological Reports*, *107*, 303–317. doi:10.2466/01.11.14.20.PR0.107.4.303-317

Kim, J.-I., Schallert, D. L., & Kim, M. (2010). An integrative cultural view of achievement motivation: Parental and classroom predictors of children's goal orientations when learning mathematics in Korea. *Journal of Educational Psychology*, *102*, 418–437. doi:10.1037/a0018676.

†Kirmeyer, S. L., & Biggers, K. (1988). Environmental demand and demand engendering behavior: An observational analysis of the Type A pattern. *Journal of Personality and Social Psychology*, *54*, 997–1005. doi:10.1037/0022-3514.54.6.997

†Krishnan, B. C., Netemeyer, R. G., & Boles, J. S. (2002). Self-efficacy, competitiveness, and effort as antecedents of salesperson performance. *Journal of Personal Selling & Sales Management*, *22*, 285–295.

†Kumar, R. (2006). Students' experiences of home–school dissonance: The role of school academic culture and perceptions of classroom goal structures. *Contemporary Educational Psychology*, *31*, 253–279. doi:10.1016/j.cedpsych.2005.08.002

(*Appendix continues*)

Kumar, S., & Jagacinski, C. M. (2006). Imposters have goals too: The imposter phenomenon and its relationship to achievement goal theory. *Personality and Individual Differences*, *40*, 147–157. doi:10.1016/j.paid.2005.05.014

†Lam, S.-F., Yim, P.-S., Law, J. S. F., & Cheung, R. W. Y. (2004). The effects of competition on achievement motivation in Chinese classrooms. *British Journal of Educational Psychology*, *74*, 281–296. doi:10.1348/000709904773839888

†Lang, H. G., Stinson, M. S., Kavanagh, F., Liu, Y., & Basile, M. L. (1999). Learning styles of deaf college students and instructors' teaching emphases. *Journal of Deaf Studies and Deaf Education*, *4*, 16–27. doi:10.1093/deafed/4.1.16

Lacaille, N., Koestner, R., & Gaudreau, P. (2007). On the value of intrinsic rather than traditional achievement goals for performing artists: A short-term prospective study. *International Journal of Music Education*, *25*, 245–257. doi:10.1177/0255761407083578

Lau, K. L., & Lee, J. C. (2008). Validation of a Chinese achievement goal orientation questionnaire. *British Journal of Educational Psychology, 78,* 331–353.

Lau, S., Liem, A. D., & Nie, Y. (2008). Task- and self-related pathways to deep learning: the mediating role of achievement goals, classroom attentiveness, and group participation. *British Journal of Educational Psychology, 78,* 639–662. doi:10.1348/000709907X270261

Lau, S., & Nie, Y. (2008). Interplay between personal goals and classroom goal structures in predicting student outcomes: A multilevel analysis of person-context interactions. *Journal of Educational Psychology, 100,* 15–29. doi:10.1037/0022-0663.100.1.15

Leach, C. W., Queirolo, S. S., DeVoe, S., & Chemers, M. (2003). Choosing letter grade evaluations: The interaction of students' achievement goals and self-efficacy. *Contemporary Educational Psychology, 28,* 495–509. doi:10.1016/S0361-476X(02)00058-9

†Lee, C., Jamieson, L. F., & Earley, P. C. (1996). Beliefs and fears and Type A behavior: Implications for academic performance and psychiatric health disorder symptoms. *Journal of Organizational Behavior*, *17*, 151–177. doi:10.1002/(SICI)1099-1379(199603)17:2<151::AID-JOB738>3.0.CO;2-1

Lee, F. K., Sheldon, K. M., & Turban, D. B. (2003). Personality and the goal-striving process: The influence of achievement goal patterns, goal level, and mental focus on performance and enjoyment. *Journal of Applied Psychology*, *88*, 256–265. doi:10.1037/0021-9010.88.2.256

Leondari, A., & Gialamas, V. (2002). Implicit theories, goal orientations, and perceived competence: Impact on students' achievement behavior. *Psychology in the Schools*, *39*, 279–291. doi:10.1002/pits.10035.

Leondari, A., & Gonida, E. (2007). Predicting academic self-handicapping in different age groups: The role of personal achievement goals and social goals. *British Journal of Educational Psychology*, *77*, 595–611. doi:10.1348/000709906X128396

†Lerner, B. S., & Locke, E. A. (1995). The effect of goal setting, self-efficacy, competition, and personal trials on the performance of an endurance task. *Journal of Sport & Exercise Psychology*, *17*, 138–152.

Levy-Tossman, I., Kaplan, A., & Assor, A. (2007). Academic goal orientations, multiple goal profiles, and friendship intimacy among early adolescents. *Contemporary Educational Psychology*, *32*, 231–252. doi:10.1016/j.cedpsych.2006.06.001

†Lewis, M. A., & Cooney, J. B. (1987). Attributional and performance effects of competitive and individualistic feedback in computer-assisted mathematics instruction. *Computers in Human Behavior*, *3*, 1–13. doi:10.1016/0747-5632(87)90005-7

Li, C.-H. (2010). Predicting subjective vitality and performance in sports: The role of passion and achievement goals. *Perceptual and Motor Skills*, *110*, 1029–1047. doi:10.2466/05.06.07.14.PMS.110.C.1029-1047

Li, C.-H., Chi, L., Yeh, S.-R., Guo, K.-B., Ou, C.-T., & Kao, C.-C. (2011). Prediction of intrinsic motivation and sports performance using 2 × 2 achievement goal framework. *Psychological Reports*, *108*, 625–637. doi:10.2466/05.11.14.PR0.108.2.625-637

†Liem, D. G., & Zandstra, E. H. (2010). Motivating instructions increases children's sensory sensitivity. *Food Quality and Preference*, *21*, 531–538. doi:10.1016/j.foodqual.2010.02.003

Lochbaum, M., Stevenson, S., & Hilario, D. (2009). Achievement goals, thoughts about intense physical activity and exerted effort: A mediational analysis. *Journal of Sport Behavior*, *32*, 53–68.

