Prospective Relations between 2 × 2 Achievement Goals and the Quality of Sport Training

Relations entre les buts d’accomplissement 2 × 2 et la qualité de l’entraînement sportif

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Abstract
Athletes will ideally plan their training to ensure physical readiness for their next training bout and competition; however, different self-regulatory strategies may lead to different behaviors during training (e.g., using mental training strategies vs. using alcohol). Drawing on a contextual perspective, this study investigated whether athletes’ 2 × 2 achievement goals predicted the quality of their training over the following six weeks. Female track and field athletes (N = 71) rated their 2 × 2 achievement goals at the beginning of their indoor season, completed bi-weekly behavior surveys, and maintained daily diaries for six weeks. Pre-season mastery-approach achievement goals predicted consistently beneficial training processes, whereas performance-based goals were unrelated.

Résumé
Idéalement, les athlètes vont planifier leur entraînement de manière à être prêts physiquement pour leur prochain entraînement et pour la compétition. Cependant, différentes stratégies d’auto-régulation peuvent conduire à différents comportements pendant l’entraînement (e.g., utilisation de stratégies d’entraînement mental ou consommation d’alcool). Reposant sur une perspective contextuelle, cette étude a examiné si les buts d’accomplissements 2 × 2 des athlètes prédisaient la qualité de leur entraînement sur une durée de 6 semaines. Des athlètes de compétition féminine (N = 71) ont rapporté leur buts d’accomplissement 2 × 2 au début de la saison en salle, ont complété des enquêtes de comportements de manière bihebdomadaire, et ont tenu un journal.

Key-words
Approach-avoidance, self-handicapping

Mots-clés
Approche-évitement, auto-handicap

Acknowledgments
Thanks to Beth Alford-Sullivan and the research assistants who assisted with this study.
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to training processes. Mastery-avoidance goals were positively associated with daily sport-related distress, whereas mastery-approach goals were negatively associated with daily sport-related distress. These findings suggest that defining competence in mastery-based terms is generally valuable for sport training provided that those goals are oriented toward the positive possibility of competence and not away from the aversive possibility of incompetence.

Achievement goals have emerged as one of the most popular constructs for explaining variability in human competence pursuits, processes, and outcomes (Dweck, 1986; Nicholls, 1984). Competitive athletes focus on achieving favorable training processes and competitive outcomes, and thus, may find the cognitive, behavioral, and affective consequences of different achievement goals to be especially relevant to their pursuits. Over the past decade, the achievement goal literature has expanded from an exclusive focus on the definition of competence in achievement goals (i.e., mastery vs. performance) to incorporate the valence of those goals (i.e., toward competence vs. away from incompetence) (Elliot & Harackiewicz, 1996). This distinction between approach and avoidance goals has proven to be profitable in educational, industrial-organizational, and social psychological research (for reviews, see Moller & Elliot, 2006; Payne, Youngcourt, & Beaubien, 2007) but is less well-established in the sport domain (Elliot & Conroy, 2005; Roberts, Treasure, & Conroy, 2007). Accordingly, the present research examined links between the 2 (definitions of competence) × 2 (goal valences) framework of achievement goals and a variety
of training processes in sport. We hypothesized that the training focus of this context may influence which goals regulate behavior; however, the potential for such context-specific effects has rarely been addressed in achievement goal research. This study extends the achievement goal perspective by explicitly theorizing how the training context provides optimal conditions for mastery-based achievement goals to predict training-related outcomes.

Achievement Goals

The achievement goal construct describes "cognitive representation[s] of a competence based possibility that an individual seeks to attain" (Elliot, 1999, p. 628). These goals provide the dynamic focus for achievement behavior (Elliot, 2005). The temporal resolution and operational precision of these cognitive entities varies across studies from highly variable foci (e.g., Gernigon, d'Arripe-Longueville, Delignieres, & Ninot, 2004) to relatively stable individual differences representing personal theories of achievement (e.g., Duda & Nicholls, 1992). Goals do exhibit some temporal stability (Conroy, Elliot, & Hofer, 2003; Duda & Whitehead, 1998). The hierarchical model of achievement motivation attributes that stability to situational consistencies (e.g., evaluative criteria), other stable individual differences (e.g., neurophysiological predispositions, achievement motives, self-perceptions, relational variables), or some combination thereof (Elliot, 2006).

