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*(2), 211-245.

Predicting Race Performance in Triathlon:

The Role of Perfectionism, Achievement Goals, and Personal Goal Setting

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We thank Kathleen Otto, Oliver Stoll, and two anonymous reviewers for helpful comments and suggestions on earlier versions of this article; Gregor Kuhn for helpful advice on how to control for previous best performance in triathlon; and the race organizers and all participating triathletes for making this research happen.

Study 2 was supported by research grant #RES-000-22-2217 from the Economic and Social Research Council (ESRC) to the first author.

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Abstract

The question of how perfectionism affects performance is highly debated. Because empirical studies examining perfectionism and competitive sport performance are missing, the present research investigated how perfectionism affected race performance and what role athletes' goals played in this relationship in two prospective studies with competitive triathletes (Study 1: $N = 112$; Study 2: $N = 321$). Regression analyses showed that perfectionistic personal standards, high performance-approach goals, low performance-avoidance goals, and high personal goals predicted race performance beyond athletes' performance level. Moreover, the contrast between performance-avoidance and performance-approach goals mediated the relationship between perfectionistic personal standards and performance, whereas personal goal setting mediated the relationship between performance-approach goals and performance. The findings indicate that perfectionistic personal standards do not undermine competitive performance, but are associated with goals that help athletes achieve their best possible performance.

Keywords: perfectionism; competition; performance; motivation; achievement goals; goal setting; approach; avoidance

Introduction

In the psychology of sport, the question of how perfectionism affects performance is highly debated. Whereas some researchers regard perfectionism as a psychological characteristic that makes Olympic champions (Gould, Dieffenbach, & Moffett, 2002), others regard perfectionism as a maladaptive characteristic that undermines, rather than helps, athletic performance (Flett & Hewitt, 2005). Unfortunately, empirical evidence is scarce. So far only two studies have investigated perfectionism and performance in sport (Anshel & Mansouri, 2005; Stoll, Lau, & Stoeber, 2008). Apart from producing divergent findings—the first study found perfectionism to predict performance decrements, the second performance increments—the studies investigated perfectionism and performance in a laboratory task and during training, but not in competition. Because the question of how perfectionism affects athletes' competitive performance is still unanswered, the aim of the present study was to investigate how perfectionism affects race performance in triathlon.

According to dictionary definitions, perfectionism is seen as "the uncompromising pursuit of excellence" (Thompson, 1995, p. 1015). Scientific theory and research, however, have progressed to a more differentiated view seeing perfectionism as a multidimensional and multifaceted characteristic (see Enns & Cox, 2002, for a review). Moreover, cumulative evidence indicates that two major dimensions of perfectionism should be differentiated: personal standards perfectionism and evaluative concerns perfectionism (Blankstein, Dunkley, & Wilson, 2008; Dunkley, Blankstein, Halsall, Williams, & Winkworth, 2000). Personal standards perfectionism comprises the facets of perfectionism that capture perfectionistic personal standards and a self-oriented striving for perfection. This dimension has shown to be related to positive characteristics, processes, and outcomes such as endurance, positive affect, and higher academic performance. In comparison, evaluative concerns perfectionism captures those facets of perfectionism that relate to concern over mistakes, doubts about actions, and concern over others' evaluation of one's performance. This dimension has shown to be related to negative characteristics, processes, and outcomes such as test anxiety, negative affect, and distress (see Stoeber & Otto, 2006, for a comprehensive review).

Perfectionism in Sport

The differentiation between personal standards perfectionism and evaluative concerns perfectionism is important when investigating perfectionism in sport. Specifically when ex-

amining the evidence suggesting that perfectionism is associated with maladaptive characteristics and behaviors that may be detrimental to sport performance and athletic development (Flett & Hewitt, 2005; Hall, 2006), it is mainly the facets of evaluative concerns perfectionism that show close relationships with negative characteristics and outcomes, not the facets of personal standards perfectionism. On the contrary, the facets of personal standards perfectionism have shown relationships with positive characteristics and outcomes in athletes, particularly when overlap with the facets of evaluative concerns perfectionism was controlled for. In this case, the facets of personal standards perfectionism were associated with positive attitudes, beliefs, and processes such as hope of success, competitive self-confidence, self-serving attributions of success and failure, and lower levels of anxiety and burnout (Hill, Hall, Appleton, & Kozub, 2008; Stoeber & Becker, in press; Stoeber, Otto, Pescheck, Becker, & Stoll, 2007).

Moreover, recent findings indicate that personal standards perfectionism and evaluative concerns perfectionism show differential relationships with achievement goals. Traditionally, achievement goal theory in sport has distinguished between two goal orientations: performance goals and mastery goals (also called ego goals and task goals; Duda & Nicholls, 1992). Studies on perfectionism and achievement goals in athletes, following the traditional approach, found that perfectionistic personal standards—which is the defining facet of personal standards perfectionism (Dunkley et al., 2000)—showed positive correlations with performance and mastery goals whereas concern over mistakes—the defining facet of evaluative concerns perfectionism (Dunkley et al., 2000)—showed positive correlations with performance goals only (Dunn, Dunn, & Syrotuik, 2002; Hall, Kerr, & Matthews, 1998; Lemyre, Hall, & Roberts, 2008; Ommundsen, Roberts, Lemyre, & Miller, 2005).

Recently, however, researchers in sport psychology have adopted the 2 × 2 framework introduced by Elliot and McGregor (2001) which differentiates between four achievement goals: performance-approach, performance-avoidance, mastery-approach, and mastery-avoidance goals (Conroy, Elliot, & Hofer, 2003; Elliot & Conroy, 2005). According to Conroy et al. (2003), (a) performance-approach goals represent the motivation to demonstrate normative competence (e.g., striving to do better than others), (b) performance-avoidance goals represent the motivation to avoid demonstrating normative incompetence (e.g., striving to avoid doing worse than others), (c) mastery-approach goals represent the motivation to achieve absolute or intrapersonal competence (e.g., striving to master a task), and (d) mastery-avoidance goals represent the motivation to avoid absolute or intrapersonal incompetence (e.g., striving to avoid doing worse than one has done previously). The differentiation between avoidance and approach goals is important when regarding how the dimensions of perfectionism relate to achievement goals in athletes. Two recent studies following the 2 × 2 framework found that all facets of perfectionism showed positive correlations with performance-approach goals, but only the facets associated with personal standards perfectionism showed positive correlations with mastery-approach goals. In contrast, the facets associated with evaluative concerns perfectionism showed positive correlations with performance-avoidance and mastery-avoidance goals (Kaye, Conroy, & Fifer, 2008; Stoeber, Stoll, Pescheck, & Otto, 2008, Study 2).

The findings that personal standards perfectionism is mainly associated with approach goals while evaluative concerns perfectionism is mainly associated with avoidance goals have important implications. First, the findings provide support for the dual process model of perfectionism proposed by Slade and Owens (1998). This model holds that positive perfectionism (personal standards perfectionism) is focused on the pursuit of perfection and thus associated with approach goals and hope of success, whereas negative perfectionism (evaluative concerns perfectionism) is focused on the avoidance of imperfection and thus associated with avoidance goals and fear of failure.

Consideration of such findings is critical when examining the relationship between perfectionism and sport performance. Whereas educational psychology research following the revised achievement goal theory (differentiating performance-approach, performance-avoidance, and mastery goals) has long gathered evidence that performance-approach goals predict academic performance (see Harackiewicz, Barron, Pintrich, Elliot, & Thrash, 2002, for a review), research in sport psychology only recently demonstrated that performance-approach goals predict sport performance (Elliot, Cury, Fryer, & Huguet, 2006). Elliot et al. investigated a sample of basketball players and experimentally induced performance-approach and performance-avoidance goals prior to a dribbling task. Findings showed that the *contrast* between performance-approach and performance-avoidance manipulation predicted dribbling performance: players who had been instructed to do better than others (performance approach) showed a significantly higher performance when contrasted with players who had been instructed to avoid doing worse than others (performance avoidance). Collectively, when combining Elliot et al.'s finding with the observation that personal standards perfectionism is associated with higher levels of performance-approach goals, but not higher levels of performance-avoidance goals (Kaye et al., 2008; Stoeber, Stoll, et al., 2008), one may expect that personal standards perfectionism should predict sport performance.

Empirical support for this expectation is sketchy, however. Outside the sports domain, many studies have demonstrated that facets associated with personal standards perfectionism are associated with higher academic performance (e.g., Accordino, Accordino, & Slaney, 2000; Bieling, Israeli, Smith, & Antony, 2003; Blankstein et al., 2008; Enns, Cox, Sareen, & Freeman, 2001; Stoeber & Rambow, 2007), higher test performance (Stoeber & Kersting, 2007), and higher musical performance (Stoeber & Eismann, 2007). In the sports domain, however, to date only two studies have investigated the relationship between perfectionism and performance in athletes—with diverging findings.