Lovejoy, C. M., & Durik, A. M. (2010). Self-handicapping: The interplay between self-set and assigned achievement goals. *Motivation and Emotion*, *34*, 242–252. doi:10.1007/s11031-010-9179-4

Luo, W., Paris, S. G., Hogan, D., & Luo, Z. (2011). Do performance goals promote learning? A pattern analysis of Singapore students' achievement goals. *Contemporary Educational Psychology*, *36*, 165–176. doi:10.1016/j.cedpsych.2011.02.003

Mägi, K., Lerkkanen, M.-K., Poikkeus, A.-M., Rasku-Puttonen, H., & Kikas, E. (2010). Relations between achievement goal orientations and math achievement in primary grades: a follow-up study. *Scandinavian Journal of Educational Research*, *54*, 295–312. doi:10.1080/00313831003764545

Malka, A., & Covington, M. V. (2005). Perceiving school performance as instrumental to future goal attainment: Effects on graded performance. *Contemporary Educational Psychology*, *30*, 60–80. doi:10.1016/j.cedpsych.2004.04.001

Malmberg, L.-E. (2008). Student teachers' achievement goal orientations during teacher studies: antecedents, correlates and outcomes. *Learning and Instruction*, *18*, 438–452. doi:10.1016/j.learninstruc.2008.06.003

†Martin, J. J., Eklund, R. C., & Smith, A. L. (1994). The relationships among competitiveness, age and ability in distance runners. *Journal of Sport Behavior*, *17*, 258–266.

†Matthews, K. A., Helmreich, R. L., Beane, W. E., & Lucker, G. W. (1980). Pattern A, achievement striving, and scientific merit: Does pattern A help or hinder? *Journal of Personality and Social Psychology*, *39*, 962–967. doi:10.1037/0022-3514.39.5.962

Matos, L., Lens, W., & Vansteenkiste, M. (2007). Achievement goals, learning strategies and language achievement among Peruvian high school students. *Psychologica Belgica*, *47*, 51–70.

Maurer, T. J., Lippstreu, M., & Judge, T. A. (2008). Structural model of employee involvement in skill development activity: The role of individual differences. *Journal of Vocational Behavior*, *72*, 336–350. doi:10.1016/j.jvb.2007.10.010

McGregor, H. A., & Elliot, A. J. (2002). Achievement goals as predictors of achievement-relevant processes prior to task engagement. *Journal of Educational Psychology*, *94*, 381–395. doi:10.1037/0022-0663.94.2.381

†Michaels, J. W. (1978). Effects of differential rewarding and sex on math performance. *Journal of Educational Psychology*, *70*, 565–573. doi:10.1037/0022-0663.70.4.565

Middleton, M. J., Kaplan, A., & Midgley, C. (2004). The change in middle school students' achievement goals in mathematics over time. *Social Psychology of Education*, *7*, 289–311. doi:10.1023/B:SPOE.0000037484.86850.fa

Middleton, M. J., & Midgley, C. (1997). Avoiding the demonstration of lack of ability: An underexplored aspect of goal theory. *Journal of Educational Psychology*, *89*, 710–718. doi:10.1037/0022-0663.89.4.710

(*Appendix continues*)

†Midgley, C., & Urdan, T. (2001). Academic self-handicapping and achievement goals: A further examination. *Contemporary Educational Psychology*, *26*, 61–75. doi:10.1006/ceps.2000.1041

Milner, L. A., & Ferrari, J. R. (2010). The role of goal orientation in emerging adult identity processing styles. *Identity: An International Journal of Theory and Research*, *10*, 270–283. doi:10.1080/15283488.2010.523645

Moreno, J. A., González-Cutre, D., Sicilia, Á., & Spray, C. M. (2010). Motivation in the exercise setting: Integrating constructs from the approach–avoidance achievement goal framework and self-determination theory. *Psychology of Sport and Exercise*, *11*, 542–550. doi:10.1016/j.psychsport.2010.06.003

†Moriarty, B., Douglas, G., Punch, K., & Hattie, J. (1995). The importance of self-efficacy as a mediating variable between learning environments and achievement. *British Journal of Educational Psychology*, *65*, 73–84. doi:10.1111/j.2044-8279.1995.tb01132.x

Morris, R. L., & Kavussanu, M. (2008). Antecedents of approach-avoidance goals in sport. *Journal of Sports Sciences*, *26*, 465–476. doi:10.1080/02640410701579388

Morris, R. L., & Kavussanu, M. (2009). The role of approach-avoidance versus task and ego goals in enjoyment and cognitive anxiety in youth sport. *International Journal of Sport and Exercise Psychology*, *7*, 185–202. doi:10.1080/1612197X.2009.9671899

Muis, K. R., & Franco, G. M. (2009). Epistemic beliefs: Setting the standards for self-regulated learning. *Contemporary Educational Psychology*, *34*, 306–318. doi:10.1016/j.cedpsych.2009.06.005

Murayama, K., & Elliot, A. J. (2009). The joint influence of personal achievement goals and classroom goal structures on achievement-relevant outcomes. *Journal of Educational Psychology*, *101*, 432–447. doi:10.1037/a0014221

Murayama, K., Elliot, A. J., & Yamagata, S. (2011). Separation of performance-approach and performance-avoidance achievement goals: A broader analysis. *Journal of Educational Psychology*, *103*, 238–256. doi:10.1037/a0021948

†Musson, D. M., Sandal, G. M., & Helmreich, R. L. (2004). Personality characteristics and trait clusters in final stage astronaut selection. *Aviation, Space, and Environmental Medicine*, *75*, 342–349.