The majority of achievement goal research has utilized a dichotomous framework that distinguishes goals based on their definition of competence (Duda, 2005; Dweck, 1986; Nicholls, 1989; Roberts et al., 2007). With mastery goals, individuals focus on task-referenced (i.e., performing as well as possible) or self-referenced (i.e., learning or improving) competence, whereas with performance goals, individuals focus on normatively-referenced competence (i.e., outperforming others).¹ Mastery goals have been linked to a number of desirable outcomes and

¹. To date, researchers have typically combined self-referenced and task-referenced definitions of competence into a single category of mastery goals. There may be value in distinguishing these two definitions of competence in future research (Elliot, 1999; Elliot & Conroy, 2005; Harwood, Hardy, & Swain, 2000); however, a combined mastery category was used in the present research.
processes including persistence in the face of failure, enhanced task enjoyment, and increased task absorption (Ames, 1992; Dweck & Leggett, 1988). Performance goals have had more equivocally relations with achievement processes and outcomes (e.g., enhanced effort and performance, withdrawal of effort in the face of failure, increased levels of perceived threat, and negative affect; for reviews, see Duda, 2001; Elliot, 1999). To enhance the predictive power of the goals construct and account for some equivocal findings, Elliot and colleagues (Elliot & Harackiewicz, 1996; Elliot & McGregor, 2001) extended the dichotomous model of goals to include the valence of achievement goals. This expanded $2 \times 2$ model of achievement goals comprised mastery-approach (MAp; i.e., striving to surpass prior personal performances [self-referenced competence] or to meet all task demands [task-referenced competence]), mastery-avoidance (MAv; i.e., striving not to perform worse than one has previously [self-referenced competence] or worse than a task demands [task-referenced competence]), performance-approach (PAp; i.e., striving to perform better than others), and performance-avoidance (PAv; i.e., striving not to perform worse than others) goals (Elliot, 1999; Pintrich, 2000). Although three of these goals are relatively well-entrenched in the literature, MAv goals are a more recent addition and may require some additional explanation. These goals represent an aim to maintain and not decrease one’s ability or to not make a mistake. When given a choice, approximately 1/3 of college students endorse MAv goals as their dominant achievement goal (Van Yperen, 2006) but they appear to be less common in elementary physical education students (Sideridis & Mouratidis, 2008). These goals are especially common for athletes who have a high fear of failure, perfectionistic concerns or negative reactions to imperfection (Conroy et al., 2003; Kaye, Conroy, & Fifer, 2008; Stoeber, Stoll, Pescheck, & Otto, 2008). They are thought to be salient during rehabilitation when athletes are cautious about aggravating injuries and may self-regulate in terms of how far removed they are from previous capabilities (as opposed to their potential; Elliot & Conroy, 2005). They may also be common at the end of athletic careers when athletes are trying to preserve existing skill levels as long as possible (Elliot & Conroy, 2005). Training provides another context in which MAv goals may be
especially salient because, consistent with the aims of training, (in)competence is inherently defined in self- or task-referenced terms. This 2 × 2 framework has proven valuable for enhancing the predictive power of the achievement goal construct in academic and occupational contexts, especially with respect to the different consequences of MAp, Pap, and PAv goals (for reviews, see Moller & Elliot, 2006; Payne et al., 2007). For example, PAp and PAv goals have very different effects on outcomes such as intrinsic motivation, self-handicapping, and performance (Elliot & Harackiewicz, 1996; Elliot & McGregor, 2001; Renkema & Van Yperen, 2008). In a series of experiments that manipulated goals prior to a basketball dribbling task, PAp goals were linked with greater competence valuation, task absorption, practice time, and investment in learning, and lower levels of state anxiety compared to PAv goals (Cury, Da Fonséca, Rufo, Peres, & Sarrazin, 2003; Cury, Elliot, Sarrazin, Da Fonseca, & Rufo, 2002; Elliot, Cury, Fryer, & Huguet, 2006). These findings indicate that the undesirable effects of performance-based goals in the physical domain may be attributed more to PAv than PAp goals.

Differences between the two mastery-based goals have not received as much attention; however, emerging evidence is generally consistent with expectations that these goals have different consequences. For example, MAp goals positively predicted college students’ use of meta-cognitive strategies and deep processing, whereas MAv goals were unassociated with these outcomes (Elliot & McGregor, 2001; Howell & Watson, 2007). MAp goals also negatively predicted students’ disorganization and procrastination and positively predicted grades, whereas MAv goals positively predicted disorganization and procrastination and negatively predicted grades (Howell & Watson, 2007). Among part-time workers in the service and manufacturing industries, MAp goals positively predicted attitudes toward job training, whereas MAv goals were unassociated with such attitudes (Narayan & Steele-Johnson, 2007). Thus, MAp goals appear to exhibit consistently desirable consequences in educational and occupational contexts, whereas the consequences of MAv goals appear to be less desirable in these contexts.