The first study (Anshel & Mansouri, 2005) was a laboratory study investigating perfectionism and motor performance. Male undergraduate athletes completed measures of personal standards perfectionism (personal standards) and evaluative concerns perfectionism (concern over mistakes). Afterwards athletes performed a body balancing task on a stabilometer for twenty trials. In half of the trials, athletes received no feedback on their performance. In the other half, they received false negative feedback that they were failing to reach their previous best. Results showed that personal standards perfectionism and evaluative concerns perfectionism did not influence performance when no feedback was given, but impaired performance when false negative feedback was given, suggesting that perfectionism may undermine athletes' performance. The second study (Stoll et al., 2008) was a field study investigating perfectionism and training performance. Male and female undergraduate athletes completed measures of personal standards perfectionism (striving for perfection) and evaluative concerns perfectionism (negative reactions to imperfection). Afterwards athletes performed a series of trials with a new basketball training task that required scoring baskets from a nonstandard position. Results showed that striving for perfection was associated with higher overall performance whereas the combination of high levels of striving for perfection with high levels of negative reactions to imperfection predicted performance increments over the series of trials, suggesting that perfectionism may enhance athletes' performance.

Although the two studies' findings are diverging, they are not necessarily contradictory. Perfectionism may have a negative influence on performance in laboratory settings when false feedback regarding performance is given (Anshel & Mansouri, 2005) and have a positive influence on performance in "real life" settings such as training situations when participants receive veridical feedback about their performance (Stoll et al., 2008). Moreover, the two studies did not investigate competitive performance. Consequently, the important question whether perfectionism undermines or underscores athletes' performance is still unresolved, particularly regarding competitive performance.

Aims of the Present Research

Against this background, the aim of the present research was to provide the first systematic investigation of how perfectionism influences competitive performance in sports. Specifically, the aim was to investigate how perfectionistic personal standards and concern over mistakes—the two defining facets of personal standards perfectionism and evaluative concerns perfectionism—predicted race performance in triathlon and what role the achievement goals of the 2 × 2 framework played in this relationship. The reasons why we chose triathlon (a sport in which athletes compete in swimming, cycling, and running all in one race) were threefold: First, triathlon provides for objective measures of performance (time to finish race). Moreover, it provides for multiple measures of athletes' performance level (previous best swimming, cycling, and running) and thus allows for better control of athletes' previous performance when predicting their performance in an upcoming race. Second, race performance in triathlon is largely self-determined and relatively independent of the performance level of one's opponent (cf. tennis) or one's team (cf. football) giving athletes greater control of their performance and allowing athletes' personality to have a greater effect on performance. Third, triathlon races attract large numbers of participants making it possible to obtain sample sizes that provide sufficient statistical power to detect significant effects (Cohen, 1992).

Regarding perfectionism, achievement goals, and race performance and focusing on the personal standards perfectionism dimension of perfectionism, our analyses were guided by the following expectations. First, based on the large body of findings showing that the facets of personal standards perfectionism are associated with higher performance in exams, tests, and music competitions and on Stoll et al.'s (2008) respective findings with training performance in sport, we expected that perfectionistic personal standards would show a positive correlation with race performance in triathlon. Second, based on the findings from revised achievement goal theory that performance-approach goals predict academic performance and Elliot et al.'s (2006) respective findings with training performance in sport, we expected that performance-approach goals would also show a positive correlation with race performance in triathlon. Finally, based on the recent findings with athletes that the facets of personal standards perfectionism are associated with performance-approach goals, but not with performance-avoidance goals (Kaye et al., 2008; Stoeber, Stoll, et al., 2008) and Elliot et al.'s findings that the contrast between performance-approach and performance-avoidance goals predicted training performance, we expected that perfectionistic personal standards, performance-approach goals, and performance-avoidance goals would also predict race performance in triathlon. Furthermore, we sought to explore what role achievement goals play in the relationship between perfectionism and race performance. In particular, we sought to explore whether performance-approach goals—either alone or when contrasted against performance-avoidance goals (Elliot et al., 2006)—mediated the relationship between perfectionistic personal standards and race performance in triathlon.

Study 1

Method

Participants, Procedure, and Race Details

Participants. A sample of $N = 126$ athletes (98 male, 28 female) was recruited at a Half-Ironman distance triathlon. Mean age of athletes was 36.5 years ($SD = 7.6$; range = 21-58 years). All athletes had pre-registered for the race and were recruited during registration on the day before the race. Overall, 190 questionnaires were distributed of which 126 (66%) were returned. Of the 126 athletes who returned questionnaires, 11 did not enter the race, did not

finish the race, or experienced problems with the timing device. Consequently, race performance data were available from 115 athletes.

Procedure. Prior to conducting the study, ethical approval was obtained from the ethics committee of the first author's department. The day before the race, the first and second author set up a stand in the area where participants registered for the race and received race information and technical gear (e.g., start numbers, timing device). Athletes who were registering were asked whether they would participate in a questionnaire study. Athletes who agreed were handed a questionnaire and a pen. Athletes' participation was voluntary, and there was no financial compensation. Data on athletes' race performance were obtained from the official race results provided by the race organizers.

Race details. The race was the New Forest Middle Distance Triathlon commencing on 26 September 2006. This race took part in The New Forest, a National Park in the south of England, and comprised 1.9 km (1.2 miles) swimming, 90 km (56 miles) cycling, and 21.1 km (13.1 miles) running distance which is half of the "Ironman" distance. The swimming took place in Lake Ellingham, a small water-ski lake, and the cycling (paved roads) and running (paved roads, gravel tracks) took place on a generally flat route.

Measures

Performance level. Because the New Forest race was the last major race of the UK's 2006 triathlon season, we measured performance level by asking athletes to indicate the best times they had accomplished in a triathlon during the current season and to write down swimming, cycling, and running distances and times of their seasonal best triathlon (seasonal best).

Perfectionism. To measure perfectionistic personal standards and concern over mistakes, we used the Personal Standards and Concern over Mistakes subscales of the Sport Multidimensional Perfectionism Scale (Sport-MPS; Dunn et al., 2002). The Sport-MPS was chosen because it is the most widely-used sport-specific measure of perfectionism and has been tested in a number of studies showing high reliability and validity (e.g., Dunn et al., 2002; Dunn et al., 2006; Vallance, Dunn, & Dunn, 2006). Because triathlon is an individual sport, we used the figure skater version of the Sport-MPS designed for individual sports (Dunn et al., 2006) and adopted it to triathlon by deleting all references to figure skating and modifying the instruction stressing that all items referred to triathlon.[1] The Personal Standards scale comprised seven items measuring perfectionistic personal standards (e.g., "I have extremely high goals for myself"), and the Concern over Mistakes subscale comprised eight items measuring perfectionistic concern over mistakes (e.g., "People will probably think less of me if I make mistakes in competition"). Items were answered on a 7-point scale from 1 (disagree) to 7 (agree).

Achievement goals. To measure achievement goals based on the 2 × 2 framework, we used the Achievement Goals Questionnaire for Sport (AGQ-S; Conroy et al., 2003). The AGQ-S has been tested in a number of studies and has shown good reliability and validity (e.g., Conroy et al., 2003; Conroy, Kaye, & Coatsworth, 2006; Kaye et al., 2008). It comprises four scales with three items each to capture mastery-approach goals (e.g., "It is important to me to perform as well as I possibly can"), performance-approach goals (e.g., "It is important to me to perform better than others"), mastery-avoidance goals (e.g., "I worry that I may not perform as well as I possibly can"), and performance-avoidance goals ("I just want to avoid performing worse than others"). All items were presented with the instruction stressing that participants respond to the items with respect to the next day's race. Items were answered on a 7-point scale from 1 (disagree) to 7 (agree).

Race performance. Race performance data (race times in hours, minutes, and seconds), obtained from the official records, were converted to minutes.

Preliminary Analyses

Performance level. In triathlon, race distances vary widely. For adults, standard distances range from the Super Sprint distance of 400 m (0.25 miles) swimming, 10 km (6.2 miles) cycling, and 5 km (3.1 miles) running to the full "Ironman" distance of 3.8 km (2.4 miles) swimming, 180 km (112 miles) cycling, and 42.2 km (26.2 miles) running. Consequently, to compare athletes' seasonal best, computing average speeds (i.e., distances divided by times) for swimming, cycling, and running provides a good approximation of athletes' performance level (G. Kuhn, personal communication, 31 August 2006). Therefore, the seasonal best times and distances that participants reported were converted to km/h (distance in kilometers divided by time in hours) and used as indicators of performance level.

Outliers. Following recommendations (Tabachnick & Fidell, 2007), variables were screened for outliers. First, variables were screened for univariate outliers. Three cases showed standardized scores larger than $z = 3.29$, $p < .001$ and were excluded from the sample. Next, variables were screened for multivariate outliers by computing for each case the Mahalanobis distance from the rest of the cases. No case showed a Mahalanobis distance larger than the critical value of $\chi^2(12) = 40.79$, $p < .001$. Consequently, the final sample was $N = 112$. Table 1 shows descriptive statistics, reliabilities (Cronbach's alphas), and valid *n*s for all variables. With Cronbach's alphas above .70, all scales' scores showed acceptable reliability (Nunnally & Bernstein, 1994).

Missing value analysis. As can be seen from Table 1, there was a considerable number of missing values for seasonal best. (Many participants did not remember their seasonal best. Moreover, for several participants, it was their first triathlon of the season; and for a few participants, it was their first triathlon ever.) Consequently, a missing value analysis was conducted to investigate possible differences between the 84 participants who provided complete data for all variables (listwise complete) and the 28 participants who did not (listwise incomplete). Regarding gender, a cross-tabulation of gender and subsample (listwise complete vs. incomplete) found no association between gender and subsample, $\chi^2(1) = 0.02$, *ns* indicating that subsamples did not differ in gender distribution. Regarding age, perfectionism, achievement goals, and race performance, a multivariate analysis of variance (MANOVA) with eight dependent variables (DVs)—age, personal standards, concern over mistakes, performance approach, performance avoidance, mastery approach, mastery avoidance, and race performance—and subsample as between-participants factor found no significant effect of subsample, $F(8, 103) = 1.10$, *ns* indicating that subsamples did not differ significantly on the DVs. Consequently, the results of the regression analysis, which used listwise deletion of missing values, and the result of the mediation analyses, which used residual scores from the regression analysis, should be generalizable to all participants.