Narayan, A., & Steele-Johnson, D. (2007). Relationships between prior experience of training, gender, goal orientation and training attitudes. *International Journal of Training and Development*, *11*, 166–180. doi:10.1111/j.1468-2419.2007.00279.x

Neff, K. D., Hsieh, Y.-P., & Dejitterat, K. (2005). Self-compassion, achievement goals, and coping with academic failure. *Self and Identity*, *4*, 263–287. doi:10.1080/13576500444000317

Negru, O., & Damian, L. (2010). Personal and classroom promoted achievement goals: Interdependence between students and teachers. *Cognition, Brain, Behavior: An Interdisciplinary Journal*, *14*, 81–99.

†Nelson, G. (1984). The relationship between dimensions of classroom and family environments and the self-concept, satisfaction, and achievement of Grade 7 and 8 students. *Journal of Community Psychology*, *12*, 276–287. doi:10.1002/1520-6629(198407)12:3<276::AID-JCOP2290120311>3.0.CO;2-6

Nelson, R. M., & DeBacker, T. K. (2008). Achievement motivation in adolescents: The role of peer climate and best friends. *Journal of Experimental Education*, *76*, 170–189. doi:10.3200/JEXE.76.2.170-190

Ng, C.-C. (2008). Multiple-goal learners and their differential patterns of learning. *Educational Psychology*, *28*, 439–456. doi:10.1080/01443410701739470

†Ngaosuvan, L., & Mantyla, T. (2005). Rewarded remembering: Dissociations between self-rated motivation and memory performance. *Scandinavian Journal of Psychology*, *46*, 323–330. doi:10.1111/j.1467-9450.2005.00462.x

Nielsen, S. G. (2008). Achievement goals, learning strategies and instrumental performance. *Music Education Research*, *10*, 235–247. doi:10.1080/14613800802079106

Niemivirta, M. (2002). Motivation and performance in context: The influence of goal orientations and instructional setting on situational appraisals and task performance. *Psychologia: An International Journal of Psychology in the Orient, 45,* 250-270. doi:10.2117/psysoc.2002.250

Nien, C.-L., & Duda, J. (2009). Construct validity of multiple achievement goals: A multitrait-multimethod approach. *International Journal of Sport and Exercise Psychology, 7,* 503-520. doi:10.1080/1612197X.2009.9671922

Niiya, Y., Ballantyne, R., North, M. S., & Crocker, J. (2008). Gender, contingencies of self-worth, and achievement goals as predictors of academic cheating in a controlled laboratory setting. *Basic and Applied Social Psychology*, *30*, 76–83. doi:10.1080/01973530701866656

†Northam, S., & Bluen, S. D. (1994). Differential correlates of components of Type A behaviour. *South African Journal of Psychology/Suid-Afrikaanse Tydskrif vir Sielkunde*, *24*, 131–137. doi:10.1080/02640410903150459

Ntoumanis, N., Thøgersen-Ntoumani, C., & Smith, A. L. (2009). Achievement goals, self-handicapping, and performance: A 2 × 2 achievement goal perspective. *Journal of Sports Sciences*, *27*, 1471–1482. doi:10.1080/02640410903150459

†Okebukola, P. A. (1984). In search of a more effective interaction pattern in biology laboratories. *Journal of Biological Education*, *18*, 305–308. doi:10.1080/00219266.1984.9654661

†Okebukola, P. A. (1985). The relative effectiveness of cooperative and competitive interaction techniques in strengthening students' performance in science classes. *Science Education*, *69*, 501–509. doi:10.1002/sce.3730690406

†Okebukola, P. A. (1986). Impact of extended cooperative and competitive relationships on the performance of students in science. *Human Relations*, *39*, 673–682. doi:10.1177/001872678603900706

†Okebukola, P. A., & Ogunniyi, M. B. (1984). Cooperative, competitive, and individualistic science laboratory interaction patterns: Effects on students' achievement and acquisition of practical skills. *Journal of Research in Science Teaching*, *21*, 875–884. doi:10.1002/tea.3660210903

†Olds, D. E., & Shaver, P. (1980). Masculinity, femininity, academic performance, and health: Further evidence concerning the androgyny controversy. *Journal of Personality*, *48*, 323–341. doi:10.1111/j.1467-6494.1980.tb00837.x

Ommundsen, Y. (2004). Self-handicapping related to task and performance-approach and avoidance goals in physical education. *Journal of Applied Sport Psychology*, *16*, 183–197. doi:10.1080/10413200490437660

Ommundsen, Y. (2006). Pupils' self-regulation in physical education: the role of motivational climates and differential achievement goals. *European Physical Education Review*, *12*, 289–315. doi:10.1177/1356336X06069275

Pajares, F. (2001). Toward a positive psychology of academic motivation. *The Journal of Educational Research*, *95*, 27–35. doi:10.1080/00220670109598780

Pajares, F., Britner, S. L., & Valiante, G. (2000). Relation between achievement goals and self-beliefs of middle school students in writing and science. *Contemporary Educational Psychology*, *25*, 406–422. doi:10.1006/ceps.1999.1027

(*Appendix continues*)

Pajares, F., & Cheong, Y. F. (2003). Achievement goal orientations in writing: A developmental perspective. *International Journal of Educational Research*, *39*, 437–455. doi:10.1016/j.ijer.2004.06.008

Papaioannou, A. G., Ampatzoglou, G., Kalogiannis, P., & Sagovits, A. (2008). Social agents, achievement goals, satisfaction and academic achievement in youth sport. *Psychology of Sport and Exercise*, *9*, 122–141. doi:10.1016/j.psychsport.2007.02.003

Papaioannou, A. G., & Siskos, B. N. (2008). Changes in achievement goals and self-concept in the early months of junior high school. *Psychological Reports*, *103*, 745–763.

Papaioannou, A. G., Tsigilis, N., Kosmidou, E., & Milosis, D. (2007). Measuring perceived motivational climate in physical education. *Journal of Teaching in Physical Education*, *26*, 236–259.