Less is known about how MAp and MAv goals differ in the physical domain, and the available evidence is more equivocal than in
the educational and occupational domains. Recreational youth swimmers’ intrinsic motivation was positively predicted by MAP goals and negatively predicted by MAV goals (Conroy, Kaye, & Coatsworth, 2006). In contrast, external regulation was positively predicted by MAV goals but negatively predicted by MAP goals. This investigation also revealed that changes in MAV goals positively predicted changes in external regulation and amotivation over the course of a swim season. Elementary physical education students who adopt MAV goals also tend to be more amotivated, more externally-regulated, and less intrinsically motivated for their activity whereas MAP goals are negatively associated with amotivation (Sideridis & Mouratidis, 2008). On the other hand, both MAP and MAV goals positively predicted self-reported effort/persistence in high school physical education classes (Guan, Xiang, McBride, & Bruene, 2006). Furthermore, goal profiles characterized by high MAV and MAP goals were associated with high levels of relative autonomy and enjoyment in physical education classes (Wang, Biddle, & Elliot, 2007). These findings present a more complicated portrait of how MAP and MAV goals operate in the physical domain compared to educational and occupational contexts.

Achievement goals may predict outcomes in some contexts better than others. We propose that achievement goals are most likely to predict outcomes when the goals are functionally-congruent with the aims of the context. For example, PAp and PAv goals may be most relevant for predicting outcomes in competitive contexts where athletes’ primary aim is to win or not to lose. In contrast, MAP and MAV goals may be most relevant for predicting outcomes in training contexts where athletes focus primarily on skill development or maintenance. To our knowledge, such context-specific effects hypotheses have not been tested explicitly in the athletic domain; however, this reasoning guided hypothesis generation for the present study of achievement goal relations with training outcomes.
Training Consequences of $2 \times 2$ Achievement Goals

Training processes reflect the specific and global qualities of training, including how an athlete prepares to practice, whether an athlete gives maximal effort during practice, and how an athlete appraises the demands of training. These processes exert a proximal influence on the gains accrued from training and therefore have a distal influence on competitive success. Although such outcomes represent complex behaviors in and of themselves and are likely to be multiply determined, achievement goals may be one source of variability in training processes because sport training is designed to influence athletes’ competence. This objective inherently orients athletes and coaches to evaluate competence according to how well the task is performed in absolute terms (i.e., task-referenced standards), as well as whether the athlete is improving relative to her or his previous ability (i.e., self-referenced standards). Moreover, mastery-based achievement goals should be most congruent with the purpose of training, and therefore most beneficial, when they are focused on developing competence (a positive outcome) as opposed to preventing a loss of competence (a negative outcome).

Based on the potential for context-specific effects, MAp goals were hypothesized to lead to a consistent pattern of desirable training processes because of their functional congruence with the aims of training. Although MAv goals may be somewhat congruent with the purpose of training and consequently likely to be associated with some desirable training processes, their avoidance-based focus on preventing incompetence suggests that they may evoke threat appraisals and create distress. Therefore, MAv goals were not expected to be consistently beneficial in training contexts, especially when the influence of MAp goals was controlled. Performance-based goals may be quite high for athletes, particularly elite athletes (Hardy, 1997); however, these goals are not functionally congruent with the immediate aims of training. Thus, based on the logic of context-specific effects, we did not expect them to predict training outcomes (regardless of their mean levels).

Achievement goals may also influence the quality of training processes because they can be self-regulatory expressions of self-
protective motives. For example, fear of failure is a competence-related variable that has emerged as a robust predictor of avoidance-based achievement goals in the 2 × 2 framework (Conroy & Elliot, 2004; Elliot & McGregor, 2001). Athletes who fear failing regulate their behavior in ways that will protect them from the possibility of failure and its aversive consequences. One strategy for protecting the self, especially from the threat of incompetence, is behavioral self-handicapping (Urdan & Midgley, 2001). This strategy of self-handicapping involves “creating impediments that make good performance less likely” in an effort to facilitate external attributions for failure and reduce the likelihood of damaging internal attributions for incompetence (Jones & Berglas, 1978, p. 201).

The range of self-handicapping behaviors in sport (or any domain) is nearly limitless. Readiness for training can be compromised by alcohol use or inadequate sleep – both of these behaviors provide a clear external attribution for lackluster performance that protects the individual from attributions to poor ability. During practice, athletes can withhold effort to claim that any observed shortcomings were not due to poor ability but rather to lack of effort. Regular use of mental practice techniques (e.g., mental imagery) is known to enhance athletic performance (Vealey, 2007), so athletes could also self-handicap by neglecting this important dimension of training. The imaginative athlete will find no shortage of ways to create alternative explanations for a poor performance, and athletes who focus on avoiding incompetence in their sport may be especially prone to such behavioral self-handicapping.