Analytic Strategy

To investigate our hypotheses, the following analytic strategy was applied. First, we computed and inspected the correlations of background variables (gender, age, performance level) and personality variables (perfectionism, achievement goals) with race performance.

Next, we computed a hierarchical regression analysis predicting race performance (total race time) from background and psychological variables. The regression analysis comprised three steps with variables entered in the order of increasing specificity. In Step 1, we entered the background variables and regressed race performance on gender, age, and performance level (i.e., seasonal best swimming, cycling, and running). In Step 2, we entered athletes' perfectionism in triathlon (personal standards, concern over mistakes) to investigate if it predicted race performance above the effects of the background variables. In Step 3, we entered the 2 × 2 achievement goals to investigate if athletes' achievement goals for next day's race predicted race performance above the effects of the background variables and perfectionism.

Following recommendations (Tabachnick & Fidell, 2007), we entered variables simultaneously and employed listwise deletion of missing values.

Finally, we computed mediation analyses following Baron and Kenny's (1986) regression approach according to which a mediation effect has to meet three conditions: (a) the independent variable significantly predicts both the presumed mediator variable and the dependent variable; (b) the mediator variable significantly predicts the dependent variable; and (c) when the influence of the mediator variable is controlled for, the previously significant relationship between independent variable and dependent variable is no longer significant. Because this approach does not provide a direct test of mediation, we additionally computed Sobel tests and bootstrapping tests, as recommended by Shrout and Bolger (2002), using the procedures provided by Preacher and Hayes (2004). To control for the effects of age, gender, and previous performance, we took the residual race performance from Step 1 of the regression analysis as the dependent variable.

Results

Correlations

Following our analytic strategy, we first inspected the correlations (see Table 2). In line with our expectations, perfectionistic personal standards showed a positive correlation with race performance. Furthermore, as was expected from revised achievement goal theory (Harackiewicz et al., 2002), performance-approach goals showed a positive correlation with race performance. Unexpected from revised achievement goal theory, mastery-approach goals also showed a positive correlation with race performance.[2] Consequently, we turned to the hierarchical regression analysis, which controlled for the overlap between variables, to investigate which variables made unique contributions to the prediction of race performance.

Regression Analysis

Results of the hierarchical regression analyses are provided in Table 3. In Step 1, the background variables together predicted 40.3% of variance in race performance. Regarding the individual predictor variables, performance level in swimming (seasonal best swimming) and performance level in running (seasonal best running) showed significant positive regression coefficients, indicating that they made unique contributions to the prediction of race performance. In Step 2, adding perfectionism to the equation explained further 6.0% of variance in race performance. In line with our expectations, personal standards showed a positive regression coefficient, indicating that athletes who had higher levels of perfectionistic personal standards in triathlon raced faster times than athletes who had lower levels, even after differences in performance level were controlled for. In Step 3, adding achievement goals explained a further 15.1% of variance in race performance. As expected, performance-approach goals showed a positive regression coefficient, indicating that athletes with a strong motivation to do better than others (performance approach) raced faster times than athletes who did not have this motivation. Moreover, results showed that performance-avoidance goals showed a negative regression coefficient, indicating that athletes with a strong motivation to avoid doing worse than others (performance avoidance) raced slower times than athletes who did not have such a motivation, corroborating Elliot et al.'s (2006) findings that high levels of performance-approach and low levels of performance-avoidance goals predict sport performance.

Mediation Analyses

Inspection of the results from the regression analysis suggested that the effect of personal standards on race performance was mediated by participants' achievement goals (cf. Baron & Kenny, 1986): personal standards were a significant predictor of race performance in Step 2, but ceased to be a significant predictor in Step 3 when the 2 × 2 achievement goals

were entered and performance-approach goals and performance-avoidance goals showed up as significant predictors of race performance (see Table 3). To investigate whether performance-approach or performance-avoidance goal mediated the relationship between personal standards and race performance, we computed regression analyses in which residual race performance (i.e., the standardized residuals from Step 1 of the hierarchical regression analysis in Table 1) served as the dependent variable, personal standards served as the independent variable, and either performance-approach goals or performance-avoidance goals served as the mediator variable. However, results showed that when regarded individually, neither performance-approach goals nor performance-avoidance goals mediated the significant relationship between personal standards and residual race performance.

Consequently, we examined whether performance-approach and performance-avoidance goals, when combined, mediated the relationship. Because performance-approach and performance-avoidance had opposite effects on race performance, we examined the contrast between performance-approach and performance-avoidance goals (Elliot et al., 2006) by computing difference scores between performance-approach and performance-avoidance goals (performance approach-avoidance contrast = standardized performance-approach goals – standardized performance-avoidance goals) (see Chalabaev, Sarrazin, Stone, & Cury, 2008). Note that computing difference scores is comparable to effect-coding the two performance goal orientations, giving performance-approach goals a weight of +1 and performance-avoidance goals a weight of –1. Moreover, using standardized scores when computing difference scores gives both performance goals equal weight as is reflected in the correlations of the resulting contrast scores with the performance goals scores: r(performance approach-avoidance contrast, performance-approach goals) = +.49 and r(performance approach-avoidance contrast, performance-avoidance goals) = –.49, both $p < .001$. When the mediation analyses were conducted with these contrast scores, results showed that the performance approach-avoidance contrast fulfilled Baron and Kenny's (1986) three conditions for a mediation effect, as shown in Figure 1: (a) personal standards significantly predicted both performance approach-avoidance contrast and race performance; (b) the performance approach-avoidance contrast significantly predicted race performance; and (c) when the influence of the performance approach-avoidance contrast was controlled for, the previously significant relationship between personal standards and race performance was no longer significant. Moreover, when the mediation was tested using the procedures provided by Preacher and Hayes (2004), both Sobel test ($z = 3.13$, $p < .01$) and bootstrap test (95% CI [indirect effect] = .08-.32) were significant[3] confirming that the contrast between performance-approach and performance-avoidance goals fully mediated the relationship between perfectionistic personal standards and residual race performance.

Discussion

The findings of Study 1 confirmed our expectations that perfectionistic personal standards showed a significant positive correlation with race performance in triathlon. What is more, the regression analysis showed that perfectionistic personal standards predicted race performance beyond athletes' previous performance level. Performance-approach goals and performance-avoidance goals predicted further variance in race performance, with performance-approach goals being a positive and performance-avoidance goals a negative predictor of performance. Finally, mediation analyses indicated that the positive effect of perfectionistic personal goals on race performance was mediated by athletes' performance goals. When the contrast between performance-approach goals and performance avoidance goals (Chalabaev et al., 2008; Elliot et al., 2006) was computed, it fully mediated the relationship between perfectionistic personal goals and race performance: athletes who had high levels of perfectionistic personal standards were more approach-oriented than avoidance-oriented in their performance goals (i.e., they were more strongly motivated to perform better than others than they

were motivated not to do worse than others), and this predominance of performance approach over performance avoidance was responsible for their higher race performance.

The findings have some limitations, however. Because they are the first to show that perfectionism and the 2 × 2 achievement goals predict competitive performance in athletes, they need to be replicated before solid conclusions can be drawn. Moreover, due to the nature of the study requiring athletes to have (and accurately remember and report) a seasonal best performance, the sample size was significantly reduced when listwise deletion of missing values was applied. Consequently, the findings should be replicated with a larger sample. Finally, Study 1 investigated only athletes' general achievement goals for the race, but not the specific personal goals that athletes set themselves. Studies have shown that personal standards perfectionism and perfectionistic striving (Bieling et al., 2003; Stoeber, Hutchfield, & Wood, 2008) as well as performance-approach goals (McGregor & Elliot, 2002) are associated with higher aspiration levels, suggesting that it would be important to include goal setting when investigating how perfectionism and achievement goals predict performance.

A further reason to include goal setting is that, for over 35 years, research on goal setting theory (Locke & Latham, 1990) has accumulated convincing evidence demonstrating that setting specific goals is an important predictor of performance (see Locke & Latham, 2002, for a review). This holds also for sports where a number of studies have shown that setting specific goals is an important predictor of athletes' competitive performance (e.g., Kyllo & Landers, 1995; Wanlin, Hrycaiko, Martin, & Mahon, 1997; Weinberg, Harmison, Rosenkranz, & Hookom, 2005). Recently, researchers with a background in goal setting theory have begun integrating goal setting theory with achievement goal theory (e.g., Latham & Locke, 2007; Seijts, Latham, Tasa, & Latham, 2004). In this, they posit that the relationship between achievement goal orientations and performance is mediated by setting specific goals. In particular, they claim that achievement goals do not affect performance directly. Instead, the effect of achievement goals on performance is mediated by specific goals that are set (Brett & VandeWalle, 1999; Latham & Locke, 2007). However, so far no studies have tested this prediction in relation to performance-approach goals and sport performance. Consequently, an additional aim of Study 2 was to examine whether goal setting mediated the effects of achievement goals on race performance.