Park, G., Schmidt, A. M., Scheu, C., & DeShon, R. P. (2007). A process model of goal orientation and feedback seeking. *Human Performance*, *20*, 119–145. doi:10.1080/08959280701332042

Pastor, D. A., Barron, K. E., Miller, B. J., & Davis, S. L. (2007). A latent profile analysis of college students' achievement goal orientation. *Contemporary Educational Psychology*, *32*, 8–47. doi:10.1016/j.cedpsych.2006.10.003

Pekrun, R., Elliot, A. J., & Maier, M. A. (2006). Achievement goals and discrete achievement emotions: A theoretical model and prospective test. *Journal of Educational Psychology*, *98*, 583–597. doi:10.1037/0022-0663.98.3.583

Pekrun, R., Elliot, A. J., & Maier, M. A. (2009). Achievement goals and achievement emotions: Testing a model of their joint relations with academic performance. *Journal of Educational Psychology*, *101*, 115–135. doi:10.1037/a0013383

Perry, C. A. (2011). Motivation and attitude of preservice elementary teachers toward mathematics. *School Science and Mathematics*, *111*, 2–10. doi:10.1111/j.1949-8594.2010.00054.x

Phan, H. P. (2008). Achievement goals, the classroom environment, and reflective thinking: a conceptual framework. *Electronic Journal of Research in Educational Psychology*, *6*, 571–602.

Phan, H. P. (2009). Relations between goals, self-efficacy, critical thinking and deep processing strategies: A path analysis. *Educational Psychology*, *29*, 777–799. doi:10.1080/01443410903289423

†Peretti, P. O. (1971). Effects of noncompetitive, competitive instructions, and sex on performance in a color–word interference task. *The Journal of Psychology: Interdisciplinary and Applied*, *79*, 67–70. doi:10.1080/00223980.1971.9923768

†Plouffe, C. R., Hulland, J., & Wachner, T. (2009). Customer-directed selling behaviors and performance: A comparison of existing perspectives. *Journal of the Academy of Marketing Science*, *37*, 422–439. doi:10.1007/s11747-009-0142-4

†Plouffe, C. R., Sridharan, S., & Barclay, D. W. (2010). Exploratory navigation and salesperson performance: Investigating selected antecedents and boundary conditions in high-technology and financial services contexts. *Industrial Marketing Management*, *39*, 538–550. doi:10.1016/j.indmarman.2009.02.003

†Puffer, S. M. (1987). Prosocial behavior, noncompliant behavior, and work performance among commission salespeople. *Journal of Applied Psychology*, *72*, 615–621. doi:10.1037/0021-9010.72.4.615

Putwain, D. W., & Daniels, R. A. (2010). Is the relationship between competence beliefs and test anxiety influenced by goal orientation? *Learning and Individual Differences*, *20*, 8–13. doi:10.1016/j.lindif.2009.10.006.

Putwain, D., & Deveney, C. (2009). Predicting examination performance using an expanded integrated hierarchical model of test emotions and achievement goals. *Psychology Teaching Review*, *15*, 18–31.

Putwain, D., & Symes, W. (2011). Perceived fear appeals and examination performance: facilitating or debilitating outcomes? *Learning and Individual Differences*, *21*, 227–232. doi:10.1016/j.lindif.2010.11.022

Putwain, D. W., Woods, K. A., & Symes, W. (2010). Personal and situational predictors of test anxiety of students in post-compulsory education. *British Journal of Educational Psychology*, *80*, 137–160. doi:10.1348/000709909X466082

Régner, I., Escribe, C., & Dupeyrat, C. (2007). Evidence of social comparison in mastery goals in natural academic settings. *Journal of Educational Psychology*, *99*, 575–583. doi:10.1037/0022-0663.99.3.575

Radosevich, D. J., Allyn, M. R., & Yun, S. (2007). Predictive validity of goal orientation: Four-factor versus three-factor model. *Review of Business Research*, *7*, 175–183.

Radosevich, D. J., Vaidyanathan, V. T., Yeo, S.-Y., & Radosevich, D. M. (2004). Relating goal orientation to self-regulatory processes: A longitudinal field test. *Contemporary Educational Psychology, 29,* 207-229. doi:10.1016/S0361-476X(03)00032-8

Ravindran, B., Greene, B. A., & Debacker, T. K. (2005). Predicting preservice teachers' cognitive engagement with goals and epistemological beliefs. *The Journal of Educational Research*, *98*, 222–232. doi:10.3200/JOER.98.4.222-233

†Reeve, J., & Deci, E. L. (1996). Elements of the competitive situation that affect intrinsic motivation. *Personality and Social Psychology Bulletin*, *22*, 24–33. doi:10.1177/0146167296221003

†Richardson, A. G. (1988). Classroom learning environment and creativity: Some Caribbean findings. *Psychological Reports*, *62*, 939–942. doi:10.2466/pr0.1988.62.3.939

†Robie, C., Brown, D. J., & Shepherd, W. J. (2005). Interdependence as a moderator of the relationship between competitiveness and objective sales performance. *International Journal of Selection and Assessment*, *13*, 274–281. doi:10.1111/j.1468-2389.2005.00324.x

†Roeser, R. W., & Eccles, J. S. (1998). Adolescents' perceptions of middle school: Relation to longitudinal changes in academic and psychological adjustment. *Journal of Research on Adolescence*, *8*, 123–158. doi:10.1207/s15327795jra0801_6

†Roeser, R. W., Midgley, C., & Urdan, T. C. (1996). Perceptions of the school psychological environment and early adolescents' psychological and behavioral functioning in school: The mediating role of goals and belonging. *Journal of Educational Psychology*, *88*, 408–422. doi:10.1037/0022-0663.88.3.408

Roney, C. J. R., & O'Connor, M. C. (2008). The interplay between achievement goals and specific target goals in determining performance. *Journal of Research in Personality*, *42*, 482–489. doi:10.1016/j.jrp.2007.07.001

†Rose, R. M., Fogg, L. F., Helmreich, R. L., & McFadden, T. J. (1994). Psychological predictors of astronaut effectiveness. *Aviation, Space, and Environmental Medicine*, *65*, 910–915.