Although PAw goals have been linked to self-handicapping in the academic domain (Elliot & Church, 2003; Urdan & Midgley, 2001), relatively little is known about relations between achievement goals and behavioral self-handicapping in the physical domain. Mastery definitions of competence have been negatively associated with trait self-handicapping (Ommundsen, 2001, 2004), but trait self-handicapping has proven to be an inconsistent predictor of behavioral self-handicapping in sport (Ballis, 2001; Rhodewalt, Saltzman, & Wittmer, 1984). Likewise, perceptions of a task- (or mastery-) involving motivational climate have been negatively associated with situational self-handicapping (Kuczka & Treasure, 2005).
When approach – and avoidance – valenced performance goals have been distinguished in sport, PAv goals have been positively associated with self-handicapping, whereas PAp goals have been negatively associated with self-handicapping (Ommundsen, 2004). In the only experimental studies utilizing a sport task, PAv goal inductions led to less time spent practicing a task before a skills test (a form of behavioral self-handicapping) compared to both PAp and MAp goal inductions (Cury et al., 2003; Elliot et al., 2006). No studies in the physical domain have examined links between MAv goals and self-handicapping. However, the avoidance nature of these goals suggests that individuals adopting these goals will engage in esteem-protective behaviors designed to increase the availability of attributions for failure that do not reflect poorly on the self.

To summarize, the aim of this study was to evaluate prospective links between athletes’ 2 × 2 achievement goals and the quality of their training processes. Training processes of interest included athletes’ effort during practice, alcohol use, frequency of inebriation, adequacy of rest, and use of mental training strategies. Several of these behaviors could be used to self-handicap during athletic training (e.g., increased alcohol use, more frequent inebriation, and reduced effort, rest, and mental training). Athletes’ daily evaluations of the subjective distress associated with sport and their self-evaluations of practice performance were used as broader indicators of the quality of training processes. In general, MAp goals were hypothesized to be positively associated with adaptive training processes due to their explicit congruence with the aims of training. Additionally, MAp goals were expected to be associated with less distress than MAv goals because the former focus on appetitive possibilities, whereas the latter focus on aversive possibilities. Performance-based goals were hypothesized to be unassociated with the quality of training processes, because normative competence is less congruent with the aims of training than competition. Performance-based goals were included in our analyses to rule out the possibility that they predicted outcomes, to control any outcome variance associated with them, and to provide the most precise estimates of relations between each mastery-based goal and the focal outcomes.
Methods

Participants

Volunteers ($N = 71$) were recruited from the varsity women’s track and field team at a large Division-1 university in the United States (99% participation rate). The mean age of participants was 19.6 years ($SD = 1.3$) and the sample included African-Americans ($n = 10$), Caucasians ($n = 57$), and participants from other racial and ethnic backgrounds ($n = 4$; one participant did not report a racial or ethnic background). Participants identified a variety of primary events, including sprints ($n = 11$), middle distance ($n = 14$), long distance ($n = 20$), jumping events ($n = 4$), throwing events ($n = 13$), heptathlon ($n = 2$), and pole vault ($n = 6$); two participants did not report a primary event.

Instruments

The 12-item Achievement Goal Questionnaire for Sport (AGQ-S; Conroy et al., 2003) was employed to assess achievement goals. The scale included three items that corresponded to each of the four achievement goals in the $2 \times 2$ model (Elliot & McGregor, 2001): mastery-approach (MAp; e.g., “It is important to me to perform as well as I can”), mastery-avoidance (MAv; e.g., “I worry that I may not perform as well as I can”), performance-approach (PAp; e.g., “It is important to me to do well compared to others”), and performance-avoidance (PAv; e.g., “I just want to avoid performing worse than others”) goals. Using a scale ranging from 1 (not at all like me) to 7 (completely like me), participants indicated how well each item described their focus for the upcoming season. As described by Conroy et al. (2003), the original items from Elliot and McGregor (2001) were adapted in the AGQ-S to be appropriate for the sport context and to emphasize a focus on normative incompetence in the PAv goal items. In previous research, scores from this measure have demonstrated evidence of high internal consistency, longitudinal factorial invariance and temporal stability for latent mean scores, and theoretically-expected relations with antecedents such as fear of failure and with consequences such as situational motivation (Conroy, 2004; Conroy & Elliot, 2004; Conroy et al., 2003, 2006).
Athletes were asked to take a moment at the end of every day to rate their personal effort during the team practice on a category ratio perceived exertion scale (cf. Borg, 1982) ranging from 0 (nothing at all) to 10 (very, very heavy). Participants also rated their experience of sport-related distress each day on a scale ranging from 0 (absolutely no distress) to 100 (maximally distressful). These daily diaries were collected at the end of each week when participants were given their next daily diary sheet. Daily ratings were averaged to create weekly scores for workout effort and subjective sport-related distress.

At the end of a team practice every second week, participants completed a biweekly behavior questionnaire. Participants were asked to respond to the following questions: “In the past two weeks, how many days did you drink more than one alcoholic beverage?”, “In the past two weeks, how many days did you get drunk?”, “In the past two weeks, how many hours of sleep did you get per night (on average)?”, and “In the past two weeks, how many days did you use mental training strategies (e.g., relaxation, concentration exercises, imagery, performance routines)?”