Therefore, a second study was conducted with the aims (a) to replicate the central findings of Study 1 with a larger sample; (b) to investigate how perfectionism and achievement goals related to personal goal setting and whether the inclusion of personal goal could further improve the prediction of triathletes' race performance; and, as a separate question, (c) to explore whether goal setting mediated the relationship between achievement goals and race performance.

Study 2

Method

Participants, Procedure, and Race Details

Participants. A sample of N = 339 athletes (281 male, 58 female) was recruited at two Olympic distance triathlons. Mean age of athletes was 37.2 years (SD = 7.9; range = 19-67 years). All athletes had pre-registered for the race and were recruited during registration the day before each race. Overall, 900 questionnaires were distributed of which 399 (44%) were returned. Of the 399 athletes who returned questionnaires, 24 did not show a total time in the official race results (because they did not enter the race, did not finish the race, or experienced problems with the timing device). Moreover, 36 athletes were excluded because they had registered for the sprint distance, not the Olympic distance. Finally, four athletes were excluded because they already had participated in Study 1, leaving data from 335 athletes for the present analyses.

Procedure. Prior to conducting the study, ethical approval was obtained from the ethics committee of the first author's faculty. At both races, a stand was set up in the registration area, and the first author and three postgraduate students distributed questionnaires to athletes who registered for the race. (Else, the procedure was the same as in Study 1.) At Race 1, there were 659 questionnaires handed out of which 249 (38%) were returned. Because this return rate was lower than was expected from Study 1, an incentive was introduced at Race 2: Athletes who returned questionnaires could enter a lottery to win one of two cash prizes of £100 (approx. US $200). Consequently, the return rate at Race 2 was considerably higher. Of 241 questionnaires handed out, 150 (62%) were returned.

Race details. Race 1 was the NOKIA Royal Windsor Triathlon on 15 June 2007, and Race 2 the Bournemouth International Triathlon on 8 July 2007. The race in Windsor, a town at the River Thames located west of London, comprised an Olympic distance of 1.5 km (0.9 miles) swimming, 42 km (26.1 miles) cycling, and 10 km (6.2 miles) running. Swimming took place in the Thames, and the cycling and running route went through Windsor town (paved roads). The race in Bournemouth, a seaside town on the south coast of England, comprised an Olympic distance of 1.5 km (0.9 miles) swimming, 40 km (24.8 miles) cycling, and 10 km (6.2 miles) running. Swimming took place in Bournemouth Bay (open sea), the cycling route went through Bournemouth town (paved roads), and the running route went along the Bournemouth seaside promenade (paved road).[4] Data on athletes' race performance were obtained from the official race results provided by the race organizers.

Measures

Perfectionism, achievement goals, performance level, race performance. To measure perfectionism, achievement goals, and race performance, the same measures as in Study 1 were used. Regarding performance level, however, two changes were introduced. First, because it was early in the UK triathlon season, many participants were expected not to have a seasonal best yet. Consequently, participants were asked for both their seasonal best performance and their personal best performance so that fewer participants would have missing data. Personal best performance was measured by asking athletes to indicate the best times they had ever accomplished in a triathlon by writing down swimming, cycling, and running distances and times of their personal best triathlon (personal best). If the personal best was the same as the seasonal best, athletes were asked to write down "same as seasonal best." Second, for both seasonal best and personal best, athletes were asked to write down the name and date of the race for which they reported the times to ensure that their best swimming, cycling, and running performance was from the same triathlon.

Personal goal setting. To measure personal goal setting, we followed research on goal expectancies (G. Jones & Hanton, 1996) according to which two kinds of specific goals should be differentiated: performance goals and outcome goals. Performance goals describe specific goals with respect to objective performance (e.g., the time that athletes want to achieve in a race) whereas outcome describe specific goals with respect to the result of the competition (e.g., the rank that athletes want to achieve in a race). Consequently, to measure the goals that athletes set themselves for the race, athletes were asked for their performance goal, their outcome goal, and their performance and outcome goal expectancies. Regarding their performance goal, athletes indicated the total race time (hours, minutes) they wanted to achieve in the race. Moreover, they indicated how confident they were to achieve this goal on a 4-point scale from 0 = "not confident at all" to 3 = "very confident" (performance goal expectancy). Regarding their outcome goal, athletes indicated the position (rank) they wanted to finish the race on an 8-point scale with the categories 1 = "top 5% (faster than 95% of the field)," 2 = "top 10% (faster than 90% of the field)," 3 = "top 25% (faster than 75% of the field)," 4 = "top 50% (faster than 50% of the field)," 5 = "top 75% (faster than 25% of the field)," 6 = "top 90% (faster than 10% of the field)," 7 = "top 95% (faster than 5% of the field)," and 8 = "I just want to finish the race." Moreover, they indicated how confident they were to achieve

this goal on a 4-point scale from 0 = "not confident at all" to 3 = "very confident" (outcome goal expectancy).

Preliminary Analyses

Performance level. Parallel to the procedures in Study 1, time and distance for seasonal best and personal best were transformed to average speed (km/h) resulting in three indicators of seasonal best (km/h for swimming, cycling, and running) and three of personal best (km/h for swimming, cycling, and running).

Outliers. As in Study 1, variables were first screened for univariate outliers. Twelve cases showed standardized scores larger than the critical value of $z = 3.29$, $p < .001$ and were excluded from the analyses. Next, variables were screened for multivariate outliers by computing for each case the Mahalanobis distance. Two cases showed a Mahalanobis distance larger than the critical value $\chi^2(20) = 45.32$, $p < .001$ and were excluded from the analyses. Consequently, the final sample for the statistical analyses was $N = 321$. Table 4 shows the descriptive statistics, reliabilities (Cronbach's alphas), and valid *n*s of all variables. All alphas were above .70 demonstrating acceptable reliability (Nunnally & Bernstein, 1994), except the alpha for mastery-approach goals which was marginally acceptable.

Missing value analysis. Although the number of missing values for personal best was significantly smaller than that for seasonal best (see Table 4), both indicators of performance level showed a considerable number of missing values. Moreover, many participants did not indicate their personal goals for the race. Consequently, two missing value analyses were conducted: a first analysis investigated possible differences between the 133 participants who provided complete data for all variables in Table 4 when seasonal best was taken as an indicator of performance level (seasonal best listwise complete) and the 188 participants who did not (seasonal best listwise incomplete); and a second analysis to investigate possible differences between the 181 participants who provided complete data when personal best was taken as an indicator of performance level (personal best listwise complete) and the 140 participants who did not (personal best listwise incomplete). In both analyses, a cross-tabulation of gender and subsample (listwise complete vs. incomplete) indicated that subsamples did not differ in gender distribution: $\chi^2(1) = 1.15$, *ns* (gender × seasonal best listwise complete vs. incomplete) and $\chi^2(1) = 2.29$, *ns* (gender × personal best listwise complete vs. incomplete). Regarding age, perfectionism, achievement goals, personal goals, and race performance, we computed a MANOVA with 12 DVs—age, personal standards, concern over mistakes, performance approach, performance avoidance, mastery approach, mastery avoidance, performance goal, performance goal expectancy, outcome goal, outcome goal expectancy, and race performance—and subsample as between-participants factor. With the use of Wilks' criterion, the combined DVs were not significantly affected by subsample when personal best listwise complete vs. incomplete was regarded, $F(12, 218) = 1.08$, *ns* but they were affected by subsample when seasonal best listwise complete vs. incomplete was regarded, $F(12, 220) = 1.97$, $p < .05$. Follow-up ANOVAs showed that the 133 athletes who provided listwise complete data including seasonal best were younger ($M = 35.91$ [$SD = 7.42$] vs. $M = 38.05$ [$SD = 7.82$], $F[1, 317] = 6.08$, $p < .05$), had higher levels of personal standards [$M = 3.92$ [$SD = 1.00$] vs. $M = 3.61$ [$SD = 1.14$], $F[1, 315] = 6.51$, $p < .05$), performance-approach goals ($M = 4.43$ [$SD = 1.34$] vs. $M = 4.08$ [$SD = 1.46$], $F[1, 317] = 4.83$, $p < .05$), mastery-approach goals ($M = 5.68$ [$SD = 0.98$] vs. $M = 5.37$ [$SD = 1.03$], $F[1, 319] = 7.43$, $p < .01$), performance goals ($M = 149.82$ [$SD = 22.47$] vs. $M = 158.08$ [$SD = 24.53$], $F[1, 291] = 8.76$, $p < .01$), and outcome goals ($M = 3.68$ [$SD = 1.67$] vs. $M = 4.53$ [$SD = 1.86$], $F[1, 309] = 17.64$, $p < .001$) before the race, and showed higher race performance in the race ($M = 156.87$ [$SD = 16.27$] vs. $M = 164.79$ [$SD = 16.90$], $F[1, 319] = 17.66$, $p < .001$) than the 188 participants who did not provide complete data. This result suggests that the participants with listwise complete data including seasonal best were the more competitive athletes (as they already had raced a triathlon

early in the season and had higher standards, higher levels of approach achievement goals, and higher personal goals for the upcoming race). Consequently, it may be that the results of the regression analysis in which seasonal best was used as an indicator of performance level are restricted to more competitive athletes, whereas the results of the regression analysis in which personal best was used should be generalizable to all participants (see *Regression Analyses*).