Roussel, P., Elliot, A. J., & Feltman, R. (2011). The influence of achievement goals and social goals on help-seeking from peers in an academic context. *Learning and Instruction*, *21*, 394–402. doi:10.1016/j.learninstruc.2010.05.003

†Ruble, D. N., Feldman, N. S., & Boggiano, A. K. (1976). Social comparison between young children in achievement situations. *Developmental Psychology*, *12*, 192–197. doi:10.1037/0012-1649.12.3.192

Ryan, A. M., Patrick, H., & Shim, S.-O. (2005). Differential profiles of students identified by their teacher as having avoidant, appropriate, or dependent help-seeking tendencies in the classroom. *Journal of Educational Psychology*, *97*, 275–285. doi:10.1037/0022-0663.97.2.275

(*Appendix continues*)

Schmidt, A. M., & Ford, J. K. (2003). Learning within a learner control training environment: The interactive effects of goal orientation and metacognitive instruction on learning outcomes. *Personnel Psychology*, *56*, 405–429. doi:10.1111/j.1744-6570.2003.tb00156.x

†Schmidt, C. P. (2005). Relations among motivation, performance achievement, and music experience variables in secondary instrumental music students. *Journal of Research in Music Education, 53,* 134–147.

†Schmidt, C. P., Zdzinski, S. F., & Ballard, D. L. (2006). Motivation orientations, academic achievement, and career goals of undergraduate music education majors. *Journal of Research in Music Education*, *54*, 138–153.

†Schroth, M. L. (1987). Relationships between achievement-related motives, extrinsic conditions, and task performance. *The Journal of Social Psychology*, *127*, 39–48.

†Scott, W. E., & Cherrington, D. J. (1974). Effects of competitive, cooperative, and individualistic reinforcement contingencies. *Journal of Personality and Social Psychology*, *30*, 748–758. doi:10.1037/h0037534

Senko, C., & Harackiewicz, J. M. (2005). Regulation of achievement goals: The role of competence feedback. *Journal of Educational Psychology*, *97*, 320–336. doi:10.1037/0022-0663.97.3.320

Senko, C., & Miles, K. M. (2008). Pursuing their own learning agenda: How mastery-oriented students jeopardize their class performance. *Contemporary Educational Psychology*, *33*, 561–583. doi:10.1016/j.cedpsych.2007.12.001

Seo, D., & Taherbhai, H. (2009). Motivational beliefs and cognitive processes in mathematics achievement, analyzed in the context of cultural differences: A Korean elementary school example. *Asia Pacific Education Review*, *10*, 193–203. doi:10.1007/s12564-009-9017-0

Seo, E. H. (2009). The relationship of procrastination with a mastery goal versus an avoidance goal. *Social Behavior and Personality*, *37*, 911–920.

†Seta, J. J., Paulus, P. B., & Risner, H. T. (1977). The effects of group composition and evaluation on task performance. *Bulletin of the Psychonomic Society*, *9*, 115–117.

†Shalley, C. E., & Oldham, G. R. (1997). Competition and creative performance: Effects of competitor presence and visibility. *Creativity Research Journal*, *10*, 337–345. doi:10.1207/s15326934crj1004_5

†Shaw, M. E. (1958). Some motivational factors in cooperation and competition. *Journal of Personality*, *26*, 155–169. doi:10.1111/j.1467-6494.1958.tb01577.x

Shen, B., Chen, A., & Guan, J. (2007). Using achievement goals and interest to predict learning in physical education. *Journal of Experimental Education*, *75*, 89–108. doi:10.3200/JEXE.75.2.89-108

Shen, B., McCaughtry, N., Martin, J. J., & Fahlman, M. (2009). Motivational profiles and their associations with achievement outcomes. *Journal of Teaching in Physical Education*, *28*, 441–460.

Shih, S.-S. (2005). Taiwanese sixth graders' achievement goals and their motivation, strategy use, and grades: An examination of the multiple goal perspective. *The Elementary School Journal*, *106*, 39–58. doi:10.1086/496906

†Shih, S.-S. (2007). The role of motivational characteristics in Taiwanese sixth graders' avoidance of help seeking in the classroom. *The Elementary School Journal*, *107*, 473–495. doi:10.1086/518624

Shih, S.-S. (2008). The relation of self-determination and achievement goals to Taiwanese eighth graders' behavioral and emotional engagement in schoolwork. *The Elementary School Journal*, *108*, 313–334. doi:10.1086/528974

Shim, S., & Ryan, A. (2005). Changes in self-efficacy, challenge avoidance, and intrinsic value in response to grades: The role of achievement goals. *Journal of Experimental Education*, *73*, 333–349. doi:10.3200/JEXE.73.4.333-349

Sideridis, G. D. (2003). On the origins of helpless behavior of students with learning disabilities: Avoidance motivation? *International Journal of Educational Research*, *39*, 497–517. doi:10.1016/j.ijer.2004.06.011.

Sideridis, G. D. (2005a). Goal orientation, academic achievement, and depression: Evidence in favor of a revised goal theory framework. *Journal of Educational Psychology*, *97*, 366–375. doi:10.1037/0022-0663.97.3.366

Sideridis, G. D. (2005b). Performance approach-avoidance motivation and planned behavior theory: Model stability with Greek students with and without learning disabilities. *Reading & Writing Quarterly: Overcoming Learning Difficulties*, *21*, 331–359.

Sideridis, G. D. (2006a). Goal orientations and strong oughts: Adaptive or maladaptive forms of motivation for students with and without suspected learning disabilities? *Learning and Individual Differences*, *16*, 61–77. doi:10.1016/j.lindif.2005.07.001

Sideridis, G. D. (2006b). Understanding low achievement and depression in children with learning disabilities: A goal orientation approach. *International Review of Research in Mental Retardation, 31,* 163–203.