**Procedures**

Participants were recruited during the first official team practice for the indoor track and field season for a study examining motivational influences on training and practice habits. They were informed at the beginning of the study that their coaches would have access to summaries of their weekly training logs and biweekly questionnaires if they elected to participate (a factor that may account for attrition after the preseason assessment). Individuals who provided informed consent then responded to demographic questions and completed the AGQ-S to identify their achievement goals for the upcoming indoor season. Participants were asked to maintain a daily diary throughout the season. During a team practice at the end of every week, a research assistant collected daily diaries from the previous week. During alternate weeks of the season, a research assistant also administered a biweekly behavior questionnaire to participants at the end of a team practice. Data collection was halted prematurely after the 6th week of the season because of the unexpected accidental death of a team member, an event deemed likely to influence participants’ training behavior.
Data Analysis

There were no missing data for the AGQ-S. Some participants did not return weekly and biweekly questionnaires, but 77% of participants returned at least one weekly questionnaire ($M = 3.9$, $SD = 1.7$, range = 1-6; total of 217 questionnaires) with daily diary ratings ($M = 26.2$ days, $SD = 11.4$, range = 5-42; total of 1443 data points) and 80% of participants returned at least one biweekly questionnaire ($M = 1.6$, $SD = 0.5$, range = 1-2; total of 94 data points). The missing data appeared to be in an arbitrary pattern, and achievement goal scores did not correlate significantly with the number of missing days in daily diaries, missing weekly questionnaires, or missing biweekly questionnaires ($ps > .05$). The differential response rates to the pre-season goals assessment and the subsequent assessments of training outcomes may reflect participants' knowledge that their coaches would have access to their weekly and biweekly reports of training processes.

Weekly and biweekly assessments were nested within participants, so multilevel modeling analyses were conducted using HLM 6.04 (Raudenbush, Bryk, Cheong, & Congdon, 2004). This approach used between-person variability in achievement goals (a level-2 variable) to predict within-person (level-1) training practices. Although time of assessment is a potential source of within-person variability, it was excluded from the present analyses due to concerns that the limited number of data points for each participant may lead to misleading conclusions about how training processes changed over time. Instead, the repeated assessments provided more reliable estimates of each outcome variable in these means-as-outcomes models. In operational terms, the level-2 data file comprised participants' achievement goal scores for the season, and the goal scores were grand-mean centered in the model. The level-1 data file comprised data from the daily training logs as well as the biweekly behavior questionnaires for all participants. Intercepts were permitted to vary randomly. All outcomes were treated as continuous variables.²

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² Additional analyses were conducted with time of assessment as a level-1 predictor variable but few significant findings emerged, and findings concerning achievement goals did not change appreciably when time was included in the level-1 models.
HLM models were estimated in two steps. First, a series of fully-unconditional models were estimated as a baseline for evaluating more complex models. As seen in Equation 1, these models represented the mean level of each training practice with an intercept (β_{0j}), and permitted individual-level variation around that mean (r_{ij}). Equation 2 indicates that between-person variability in intercepts was modeled as random variation (u_{0j}) around a grand-mean (γ_{00}). These models provided estimates of the intraclass correlation coefficient (ICC) for each dependent variable. The ICC represents the proportion of variance in a training practice between participants; the proportion of variance that exists within participants can be estimated as 1 − ICC.

(1) Y_{ij} = β_{0j} + r_{ij}

(2) β_{0j} = γ_{00} + u_{0j}

The next model examined whether inter-individual variability in achievement goals accounted for significant variance in intercepts (β_{0j}) as a function of inter-individual variability in achievement goals. The level-1 model here was identical to the expression in Equation 1. The level-2 model in which (grand-mean centered) achievement goals predicted inter-individual variability in level-1 intercepts and slopes is presented in Equation 3.

(3) β_{0j} = γ_{00} + γ_{01}(MAp) + γ_{02}(MAv) + γ_{03}(PAp) + γ_{04}(PAv) + u_{0j}

**Results**

Descriptive statistics for the variables in this study are presented in Table 1. Responses to MAp items exhibited low internal consistency (α = .37) so one item ("It is important for me to master all aspects of my performance") was dropped to improve the internal consistency (α = .50); however, this score was still below conventional levels. Given the importance of controlling variance associated with MAp scores when evaluating the unique predictive power of other goals, these scores were included in the analyses despite their low internal consistency. Correlations between the four achievement goals appear in Table 2. The two mastery-based goals exhibited a marginal positive correlation whereas the two performance-based goals exhibited a large, and statistically-significant, positive correlation. The two approach goals and the two avoidance goals also exhibited significant posi-
tive correlations, respectively. The correlation between MAp and PAv goals was not significant, but the positive correlation between MAv and PAp goals was statistically significant.