Analytic Strategy

The same analytic strategy as in Study 1 was applied, with three additions. First, to take differences between the two races into account, a dichotomous variable "race" (0 = Windsor, 1 = Bournemouth) was included in the correlation analyses and in Step 1 of the hierarchical regression analyses. Second, we included personal goals and personal goal expectancies (performance goal, outcome goal) in all analyses. As in the regression analysis of Study 1, variables were entered in the order of increasing specificity. Consequently, the specific personal goals that participants set themselves for next day's race were entered in the last step (Step 4). Moreover, this strategy made results of Steps 1-3 comparable to Study 1 and allowed us to investigate whether personal goals predicted variance in race performance in addition to the variance explained by perfectionism and achievement goals. Third, we computed two regression analyses: one using seasonal best to control for performance level (with the aim to replicate Study 1's findings), and one using personal best to control for performance level (with the aim to include a larger sample and to obtain more generalizable results; see *Missing value analysis*). Regarding the mediation analyses, the same strategy as in Study 1 was applied. Again residual race performance from Step 1 of the regression analyses served as the dependent variable. However, here residual race performance also controlled for differences between the races (Windsor, Bournemouth) and all mediation analyses were performed once with residual race performance controlling for seasonal best and once with residual performance controlling for personal best.

Results

Correlations

Following our analytic strategy, we first inspected the correlations (see Table 5). Replicating the findings of Study 1, perfectionistic personal standards showed a positive correlation with race performance. Moreover, performance-approach goals and mastery-approach goals again showed positive correlations. In addition, performance-avoidance goals showed a negative correlation with race performance. Finally, personal goal setting was significantly correlated with race performance: both performance goals (time) and outcome goals (rank) showed high positive correlations with race performance. Consequently, we turned to the regression analyses to investigate which variables made unique contributions to the prediction of race performance.

Regression Analyses

Two multiple regression analyses were conducted, one controlling for seasonal best and one controlling for personal best (see Table 6). A comparison of the pattern of significant regression coefficients showed only one difference between the results of the two analyses: Only when personal best was used to control for performance level did gender and age show significant regression coefficients in the prediction of race performance (male/younger athletes raced faster times than female/older athletes). When seasonal best was used, gender and age were nonsignificant. Else, the two regression analyses showed exactly the same pattern of significant results. Regarding Step 1, the background variables predicted 60.7% of variance in race performance when seasonal best was used to control for performance level, and 65.2% when personal best was used. In both analyses, all three indicators of performance level (seasonal/personal best cycling, swimming, and running) significantly predicted race performance.

As expected, athletes who had shown better performance in previous races also showed a better performance in the present race. Note that the variance explained by the background variables in Study 2 was much larger than the respective variance in Study 1 (40.3%). Consequently, in Study 2, there was less variance left to be explained by the psychological variables. Still, adding perfectionism to the equation in Step 2 explained further 2.3% in race performance in the analysis with seasonal best, and 1.0% in that with personal best. In both analyses, perfectionistic personal standards predicted higher performance. Replicating the findings of Study 1, results showed that athletes with higher levels of personal standards raced faster times than athletes with lower levels, whereas perfectionistic concern over mistakes again did not predict race performance. Regarding Step 3, adding achievement goals to the prediction of race performance explained further 4.3% and 3.4% of variance in race performance. Replicating the findings of Study 1, performance-approach goals predicted higher performance and performance-avoidance predicted lower performance.

Finally, adding personal goals in Step 4 explained further 12.9% and 10.3% of variance in race performance. Regarding the individual goal variables, results showed that both performance goals and outcome goals predicted higher race performance. Athletes who, on the day before the race, set themselves higher performance goals (achieve a faster time) and higher outcome goals (achieve a higher rank) completed the race in faster times than athletes who set themselves lower goals, indicating that personal goal setting is an important psychological variable when predicting competitive performance in triathletes and explains further variance in race performance in addition to perfectionism and achievement goals.

Mediation Analyses

To investigate whether the mediation effect we found in Study 1 (see Figure 1) could be replicated, we computed again the contrast between performance-approach and performance-avoidance goals (see Study 1 for details) and examined whether this contrast mediated the relationship between perfectionistic personal standards and residual race performance when controlling for race, gender, age, and seasonal best (see Table 6, Seasonal best, Step 1). Contrast scores were computed as in Study 1 so that they again showed equal-sized, but opposite correlations with the two performance goals: r(performance approach-avoidance contrast, performance-approach goals) = +.58 and r(performance approach-avoidance contrast, performance-avoidance goals) = –.58, both $p < .001$. When contrast scores were included in the mediation analyses, results showed that the mediation effect of Study 1 was replicated in Study 2 (see Figure 2 for details). Again Sobel test ($z = 2.50$, $p < .05$) and bootstrap test (95% CI [indirect effect] = .03-.18) were significant confirming that the performance approach-avoidance contrast in athletes' achievement goals mediated the relationship between perfectionistic personal standards and residual race performance. When residual race performance was computed from the regression of race, age, gender, and personal best performance (see Table 6, Personal best, Step 1), results were the same as in Figure 2 except that the path from personal standards to residual race performance was only marginally significant ($\beta = .14$, $p = .068$). However, the other regression coefficients were significant (personal standards → performance approach-avoidance contrast: $\beta = .38$, $p < .001$; performance approach-avoidance contrast → race performance: $\beta = .25$, $p < .01$), the relationship between personal standards and race performance was reduced to nonsignificance when the performance approach-avoidance contrast was taken into account ($\beta = .04$, *ns*), and the overall mediation effect was significant (Sobel $z = 2.74$, $p < .01$; 95% CI [indirect effect] = .04-.15). Thus, the mediation analyses replicated the finding of Study 1 confirming that the relationship between perfectionistic personal goals and race performance was fully mediated by athletes' performance goals, particularly when the more competitive athletes were regarded and seasonal best was controlled for.

Finally, regarding the question whether goal setting mediated the relationship between achievement goals and race performance, inspection of the results from Step 4 of the regres-

sion analyses suggested that the effect of performance-approach goals on race performance was mediated by participants' goal setting: performance-approach goals were a significant predictor of race performance in Step 3, but ceased to be a significant predictor in Step 4 when personal goal setting was entered and athletes' performance goals (time) and outcome goals (rank) showed up as significant predictors of race performance (see Table 6). Consequently, we combined the two personal goals by computing a sum score for personal goal setting (i.e., personal goal setting = standardized performance goal + standardized outcome goal), and then computed the regression coefficients necessary to investigate mediation effects and tested the overall mediation effect with Sobel and bootstrap test.

When residual race performance was computed from the regression of age, gender, and seasonal best performance, results showed that personal goals fulfilled the conditions for a mediation effect (see Figure 3 for details). Moreover Sobel test ($z = 3.95$, $p < .001$) and bootstrap test (95% CI [indirect effect] = .07-.26) were significant confirming that personal goal setting mediated the relationship between performance-approach goals and race performance. When residual race performance was computed from the regression of age, gender, and personal best performance, the pattern of results was the same as in Figure 3: all regression coefficients were significant (performance approach → race performance: $\beta = .18$, $p < .05$; performance approach → personal goal setting: $\beta = .55$, $p < .001$; personal goal setting → race performance: $\beta = .46$, $p < .001$), the relationship between performance-approach goals and race performance was reduced to nonsignificance when personal goal setting was taken into account ($\beta = -.08$, *ns*), and the overall mediation effect was significant (Sobel $z = 4.72$, $p < .001$; 95% CI [indirect effect] = .11-.27). Thus, both mediation analyses indicated that the relationship between performance-approach goals and race performance was fully mediated by athletes' personal goal setting.

Discussion

Using a larger sample and examining a different race distance, Study 2 replicated all central findings of Study 1. In addition, Study 2 found that personal goal setting explained further variance in race performance in that athletes who set themselves higher performance goals (faster times) and higher outcome goals (higher ranks) showed higher race performance than athletes who set themselves lower goals. Finally, mediation analyses indicated that personal goal setting mediated the relationship between performance-approach goals and race performance, supporting claims from recent developments in goal setting theory that the effects of achievement goal orientations on performance are mediated by setting specific goals (Latham & Locke, 2007).

Regarding possible limitations of Study 2, there are two. First, for the athletes who reported only a personal best (but not a seasonal best), the effect of perfectionistic personal standards was small and the incremental contribution of overall perfectionism (i.e., personal standards and concern over mistakes combined) to the prediction of race performance was only marginally significant (see Table 6, Note). Second, goal expectancy was measured with single items so the reliability of these measures is unknown. Consequently, it is unclear whether the negative correlation between outcome goal and outcome goal expectancy (see Table 5) reflects a valid finding—namely that athletes who set higher relative outcome goals are less confident to reach these goals (whereas total time is an absolute outcome goal, rank is a relative outcome goal because it is defined in relation to other competitors)—or if this correlation is due to unreliability of the measures. Consequently, future studies may profit from including multi-item measures of goal expectancy to further investigate this finding.