Sideridis, G. D. (2007). Why are students with LD depressed? A goal orientation model of depression vulnerability. *Journal of Learning Disabilities*, *40*, 526–539. doi:10.1177/00222194070400060401

Sideridis, G. D. (2008). The regulation of affect, anxiety, and stressful arousal from adopting mastery-avoidance goal orientations. *Stress and Health: Journal of the International Society for the Investigation of Stress*, *24*, 55–69. doi:10.1002/smi.1160

†Sideridis, G. D., Mouzaki, A., Simos, P., & Protopapas, A. (2006). Classification of students with reading comprehension difficulties: The roles of motivation, affect, and psychopathology. *Learning Disability Quarterly*, *29*, 159–180. doi:10.2307/30035505

Silver, L. S., Dwyer, S., & Alford, B. (2006). Learning and performance goal orientation of salespeople revisited: The role of performance-approach and performance-avoidance orientations. *Journal of Personal Selling & Sales Management*, *26*, 27–38. doi:10.2753/PSS0885–3134260103

Skaalvik, E. M. (1997). Self-enhancing and self-defeating ego orientation: Relations with task and avoidance orientation, achievement, self-perceptions, and anxiety. *Journal of Educational Psychology*, *89*, 71–81. doi:10.1037/0022-0663.89.1.71

Skaalvik, S., & Skaalvik, E. M. (2005). Self-concept, motivational orientation, and help-seeking behavior in mathematics: A study of adults returning to high school. *Social Psychology of Education*, *8*, 285–302. doi:10.1007/s11218-005-3276-3

Skjesol, K., & Halvari, H. (2005). Motivational climate, achievement goals, perceived sport competence, and involvement in physical activity: Structural and mediator models. *Perceptual and Motor Skills*, *100*, 497–523. doi:10.2466/pms.100.2.497-523

(*Appendix continues*)

†Skon, L., Johnson, D. W., & Johnson, R. T. (1981). Cooperative peer interaction versus individual competition and individualistic efforts: Effects on the acquisition of cognitive reasoning strategies. *Journal of Educational Psychology*, *73*, 83–92. doi:10.1037/0022-0663.73.1.83

Smith, B. P. (2005). Goal orientation, implicit theory of ability, and collegiate instrumental music practice. *Psychology of Music*, *33*, 36–57. doi:10.1177/0305735605048013

Smith, J. L., Kausar, R., & Holt-Lunstad, J. (2007). Stigma consciousness in the classroom: A comparison of Pakistani women's motivation and well-being in science and non-science fields of study. *Sex Roles*, *57*, 3–13. doi:10.1007/s11199-007-9217-1

†Sommer, S. M. (1995). Social competition: Identifying new perspectives and strategies for task motivation. *The International Journal of Conflict Management*, *6*, 239–256. doi:10.1108/eb022764

†Spence, J. T., Helmreich, R. L., & Pred, R. S. (1987). Impatience versus achievement strivings in the Type A pattern: Differential effects on students' health and academic achievement. *Journal of Applied Psychology*, *72*, 522–528. doi:10.1037/0021-9010.72.4.522

†Steers, R. M. (1975). Task-goal attributes, *n* achievement, and supervisory performance. *Organizational Behavior and Human Performance*, *13*, 392–403. doi:10.1016/0030-5073(75)90058-6

Steinmayr, R., Bipp, T., & Spinath, B. (2011). Goal orientations predict academic performance beyond intelligence and personality. *Learning and Individual Differences*, *21*, 196–200. doi:10.1016/j.lindif.2010.11.026

Steinmayr, R., & Spinath, B. (2009). The importance of motivation as a predictor of school achievement. *Learning and Individual Differences*, *19*, 80–90. doi:10.1016/j.lindif.2008.05.004.

Stevenson, S. J., & Lochbaum, M. R. (2008). Understanding exercise motivation: Examining the revised social-cognitive model of achievement motivation. *Journal of Sport Behavior*, *31*, 389–412.

†Stewart-Belle, S., & Lust, J. A. (1999). Career movement of female employees holding lower-level positions: An analysis of the impact of the Type A behavior pattern. *Journal of Business and Psychology*, *14*, 187–197. doi:10.1023/A:1022927005470

Stoeber, J., & Crombie, R. (2010). Achievement goals and championship performance: Predicting absolute performance and qualification success. *Psychology of Sport and Exercise*, *11*, 513–521. doi:10.1016/j.psychsport.2010.07.007

Stoeber, J., Stoll, O., Salmi, O., & Tiikkaja, J. (2009). Perfectionism and achievement goals in young Finnish ice-hockey players aspiring to make the under-16 national team. *Journal of Sports Sciences*, *27*, 85–94. doi:10.1080/02640410802448749

Stoeber, J., Uphill, M. A., & Hotham, S. (2009). Predicting race performance in triathlon: The role of perfectionism, achievement goals, and personal goal setting. *Journal of Sport & Exercise Psychology*, *31*, 211–245.

†Stoneman, Z., & Keilman, P. A. (1973). Competition and social stimulation effects on simple motor performance of EMR children. *American Journal of Mental Deficiency*, *78*, 98–100.

Sungur, S., & Senler, B. (2010). Students' achievement goals in relation to academic motivation, competence expectancy, and classroom environment perceptions. *Educational Research and Evaluation, 16,* 303–324.