Table 1: Descriptive Statistics for Achievement Goals and Training Variables

<table>
<thead>
<tr>
<th>Achievement Goals</th>
<th>M</th>
<th>SD</th>
<th>Observed Range</th>
<th>α</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mastery-Approach Goal</td>
<td>6.90</td>
<td>0.39</td>
<td>5.00 – 7.00</td>
<td>.50</td>
</tr>
<tr>
<td>Mastery-Avoidance Goal</td>
<td>5.86</td>
<td>1.33</td>
<td>1.67 – 7.00</td>
<td>.86</td>
</tr>
<tr>
<td>Performance-Approach Goal</td>
<td>5.56</td>
<td>1.44</td>
<td>1.33 – 7.00</td>
<td>.87</td>
</tr>
<tr>
<td>Performance-Avoidance Goal</td>
<td>4.79</td>
<td>1.63</td>
<td>1.00 – 7.00</td>
<td>.86</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Daily Diary Averages</th>
<th></th>
<th></th>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Effort in Team Practices</td>
<td>5.29</td>
<td>1.70</td>
<td>2.82 – 9.49</td>
<td>–</td>
</tr>
<tr>
<td>Subjective Distress in Sport</td>
<td>34.84</td>
<td>16.93</td>
<td>0.00 – 76.67</td>
<td>–</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Biweekly Survey Averages</th>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Hours of Sleep</td>
<td>7.28</td>
<td>0.97</td>
<td>4.00 – 10.00</td>
<td>–</td>
</tr>
<tr>
<td>Alcohol Use (&gt; 1 serving/day)</td>
<td>0.61</td>
<td>1.27</td>
<td>0.00 – 7.00</td>
<td>–</td>
</tr>
<tr>
<td>Inebriated</td>
<td>0.40</td>
<td>1.02</td>
<td>0.00 – 6.00</td>
<td>–</td>
</tr>
<tr>
<td>Used Mental Training Strategies</td>
<td>2.49</td>
<td>2.59</td>
<td>0.00 – 10.00</td>
<td>–</td>
</tr>
<tr>
<td>Practice Grade</td>
<td>74.97</td>
<td>16.30</td>
<td>1.00 – 95.00</td>
<td>–</td>
</tr>
</tbody>
</table>

Table 2: Correlation Coefficients Between 2 × 2 Achievement Goals

<table>
<thead>
<tr>
<th></th>
<th>MAp</th>
<th>MAv</th>
<th>PAp</th>
<th>PAv</th>
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<tbody>
<tr>
<td>Mastery-Approach (MAp)</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mastery-Avoidance (MAv)</td>
<td>.21*</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Performance-Approach (PAp)</td>
<td>.41**</td>
<td>.40**</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Performance-Avoidance (PAv)</td>
<td>.18</td>
<td>.54**</td>
<td>.64**</td>
<td>1.00</td>
</tr>
</tbody>
</table>

* p < .01, * p < .05, † p < .10

Intraclass correlation coefficients were estimated in unconditional multilevel models. Variables with a greater proportion of variance within-persons (over time) than between-persons included daily effort (.33), and subjective distress in sport (.33). Only the number of days that participants drank more than one serving of alcohol had a greater proportion of between- than within-persons variance (.86). All other variables had approximately equal proportions of variance within- and between-persons: number of days inebriated (.42), average hours of sleep each night (.67), number of days in which mental training strategies were used (.65), and practice grades for two-week periods (.51). Conditional multilevel models were then estimated to evaluate whether 2 × 2 achievement goals accounted for variability in each of these training processes. Coefficients from each of the multilevel models using 2 × 2 achievement goals to predict the average level of each training process

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appear in Table 3. Goals were marginal predictors of the average number of hours of sleep that participants reported: PAp goals were negatively associated with sleep, whereas PAv goals were positively associated with sleep. Neither of the mastery goals was related to hours of sleep. MAP goals were significant negative predictors of alcohol use (> 1 serving/day) and the frequency of inebriation. MAV goals were a marginal positive predictor of alcohol use (> 1 serving/day), but did not predict the frequency of inebriation. Neither of the performance goals significantly predicted alcohol use or inebriation. Achievement goals were not significantly associated with participants’ daily ratings of their effort during team practices. MAP goals predicted significantly increased use of mental training strategies. MAV and MAV goals were the only achievement goals to predict significantly more positive evaluations of practice performance. Finally, MAP goals were significant negative predictors of subjective ratings of sport-related distress, whereas MAV goals were significant positive predictors of distress. Performance-based goals were unrelated to sport-related distress.3

3. Although interactive effects were not the focus of this study and no hypotheses were made for specific goal × goal interactions, a limited set of exploratory analyses were conducted to examine whether the two-way interaction between MAP and MAV achievement goals significantly predicted any outcomes. These two goals were selected based on the main effects findings reported above which were consistent with the proposal that mastery-based goals are most relevant for predicting training-related outcomes. Only one model had a statistically significant MAP × MAV interaction, namely the model of the average number of hours of sleep that participants reported. A marginally-significant main effect between PAp goals and sleep became statistically significant once the MAP × MAV interaction effect was controlled (γ = -0.23, p < .05). MAP goals were negatively related to sleep (γ = -0.35, p < .01), and relations between MAP goals and sleep were moderated by MAV goals (γMAP × MAV = -0.36, p < .01). A computational utility developed by Preacher, Curran, and Bauer (2006) was used to probe the meaning of this interaction. Participants with low MAV goals (-1 SD) had the least negative slope between MAP goals and sleep (b = -2.61, z = -7.80, p < .05). Participants with high MAV goals (+1 SD) had the most negative slope between MAP goals and sleep (b = -3.30, z = -7.02, p < .05).
Discussion