General Discussion

The purpose of the present research was to provide a first systematic investigation of how perfectionism, achievement goals, and personal goal setting influence competitive performance in sports. Two prospective studies were conducted examining how defining facets of the two dimensions of perfectionism, personal standards perfectionism and evaluative concerns perfectionism (Dunkley et al., 2000), predicted race performance in triathlon and what role the achievement goals of the 2 × 2 framework (Elliot & McGregor, 2001) played in this relationship. In addition, the second of the two studies examined personal goal setting by investigating specific personal goals in addition to the more generic achievement goals. Consistent with our expectations, both studies found that perfectionistic personal standards predicted race performance beyond what was explained by athletes' gender, age, and previous performance level: athletes with high levels of perfectionistic personal standards raced faster times than athletes with low levels of perfectionistic personal standards. Moreover, when regarding achievement goals, both studies found that performance-approach and performance-avoidance goals further predicted race performance: High levels of performance-approach goals predicted higher race performance (faster times) and high levels of performance-avoidance goals predicted poorer race performance (slower times). Mediation analyses showed that the relationship between perfectionistic personal standards and race performance was fully mediated by the contrast between athletes' performance-approach and performance-avoidance goals. In addition, the second study found that the personal goals which athletes set themselves for the race further predicted race performance: Athletes who set themselves higher performance goals (finish the race in a faster time) and athletes who set themselves higher outcome goals (finish the race in a higher rank) showed a higher race performance than athletes who did not set themselves such high personal goals. Mediation analyses showed that the relationship between performance-approach goals and race performance was fully mediated by personal goal setting, that is, by the specific performance and outcome goals that triathletes' set themselves for the race.

The present findings have important implications for theory and research on perfectionism, achievement goals, and goal setting in sports and beyond. Regarding perfectionism, the present findings are the first to demonstrate that perfectionistic personal standards predict competitive performance in sports. With this, they provide further empirical support for the claim that the facets of personal standards perfectionism in sport are associated with adaptive characteristics, processes, and outcomes (Hill et al., 2008; Kaye et al., 2008; Stoeber & Becker, in press; Stoeber et al., 2007; Stoeber, Stoll, et al., 2008). Moreover, together with previous findings on perfectionism and training performance (Stoll et al., 2008), the present findings indicate that in "real life" settings, in which athletes neither perform unfamiliar tasks nor receive failure feedback that is non-contingent on their performance (Anshel & Mansouri, 2005), perfectionistic personal standards do not undermine, but enhance athletes' performance. Consequently, perfectionistic personal standards in athletes are not necessarily a sign of maladjustment (Flett & Hewitt, 2005). Instead, such standards may form part of a "healthy pursuit of excellence" (Shafran, Cooper, & Fairburn, 2002, p. 778) and may help athletes achieve higher performance. Finally, going beyond the domain of sports, the present findings provide further support for the dual process model of perfectionism (Slade & Owens, 1998) by demonstrating that the differences between approach and avoidance motivation is critical for understanding why some forms of perfectionism have positive consequences. Moreover, the present findings dovetail with previous findings that facets of personal standards perfectionism are associated with, and are predictive of, higher performance across domains. Thus the findings provide further support for the position that it is important to differentiate between personal standards perfectionism and evaluative concerns perfectionism (Blankstein et al., 2008; Dunkley et al., 2000; Stoeber & Otto, 2006).

Regarding achievement goals, the present findings are the first to demonstrate that performance-approach and performance-avoidance goals predict competitive performance in sports.[5] In particular, they show that the contrast between performance-approach goals and performance-avoidance goals plays a pivotal role in the prediction of performance. With this, the present findings extend Elliot et al.'s (2006) findings (viz. that the contrast between performance-approach and performance-avoidance goals predicted training performance) to the domain of competitive performance and demonstrate that the differentiation between approach and avoidance orientations in performance goals is important not only for academic performance (Harackiewicz et al., 2002) but also for sport performance. Moreover, in the present research, the performance approach-avoidance contrast mediated the relationship between perfectionistic personal standards and race performance. This finding indicates that competitive athletes who have high levels of perfectionistic personal standards are more approach-oriented than avoidance-oriented in their performance goals (i.e., they are more strongly motivated to perform better than others than they are motivated not to do worse than others), and this predominance of performance-approach over performance-avoidance orientation is responsible for their higher race performance. With this, the present findings suggest that differences in approach and avoidance orientations towards performance goals may explain why the facets of personal standards perfectionism have been associated with higher performance in exams, tests, and music competitions.

Regarding personal goal setting, the present findings provide further support for goal setting theory (Locke & Latham, 1990, 2002) corroborating previous findings that goal setting leads to higher sport performance (Kyllo & Landers, 1995; Wanlin et al., 1997; Weinberg et al., 2005) and that this effect is not restricted to assigned goals, but can also be found for self-set goals (e.g., Boyce, Wayda, Johnston, Bunker, & Eliot, 2001; Ward & Carnes, 2002). Moreover, the present findings support claims from researchers working at integrating goal setting theory and achievement goal theory (Latham & Locke, 2007; Seijts et al., 2004) that achievement goals have only an indirect effect on performance and that the effect of achievement goals on performance is mediated by setting specific goals. While these claims may be exaggerated—research on achievement goals has shown that there are other pathways from achievement goals to performance (e.g., competence valuation, practice time; Elliot et al., 2006)—the present finding of personal goal setting mediating the relationship between performance-approach goals and performance suggest that integration of the two traditions may be a promising endeavor.

The present findings have a number of limitations. First, the present samples were predominantly male. Consequently, the findings may be more representative of male triathletes than of female triathletes. Second, whereas measuring previous performance by taking athletes' best triathlon and computing average speeds provides a good estimate of athletes' previous performance, it does not take differences between triathlons (e.g., race distance, weather, terrain) into account. Moreover, it is unclear to what degree the present findings are transferable to sports other than triathlon. Consequently, future studies need to investigate how perfectionism, achievement goals, and personal goal setting predict competitive performance in other sports to demonstrate the generalizability of the present findings. For example, it would be instructive to investigate how athletes who focus primarily on performance and achievement—personal standards perfectionism, performance-approach goals, personal goal setting—would fare in team sports where perfectionism and performance-approach goals have been associated with problematic peer relationships (Ommundsen et al., 2005). Third, it is unclear whether the variables included in the mediation analyses follow the temporal sequence required for mediation effects. While the outcome (race performance) was measured one day after predictors and mediators (perfectionism, achievement goals, goal setting) were measured, all predictors and mediators were measured at the same occasion. Note, however, that the predictors always preceded the mediators in the questionnaires—and always were on

a more general level than the mediators (perfectionism in triathlon predicted achievement goals in triathlon competitions; and achievement goals in triathlon competitions predicting goal setting for next day's triathlon competition). Still, future research may profit from using designs that include at least three points of measurement to ascertain the temporal sequence of the mediation effects (e.g., Cole & Maxwell, 2003). Furthermore, the present findings leave unclear how a motivational profile characterized by high levels of personal standards perfectionism and high levels of performance-approach goals will affect athletes in the long run. Whereas the present findings suggest such a profile may have short-term benefits for performance by energizing athletes to achieve their best possible performance beyond previous performance levels, such a profile could be associated with negative consequences if we looked beyond a single race because it is conceivable that personal standards perfectionism may have negative long-term consequences on athletes' development and well-being (Hall, 2006; Hill et al., 2008).

Finally, the present studies focused on motivational variables (achievement goals, personal goal setting) neglecting that perfectionism is also related to individual differences in emotional variables that play a role in sport performance such as anger (e.g., Vallance et al., 2006) and anxiety (e.g., Stoeber et al., 2007). Consequently, future studies on perfectionism and competitive performance in sport should also take athletes' emotions into account (e.g., M. V. Jones, Lane, Bray, Uphill, & Catlin, 2005). Moreover, future studies will have to demonstrate that the present findings generalize to the other facets of personal standards perfectionism and evaluative concerns perfectionism. Whereas perfectionistic personal standards and concern over mistakes are the defining facets, the two dimensions of perfectionism contain further facets (see Dunkley et al., 2002; Stoeber & Otto, 2006) that should be investigated in future studies on perfectionism and performance in sports.

Nonetheless, the present findings have important implications for theory and research on perfectionism and achievement goals in sports because they provide further empirical support for the claim that personal standards perfectionism is mostly related to adaptive characteristics and positive outcomes (Stoeber & Otto, 2006). Moreover, they show that personal standards perfectionism and performance-approach goals not only predict training performance, but also competitive performance. Like Stoll et al.'s (2008) finding that perfectionism may enhance training performance, the present findings demonstrate that perfectionism is not necessarily a maladaptive characteristic that undermines athletic performance (Flett & Hewitt, 2005). On the contrary, personal standards perfectionism may be adaptive in situations where perfectionistic personal standards give athletes an additional motivational "boost" to do their best, focus on performance-approach instead of performance-avoidance goals, set themselves challenging personal goals for their performance, and thus achieve better results. Whereas the present findings do not suggest that personal standards perfectionism is a psychological characteristic that makes Olympic champions (Gould et al., 2002), they do suggest that it is a characteristic that has the potential to help athletes' achieve higher performance in competitions.

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Footnotes

[1]The Sport-MPS contains two further scales, Perceived Parental Pressure and Perceived Coach Pressure, that we did not include because we considered perceived pressure to be perfect (whether coming from parents or coaches) as a precursor rather than a defining component of perfectionism (e.g., Rice, Lopez, & Vergara, 2005; Speirs Neumeister, 2004; Stoeber & Otto, 2006).

[2]Note that this expectation was derived from Harackiewicz et al.'s review of the educational psychology literature. In applied sport psychology, mastery goals are expected to help contribute to athletic performance (e.g., Duda, 2005).

[3]Bootstrapped effects are significant when the 95% CI does not include zero (see Preacher & Hayes, 2004, for details).

[4]The standard Olympic cycling distance is 40 km, but the International Triathlon Committee allows for 5% error in the cycling and running distances, hence the 2 km difference between Windsor's and Bournemouth's cycling distance.