Sutin, A. R. (2008). Autobiographical memory as a dynamic process: Autobiographical memory mediates basic tendencies and characteristic adaptations. *Journal of Research in Personality*, *42*, 1060–1066. doi:10.1016/j.jrp.2007.10.002

Tan, J. A., & Hall, R. J. (2005). The effects of social desirability bias on applied measures of goal orientation. *Personality and Individual Differences*, *38*, 1891–1902. doi:10.1016/j.paid.2004.11.015

Tanaka, A., Murakami, Y., Okuno, T., & Yamauchi, H. (2001). Achievement goals, attitudes toward help seeking, and help-seeking behavior in the classroom. *Learning and Individual Differences*, *13*, 23–36. doi:10.1016/S1041-6080(02)00043-2

Tanaka, A., Okuno, T., & Yamauchi, H. (2002). Achievement motives, cognitive and social competence, and achievement goals in the classroom. *Perceptual and Motor Skills*, *95*, 445–458.

Tanaka, A., & Yamauchi, H. (2001). A model for achievement motives, goal orientations, intrinsic interest, and academic achievement. *Psychological Reports*, *88*, 123–135. doi:10.2466/pr0.2001.88.1.123

Tanaka, K. (2007). Relations between general goal orientations and task-specific self-appraisals. *Japanese Psychological Research*, *49*, 235–247. doi:10.1111/j.1468-5884.2007.00350.x

Tas, Y., & Tekkaya, C. (2010). Personal and contextual factors associated with students' cheating in science. *Journal of Experimental Education*, *78*, 440–463. doi:10.1080/00220970903548046

†Tauer, J. M., & Harackiewicz, J. M. (1999). Winning isn't everything: Competition, achievement orientation, and intrinsic motivation. *Journal of Experimental Social Psychology*, *35*, 209–238. doi:10.1006/jesp.1999.1383

†Tauer, J. M., & Harackiewicz, J. M. (2004). The effects of cooperation and competition on intrinsic motivation and performance. *Journal of Personality and Social Psychology*, *86*, 849–861. doi:10.1037/0022-3514.86.6.849

Thomassen, T. O., & Halvari, H. (2007). A hierarchical model of approach achievement motivation and effort regulation during a 90-min. soccer match. *Perceptual and Motor Skills*, *105*, 609–635.

Thrash, T. M., & Elliot, A. J. (2002). Implicit and self-attributed achievement motives: Concordance and predictive validity. *Journal of Personality*, *70*, 729–756. doi:10.1111/1467-6494.05022

Tuckey, M., Brewer, N., & Williamson, P. (2002). The influence of motives and goal orientation on feedback seeking. *Journal of Occupational and Organizational Psychology*, *75*, 195–216. doi:10.1348/09631790260098677

†Tuckman, B. W. (2003). A performance comparison of motivational self-believers and self-doubters in competitive and individualistic goal situations. *Personality and Individual Differences*, *34*, 845–854. doi:10.1016/S0191-8869(02)00075-2

Tuominen-Soini, H., Salmela-Aro, K., & Niemivirta, M. (2011). Stability and change in achievement goal orientations: A person-centered approach. *Contemporary Educational Psychology*, *36*, 82–100. doi:10.1016/j.cedpsych.2010.08.002

†Urdan, T., Midgley, C., & Anderman, E. M. (1998). The role of classroom goal structure in students' use of self-handicapping strategies. *American Educational Research Journal*, *35*, 101–122.

Usher, E. L., & Pajares, F. (2009). Sources of self-efficacy in mathematics: A validation study. *Contemporary Educational Psychology*, *34*, 89–101. doi:10.1016/j.cedpsych.2008.09.002

Valle, A., Núñez, J., Cabanach, R. G., González-Pienda, J. A., Rodríguez, S., Rosário, P., . . . Cerezo, R. (2009). Academic goals and learning quality in higher education students. *The Spanish Journal of Psychology*, *12*, 96–105.

Vallerand, R. J., Mageau, G. A., Elliot, A. J., Dumais, A., Demers, M.-A., & Rousseau, F. (2008). Passion and performance attainment in sport. *Psychology of Sport and Exercise*, *9*, 373–392. doi:10.1016/j.psychsport.2007.05.003

Vallerand, R. J., Salvy, S.-J., Mageau, G. A., Elliot, A. J., Denis, P. L., Grouzet, F. M. E., & Blanchard, C. (2007). On the role of passion in performance. *Journal of Personality*, *75*, 505–534. doi:10.1111/j.1467-6494.2007.00447.x

(*Appendix continues*)

Van Nuland, H. J. C., Dusseldorp, E., Martens, R. L., & Boekaerts, M. (2010). Exploring the motivation jungle: Predicting performance on a novel task by investigating constructs from different motivation perspectives in tandem. *International Journal of Psychology*, *45*, 250–259. doi:10.1080/00207591003774493

Van Yperen, N. W., Elliot, A. J., & Anseel, F. (2009). The influence of mastery-avoidance goals on performance improvement. *European Journal of Social Psychology*, *39*, 932–943. doi:10.1002/ejsp.590

Van Yperen, N. W., & Renkema, L. J. (2008). Performing great and the purpose of performing better than others: On the recursiveness of the achievement goal adoption process. *European Journal of Social Psychology*, *38*, 260–271. doi:10.1002/ejsp.425

VandeWalle, D. (1997). Development and validation of a work domain goal orientation instrument. *Educational and Psychological Measurement*, *57*, 995–1015. doi:10.1177/0013164497057006009.