This study investigated links between $2 \times 2$ achievement goals and a variety of training processes. Results suggested that high levels of MAp goals were generally associated with more beneficial training processes over a six-week interval, and that MAv goals were associated with increased sport-related distress. MAv goals exhibited some marginal relations with important training processes (i.e., using alcohol and mental training strategies) that will be discussed as well.

Nearly all of the significant relations observed in this preliminary study of training processes involved goals grounded in a mastery definition of competence, and particularly MAp goals focused on the positive possibility of competence. These findings affirmed the importance of (a) defining competence in self- or task-referenced terms, and (b) focusing on developing competence as opposed to preventing incompetence while training. Athletes who do so are more likely to use mental training strategies, less likely to use alcohol, and more likely to evaluate the quality of their training efforts positively. The cumulative effects of using mental training, limiting alcohol use, and making positive performance appraisals over time should enhance skill acquisition and ability by promoting efficient information processing, facilitating recovery, and developing efficacy for relevant tasks, respectively. In contrast, athletes whose definitions of competence are congruent with the aims of training (i.e., mastery-based) but are focused on preventing incompetence instead of developing competence (i.e., avoidance-valenced) do not exhibit this consistent pattern of desirable training processes and instead experience significantly more distress from their activity.

When these training processes are viewed through a self-handicapping lens, it appears that MAp goals buffer against behavioral self-handicapping during training. This finding extends previous findings by Kuczka and Treasure (2005) and Ommundsen (2001, 2004) by linking MAp goals to reduced behavioral self-handicapping. They are also consistent with the self-protection theory of self-handicapping (Jones & Berglas, 1978; Urdan & Midgley, 2001) because MAp goals have been positively linked with self-esteem, a critical dispositional antecedent of self-handicapping.
(Kavussanu & Harnisch, 2000; for a relevant exception, see Niiya & Crocker, 2008).

The present findings contrast with previous work linking PAv goals to self-handicapping (Cury et al., 2003; Elliot et al., 2006; Urdan & Midgley, 2001). One difference between the present study and previous reports involves the research context. Studies documenting links between PAv goals and behavioral self-handicapping in sport have used a measure of practice time prior to a skills test to index self-handicapping. Preparing to have one's competence evaluated socially should increase the salience of normative definitions of competence and elicit effects for performance-based achievement goals. Absent a socially-evaluative context, achievement goals focused on normative definitions of competence would be unlikely to predict self-handicapping. In less socially-evaluative contexts, it appears that a focus on MAp goals orients the individual toward adaptive training processes and away from what could otherwise be construed as self-handicapping strategies. Although the present study used the logic of contextual specificity to generate hypotheses, it did not provide a complete test of the contextual-specificity of these effects. Direct contrasts between measures of behavioral self-handicapping (and other outcomes) in more and less socially-evaluative contexts would provide a more definitive test of the hypothesis that achievement goals predict outcomes best when the social context of the outcome corresponds to how competence is defined in the goal. Such a finding would support propositions that "different achievement goals may be better suited for different types of situations" (p. 708; Barron & Harackiewicz, 2001) and that performers can benefit from being able to shift their focus among multiple goals as the demands of the situation change (e.g., from training to competition).

This study provided novel data regarding the consequences of MAv goals in sport. Previous work has established links between changing MAv goals and behavioral regulation for sport (Conroy et al., 2006). The present findings provide additional evidence that MAv goals make sport training more distressful and less enjoyable for athletes. Creating a threatening environment by emphasizing the possibility of incompetence is known to increase perceived stress (Drach-Zahavy & Erez, 2002), and PAv achievement goals lead to greater threat construal in school
(McGregor & Elliot, 2002). Our finding with MAv goals suggests that it is the preoccupation with an aversive possibility (i.e., incompetence) rather than the definition of competence that promotes threat construals and increases subjective distress.

Two marginal effects of MAv goals also warrant attention given the paucity of data on the consequences of this goal in sport. MAv goals were marginally associated with increased use of mental training strategies and increased use of alcohol (a behavior involved in the initial conceptualization of the self-handicapping phenomenon; Jones & Berglas, 1978). Although firm conclusions cannot be drawn based on these results, this mixed pattern of results is interesting. It may be that alcohol use is a consequence of the increased distress reported by athletes who adopt MAv goals. This effect would be consistent with previous research linking daily variation in perceived stress with alcohol use (Carney, Armeli, Tennen, Affleck, & O’Neil, 2000). These findings suggest that a mastery definition of competence and avoidance valence may create specialized effects on training processes that should not be represented as being simply adaptive or maladaptive. It will be interesting to see whether this finding is robust in future research as the consequences of MAv regulation becomes better understood.