[5]There are two published studies investigating the effects of performance-approach and performance-avoidance goals on training performance in sports (Chalabaev et al., 2008; Elliot et al., 2006), of which only the latter found significant effects, but there are yet no published studies investigating the effects of performance-approach and performance-avoidance goals on competitive performance in sports.

Table 1

Study 1: Descriptive Statistics

Variable	*n*	*M*	*SD*	Range		α
				Min	*Max*	
Age	112	36.02	6.99	21	54	—
Previous best performance (km/h)						
Seasonal best: Swimming	86	3.31	0.45	2.11	4.70	—
Seasonal best: Cycling	86	32.88	4.61	19.48	44.01	—
Seasonal best: Running	86	13.03	1.93	7.91	18.75	—
Perfectionism						
Personal standards	112	3.62	1.15	1.00	6.57	.84
Concern over mistakes	112	2.72	1.11	1.00	5.50	.84
Achievement goals						
Performance approach	112	4.06	1.49	1.00	7.00	.83
Performance avoidance	112	3.80	1.61	1.00	7.00	.83
Mastery approach	112	5.56	1.00	2.67	7.00	.75
Mastery avoidance	112	4.57	1.56	1.00	7.00	.86
Race performance: total time (min)	112	362.71	37.47	284.53	480.25	—

Note. N = 112 (final sample) with n = valid values per variable. Gender (female) coded as 0 = male, 1 = female. α = Cronbach's alpha (not applicable for single items).

Table 2

Study 1: Correlations

Variable	1	2	3	4	5	6	7	8	9	10	11
1. Gender (female)											
2. Age	–.18										
Previous performance											
3. Seasonal best: Swimming	–.02	–.27*									
4. Seasonal best: Cycling	–.19	–.30**	.28**								
5. Seasonal best: Running	–.08	–.17	.27*	.58***							
Perfectionism											
6. Personal standards	–.15	–.18	.39***	.23*	.22*						
7. Concern over mistakes	.03	–.15	.16	.17	.23*	.59***					
Achievement goals											
8. Performance approach	.01	–.20*	.17	.14	.17	.53***	.49***				
9. Performance avoidance	.03	.11	–.12	–.04	.02	.12	.47***	.53***			
10. Mastery approach	.12	–.17	.05	–.05	–.09	.38***	.13	.25**	.09		
11. Mastery avoidance	.20*	–.15	.02	–.01	.01	.24*	.46***	.45***	.50***	.38***	
12. Race performance[a]	–.14	–.16	.39***	.51***	.53***	.43***	.18	.35***	–.13	.28**	.11

Note. $N = 112$ (correlations with pairwise *n*s of 85–112). Gender (female) coded as 0 = male, 1 = female.

[a]Race performance (total time in min) was reversed (NEWX = –X) so that higher values corresponded to higher performance.

*$p < .05$. **$p < .01$. ***$p < .001$.

Table 3

Study 1: Summary of Hierarchical Regression Analysis for Variables Predicting Race Performance Controlling for Seasonal Best Performance

Variable	*B*	*SE B*	β	*sr*²
Step 1				
Gender (female)	–14.51	7.93	–.17	.026
Age	–0.03	0.49	–.01	.000
Seasonal best: Swimming	18.93	7.53	.24*	.048
Seasonal best: Cycling	1.67	0.92	.21	.025
Seasonal best: Running	6.02	2.03	.32**	.067
Step 2				
Gender (female)	–7.18	8.04	–.08	.006
Age	0.16	0.48	.03	.001
Seasonal best: Swimming	11.44	7.70	.14	.016
Seasonal best: Cycling	1.83	0.89	.23*	.030
Seasonal best: Running	5.90	1.97	.32**	.062
Personal standards	10.89	3.76	.33**	.059
Concern over mistakes	–5.79	3.32	–.18	.022
Step 3				
Gender (female)	–10.23	7.09	–.12	.011
Age	0.81	0.44	.16	.018
Seasonal best: Swimming	9.78	6.80	.12	.011
Seasonal best: Cycling	1.81	0.78	.22*	.029
Seasonal best: Running	5.77	1.74	.31**	.059
Personal standards	0.81	4.00	.02	.000
Concern over mistakes	2.66	3.65	.08	.003
Performance approach	10.00	2.86	.38***	.066
Performance avoidance	–11.10	2.33	–.50***	.123
Mastery approach	6.03	2.56	.15	.015
Mastery avoidance	–0.84	2.29	–.03	.001

Note. Listwise n = 84. Predicted variable = race performance (total time, reversed). Gender (female) coded as 0 = male, 1 = female. R^2 = .403, $p < .001$ for Step 1; $\Delta R^2 = .060$, $p < .05$ for Step 2; $\Delta R^2 = .151$, $p < .001$ for Step 3. sr^2 = squared semi-partial correlation. Significance levels for B and sr^2 are the same as those for β.
*$p < .05$. **$p < .01$. ***$p < .001$.

Table 4

Study 2: Descriptive Statistics

Variable	*n*	*M*	*SD*	Range		α
				Min	*Max*	
Age	319	37.16	7.72	19	60	—
Previous performance (km/h)						
Seasonal best: Swimming	185	3.24	0.56	1.85	4.80	—
Seasonal best: Cycling	177	31.13	4.80	13.33	44.57	—
Seasonal best: Running	180	13.20	2.27	6.98	20.00	—
Personal best: Swimming	258	3.17	0.56	1.50	4.74	—
Personal best: Cycling	250	31.53	4.37	13.33	42.86	—
Personal best: Running	250	13.06	2.26	6.98	20.00	—
Perfectionism						
Personal standards	317	3.74	1.09	1.00	6.57	.82
Concern over mistakes	317	3.03	1.09	1.00	6.25	.85
Achievement goals						
Performance approach	319	4.23	1.42	1.00	7.00	.85
Performance avoidance	320	3.76	1.56	1.00	7.00	.80
Mastery approach	321	5.50	1.02	2.33	7.00	.68
Mastery avoidance	319	4.62	1.43	1.00	7.00	.88
Personal goal setting						
Performance goal: total time (min)	293	154.30	23.93	74	230	—
Performance goal expectancy	245	1.36	0.68	0	3	—
Outcome goal: rank	311	4.17	1.83	1	8	—
Outcome goal expectancy	307	1.56	0.77	0	3	—
Race performance: total time (min)	321	161.51	17.07	123.45	221.65	—

Note. N = 321 (final sample) with n = valid values per variable. Race coded as 0 = Race 1 (Windsor), 1 = Race 2 (Bournemouth). Gender (female) coded as 0 = male, 1 = female. α = Cronbach's alpha (not applicable for single items).

Table 5

Study 2: Correlations

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Race															
2. Gender (female)	–.10														
3. Age	–.09	–.09													
Previous best performance (km/h)															
4. Seasonal best: Swimming	.00	–.16*	–.10												
5. Seasonal best: Cycling	.13	–.20**	–.19**	.27***											
6. Seasonal best: Running	.10	–.24***	–.18*	.51***	.51***										
7. Personal best: Swimming	.18**	–.09	–.13*	.84***	.27***	.43***									
8. Personal best: Cycling	.12	–.24***	–.11	.36***	.78***	.46***	.35***								
9. Personal best: Running	.15*	–.23***	–.21**	.50***	.43***	.81***	.47***	.54***							
Perfectionism															
10. Personal standards	.00	.02	–.19***	.26***	.18*	.25***	.21***	.20**	.20**						
11. Concern over mistakes	–.05	.13*	–.14*	.00	.04	.08	–.01	.08	.09	.64***					
Achievement goals															
12. Performance approach	.04	–.02	–.18**	.20**	.20**	.31***	.20**	.30***	.34***	.61***	.52***				
13. Performance avoidance	–.09	.13*	.08	–.10	–.05	–.17*	–.12*	–.07	–.13*	.17**	.30***	.45***			
14. Mastery approach	.11*	.08	–.06	.08	.03	.12	.13*	.05	.17**	.47***	.30***	.45***	.20***		
15. Mastery avoidance	–.08	.22***	–.06	.06	–.03	–.02	.03	.02	–.01	.35***	.51***	.46***	.44***	.42***	
Personal goal setting															
16. Performance goal: total time[a]	.28***	–.24***	–.14*	.49***	.42***	.46***	.47***	.44***	.50***	.20***	.04	.35***	–.02	.23***	.00
17. Performance goal expectancy	.14*	–.16*	–.12	.11	.07	.17*	.15*	.09	.09	.13*	–.09	.02	–.13*	.01	–.20**
18. Outcome goal: rank[a]	.16**	–.11	–.30***	.54***	.37***	.52***	.53***	.47***	.47***	.43***	.18**	.47***	.02	.26***	.14*
19. Outcome goal expectancy	.03	–.13*	.03	.01	.06	.06	.07	.05	.10	–.11	–.24***	–.12*	–.16**	–.07	–.26***
20. Race performance[a]	.26***	–.26***	–.22***	.60***	.56***	.65***	.62***	.60***	.67***	.28***	.05	.35***	–.17**	.17**	.00

(Table continued on next page)

(Table 5 continued)

Variable	16	17	18	19
Personal goals				
16. Performance goal: total time[a]				
17. Performance goal expectancy	.09			
18. Outcome goal: rank[a]	.55***	.24***		
19. Outcome goal expectancy	.15*	.25***	–.24***	
20. Race performance[a]	.74***	.14*	.63***	.07

Note. N = 321 (correlations with pairwise *n*s of 151-321). Race coded as 0 = Race 1 (Windsor), 1 = Race 2 (Bournemouth). Gender (female) coded as 0 = male, 1 = female.