VandeWalle, D., & Cummings, L. L. (1997). A test of the influence of goal orientation on the feedback-seeking process. *Journal of Applied Psychology*, *82*, 390–400. doi:10.1037/0021-9010.82.3.390

Vansteenkiste, M., Smeets, S., Soenens, B., Lens, W., Matos, L., & Deci, E. L. (2010). Autonomous and controlled regulation of performance-approach goals: Their relations to perfectionism and educational outcomes. *Motivation and Emotion*, *34*, 333–353. doi:10.1007/s11031-010-9188-3

Vansteenkiste, M. V., Simons, J., Lens, W., Soenens, B., Matos, L., & Lacante, M. (2004). Less is sometimes more: Goal content matters. *Journal of Educational Psychology*, *96*, 755–764. doi:10.1037/0022-0663.96.4.755

Verner-Filion, J., & Gaudreau, P. (2010). From perfectionism to academic adjustment: The mediating role of achievement goals. *Personality and Individual Differences*, *49*, 181–186. doi:10.1016/j.paid.2010.03.029

Vogler, J. S., & Bakken, L. (2007). Motivation across domains: do goals and attributions change with subject matter for Grades 4 and 5 students? *Learning Environments Research*, *10*, 17–33. doi:10.1007/s10984-007-9021-4

Walker, C. O., & Greene, B. A. (2009). The relations between student motivational beliefs and cognitive engagement in high school. *The Journal of Educational Research*, *102*, 463–471. doi:10.3200/JOER.102.6.463-472

Walker, C. O., Winn, T. D., Adams, B. N., Shepard, M. R., Huddleston, C. D., & Godwin, K. L. (2009). Hope & achievement goals as predictors of student behavior & achievement in a rural middle school. *Middle Grades Research Journal*, *4*, 17–30.

Wang, C. K., Lim, B. S., Aplin, N. G., Chia, Y. H. M., McNeill, M., & Tan, W. K. (2008). Students' attitudes and perceived purposes of physical education in Singapore: Perspectives from a 2 × 2 achievement goal framework. *European Physical Education Review*, *14*, 51–70. doi:10.1177/1356336X07085709

Wang, C. K. J., Biddle, S. J. H., & Elliot, A. J. (2007). The 2 × 2 achievement goal framework in a physical education context. *Psychology of Sport and Exercise*, *8*, 147–168. doi:10.1016/j.psychsport.2005.08.012

Wang, C. K. J., Liu, W. C., Lochbaum, M. R., & Stevenson, S. J. (2009). Sport ability beliefs, 2 × 2 achievement goals, and intrinsic motivation: the moderating role of perceived competence in sport and exercise. *Research Quarterly for Exercise and Sport*, *80*, 303–312.

Wang, M., & Erdheim, J. (2007). Does the five-factor model of personality relate to goal orientation? *Personality and Individual Differences*, *43*, 1493–1505. doi:10.1016/j.paid.2007.04.024

Was, C. A., Al-Harthy, I., Stack-Oden, M., & Isaacson, R. M. (2009). Academic identity status and the relationship to achievement goal orientation. *Electronic Journal of Research in Educational Psychology*, *7*, 627–652.

†White, S. A. (1991). Effects of gender and competitive coaction on motor performance. *Perceptual and Motor Skills*, *73*, 581–582.

†Wigfield, A., & Guthrie, J. T. (1997). Relations of children's motivation for reading to the amount and breadth or their reading. *Journal of Educational Psychology*, *89*, 420–432. doi:10.1037/0022-0663.89.3.420

Wilkins, N. J., & Kuperminc, G. P. (2010). Why try? Achievement motivation and perceived academic climate among Latino youth. *The Journal of Early Adolescence*, *30*, 246–276. doi:10.1177/0272431609333303

Witkow, M. R., & Fuligni, A. J. (2007). Achievement goals and daily school experiences among adolescents with Asian, Latino, and European American backgrounds. *Journal of Educational Psychology*, *99*, 584–596. doi:10.1037/0022-0663.99.3.584

†Wolters, C. A. (2004). Advancing achievement goal theory: using goal structures and goal orientations to predict students' motivation, cognition, and achievement. *Journal of Educational Psychology*, *96*, 236–250. doi:10.1037/0022-0663.96.2.236

†Worchel, S., Shebilske, W. L., Jordan, J. A., & Prislin, R. (1997). Competition and performance on a computer-based complex perceptual-motor task. *Human Factors*, *39*, 410–416. doi:10.1518/001872097778827025

†Wright, P. M. (1990). Monetary incentives and task experience as determinants of spontaneous goal setting, strategy development, and performance. *Human Performance*, *3*, 237–258. doi:10.1207/s15327043hup0304_2

†Xiang, P., Bruene, A., & McBride, R. (2004). Using achievement goal theory to assess an elementary physical education running program. *The Journal of School Health*, *74*, 220–225. doi:10.1111/j.1746-1561.2004.tb07936.x

Yeo, G., Loft, S., Xiao, T., & Kiewitz, C. (2009). Goal orientations and performance: Differential relationships across levels of analysis and as a function of task demands. *Journal of Applied Psychology*, *94*, 710–726. doi:10.1037/a0015044

Yeo, G. B., Sorbello, T., Koy, A., & Smillie, L. D. (2008). Goal orientation profiles and task performance growth trajectories. *Motivation and Emotion, 32,* 296–309. doi.org/10.1007/s11031-008-9099-8

Young, J. W. (2007). Predicting college grades: The value of achievement goals in supplementing ability measures. *Assessment in Education: Principles, Policy & Practice*, *14*, 233–249.

†Zohar, A. H., LaBuda, M., & Moschel-Ravid, O. (1995). Obsessive-compulsive behaviors and cognitive functioning: A study of compulsivity, frame shifting and Type A activity patterns in a normal population. *Neuropsychiatry, Neuropsychology, & Behavioral Neurology*, *8*, 163–167.

Zusho, A., & Barnett, P. A. (2011). Personal and contextual determinants of ethnically diverse female high school students' patterns of academic help seeking and help avoidance in English and mathematics. *Contemporary Educational Psychology*, *36*, 152–164. doi:10.1016/j.cedpsych.2011.02.002

Zusho, A., Pintrich, P. R., & Coppola, B. (2003). Skill and will: The role of motivation and cognition in the learning of college chemistry. *International Journal of Science Education*, *25*, 1081–1094. doi:10.1080/0950069032000052207

Zusho, A., Pintrich, P. R., & Cortina, K. S. (2005). Motives, goals, and adaptive patterns of performance in Asian American and Anglo American students. *Learning and Individual Differences*, *15*, 141–158. doi:10.1016/j.lindif.2004.11.003

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