This study was the first to examine the consequences of 2 × 2 achievement goals in high-level, competitive athletes. The available sport research that distinguishes goals according to their valence has employed either college students involved in recreational sport activities (Conroy et al., 2003), youth in physical education classes (Cury et al., 2002, 2003; Elliot et al., 2006; Guan et al., 2006; Omundsen, 2004; Wang et al., 2007), or youth in recreational sport programs (Conroy et al., 2006). Our findings contribute further evidence that the valence of achievement goals in sport influences the consequences of those goals.

Most behavioral self-handicapping research in sport and other contexts has focused on behaviors, affects, and cognitions associated with more and less important tests of one’s competence (Ballis, 2001; Rhodewalt et al., 1984). The processes that enhance recovery from training demands, increase readiness for additional training, and enrich the quality of training have received little attention in the literature. This imbalance is ironic considering the number of daily opportunities that exist for performers
to self-handicap, and the long-term achievement-related costs of this strategy. Daily diaries and experience sampling methods can provide valuable insight into the accumulating costs of even occasional decisions to engage in self-handicapping. Documenting patterns of intra-individual fluctuations in self-handicapping and establishing the sources of such variability will be important steps in future research on training processes in athletic, academic, and occupational contexts (see Urdan & Midgley, 2001). Given the present findings and the potential for achievement goals to shift during activities (e.g., Gernigon et al., 2004), these goals are theoretically-viable sources of within-person variability in self-handicapping that should be considered in future research. Some limitations of this study also warrant attention. First, the MAP scale did not function optimally with high-level athletes in the training setting. Although the internal consistency was unusually low, this appeared to be due to a ceiling effect that reduced variability in scores. This problem is neither new nor entirely unique to this sample as reports of MAP goals (or simply mastery/task goals when the valence dimension is ignored) have tended to be negatively skewed in previous research with samples of other athletic populations as well (see Duda & Whitehead, 1998). It may be that the salience of mastery-based definitions of competence in training situations exacerbates skewness in MAP distributions. Efforts to develop a MAP scale for specific use in training situations may help to alleviate this problem in future research. Nevertheless, we believe that these scores validly distinguished athletes with relatively low MAP goals from those with moderate-to-high MAP goals but may have been less effective for distinguishing athletes with moderate MAP goals from those with high MAP goals. Despite this limitation and its effect of attenuating relations between MAP goals and other variables, it is noteworthy that these MAP scores nevertheless proved to be consistent predictors of training practices. This pattern of results speaks to the potency of MAP goals in training contexts. The study was also limited by its reliance on a single assessment of goals to predict outcomes that unfolded over the following six weeks. Temporal separation of assessments can be a valuable design characteristic when data are obtained from a single source; however, it presents a complication in the present context because goals are, by definition, somewhat dynamic enti-
ties (a point supported in research on intraindividual variability in dichotomous achievement goals; Gernigon et al., 2004). It is not currently possible to assess $2 \times 2$ goals continuously during an activity (let alone during a real-world activity that stretches over months), but our findings provide a basis for conducting more intensive research focused on linking repeated assessments of goals with intra-individual variability in training processes. Multi-level modeling technology is ideally suited for such investigations and represents a potential means for advancing the achievement motivation literature.

Future research may also benefit from obtaining data on achievement processes and outcomes from informants or objective measures (as opposed to relying exclusively on self-reports). This point is especially salient given the sensitive nature and attendant potential for a social desirability bias associated with some of the single-item self-reports used to assess outcomes in the present study (Paulhus & Vazire, 2007). Participants in the present study were informed that their coaches would have access to their training data. This design characteristic may have created an unintended demand effect so it will be important to replicate the present findings with more controlled assessments. Finally, the present sample was delimited to high-level female athletes and, given the established sex differences in achievement motivation (Dweck, 1986), it is not clear how well our conclusions will generalize to high-level male athletes.

Overall, findings from this study illustrated that achievement goals, and especially those focused on appetitive possibilities of self- or task-referenced definitions of competence (i.e., MAp goals), are linked with training processes in sport. Goal valence can also play an important role in determining the consequences of achievement goals because MAv goals appear to exhibit a more complex profile of relations with training processes that contrasts with the unambiguously adaptive profile associated with MAp goals. Although experimental research will be needed to establish the causal properties of achievement goals (cf. Cury et al., 2002, 2003), the present findings lead us to encourage achievement goal researchers to consider the potential of the $2 \times 2$ achievement goal framework for enhancing their predictions of achievement-related affect, behavior, and cognition.
References


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