[a]Values for race performance, performance goal, and outcome goal are reversed (NEWX = –X) so that higher values corresponded to higher performance and higher goals, respectively.

*p < .05. **p < .01. ***p < .001.

Table 6

Study 2: Summary of Hierarchical Regression Analyses for Variables Predicting Race Performance Controlling for Seasonal Best and Personal Best Performance

	Seasonal best				Personal best			
Variable	*B*	*SE B*	β	sr^2	*B*	*SE B*	β	sr^2
Step 1								
Race	5.86	1.88	.18**	.030	4.41	1.58	.13**	.016
Gender (female)	–1.51	2.66	–.03	.001	–4.77	2.13	–.10*	.010
Age	–0.19	0.13	–.09	.007	–0.31	0.10	–.15**	.020
Best: Swimming	12.19	2.03	.39***	.112	10.14	1.53	.35***	.088
Best: Cycling	0.87	0.23	.24***	.043	1.11	0.22	.28***	.053
Best: Running	2.22	0.54	.31***	.053	2.06	0.45	.28***	.042
Step 2								
Race	6.19	1.86	.19**	.033	4.82	1.57	.14**	.018
Gender (female)	–1.22	2.61	–.03	.001	–4.63	2.12	–.10*	.009
Age	–0.13	0.13	–.06	.003	–0.26	0.10	–.12*	.013
Best: Swimming	11.05	2.04	.35***	.087	9.46	1.55	.32***	.073
Best: Cycling	0.77	0.23	.21**	.033	1.04	0.22	.26***	.045
Best: Running	2.18	0.53	.30***	.051	2.04	0.45	.28***	.041
Personal standards	3.11	1.13	.19**	.022	2.29	0.98	.14*	.011
Concern over mistakes	–1.38	1.05	.09	.005	–1.19	0.90	–.08	.003
Step 3								
Race	5.56	1.81	.17**	.026	4.63	1.52	.13**	.017
Gender (female)	–2.27	.58	–.05	.002	–4.80	2.08	–.10*	.010
Age	–0.04	0.12	–.02	.000	–0.17	0.10	–.08	.006
Best: Swimming	10.08	1.98	.32***	.071	9.04	1.50	.31***	.066
Best: Cycling	0.80	0.22	.22***	.035	0.95	0.21	.24***	.037
Best: Running	1.50	0.54	.21**	.021	1.56	0.46	.21***	.021
Personal standards	2.16	1.23	.13	.008	1.50	1.06	.09	.003
Concern over mistakes	–1.95	1.15	–.13	.008	–1.67	0.96	–.11	.006
Performance approach	2.85	0.91	.24**	.026	2.67	0.79	.22***	.020
Performance avoidance	–2.27	0.67	–.22***	.032	–2.05	0.58	–.18***	.023
Mastery approach	–0.64	1.04	–.04	.001	–0.71	0.90	–.04	.001
Mastery avoidance	0.74	0.79	.06	.002	0.84	0.65	.07	.003

(Table continued on next page)

(Table 6 continued)

Step 4								
Race	1.89	1.51	.06	.003	2.66	1.28	.08*	.005
Gender (female)	–1.03	2.13	–.02	.000	–3.50	1.76	–.08*	.005
Age	0.08	0.10	.04	.001	–0.05	0.08	–.03	.001
Best: Swimming	2.86	1.79	.09	.004	4.25	1.35	.14**	.012
Best: Cycling	0.55	0.18	.15**	.016	0.67	0.18	.17***	.018
Best: Running	1.05	0.44	.14*	.010	1.07	0.38	.15**	.010
Personal standards	0.80	1.04	.05	.001	0.56	0.92	.04	.000
Concern over mistakes	–0.38	0.94	–.02	.000	–0.30	0.82	–.02	.000
Performance approach	0.79	0.76	.07	.002	0.49	0.70	.04	.001
Performance avoidance	–1.96	0.53	–.19***	.023	–1.87	0.48	–.17***	.019
Mastery approach	–1.07	0.83	–.06	.003	–1.16	0.74	–.07	.003
Mastery avoidance	0.36	0.64	.03	.001	0.85	0.54	.07	.003
Performance goal: time[a]	0.23	0.05	.32***	.034	0.22	0.04	.31***	.039
Performance goal expectancy	–0.11	1.09	.00	.000	–1.02	0.98	–.04	.001
Outcome goal: rank[a]	3.07	0.73	.31***	.030	2.64	0.63	.26***	.022
Outcome goal expectancy	1.61	1.07	.07	.004	0.80	0.94	.04	.001

Note. Listwise n = 133 (seasonal best), listwise n = 181 (personal best). Predicted variable = race performance (total time, reversed). Race coded as 1 = Race 1 (Windsor), 2 = Race 2 (Bournemouth). Gender (female) coded as 0 = male, 1 = female. Seasonal best: $R^2 = .607$, $p < .001$ for Step 1; $\Delta R^2 = .023$, $p < .05$ for Step 2; $\Delta R^2 = .043$, $p < .01$ for Step 3; $\Delta R^2 = .129$, $p < .001$ for Step 4. Personal best: $R^2 = .653$, $p < .001$ for Step 1; $\Delta R^2 = .011$, $p = .065$ for Step 2; $\Delta R^2 = .034$, $p < .01$ for Step 3; $\Delta R^2 = .103$, $p < .001$ for Step 4. sr^2 = squared semi-partial correlation. Significance levels for B and sr^2 are the same as those for β.

[a]Values for performance goal and outcome goal were reversed (NEWX = –X) so that higher values corresponded to higher goals.

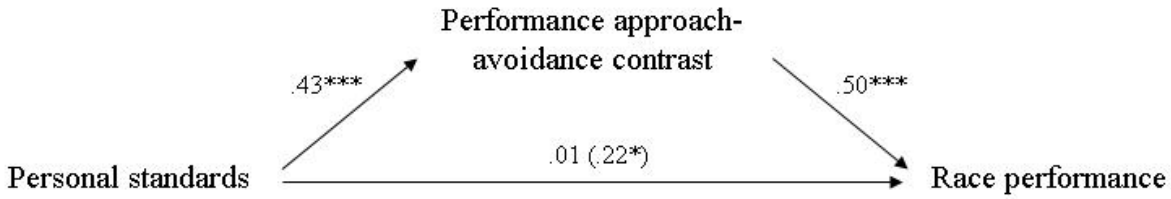
*$p < .05$. **$p < .01$. ***$p < .001$.

Figure Caption

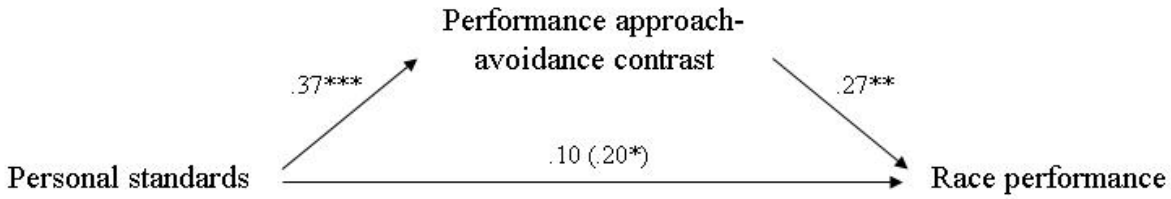
Figure 1. Study 1: The contrast between performance-approach and performance-avoidance goals (approach – avoidance) fully mediates the relationship between perfectionistic personal standards and race performance. Race performance is residual race performance controlling for age, gender, and seasonal best (see Table 3, Step 1). *p < .05. ***p < .001.

Figure 2. Study 2: The contrast between performance-approach and performance-avoidance goals (approach – avoidance) fully mediates the relationship between perfectionistic personal standards and race performance. Race performance is residual race performance controlling for race, age, gender, and seasonal best (see Table 6, Seasonal best, Step 1). *p < .05. **p <.01. ***p < .001.

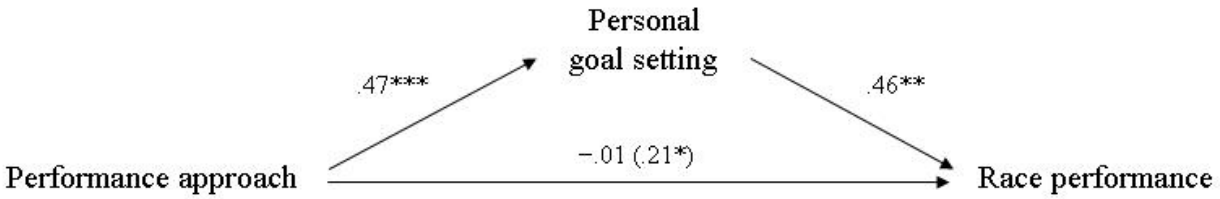
Figure 3. Study 2: Personal goal setting (performance goal [time] + outcome goal [rank]) fully mediates the relationship between performance-approach goals and race performance. Race performance is residual race performance controlling for race, age, gender, and seasonal best (see Table 6, Seasonal best, Step 1). *p < .05. **p <.01. ***p < .001.


Performance approach-avoidance contrast
.43***
.50***
.01 (.22*)
Personal standards
Race performance

[Figure 1]


Performance approach-avoidance contrast
.37***
.27**
.10 (.20*)
Personal standards
Race performance

[Figure 2]


Personal
goal setting
.47***
.46**
−.01 (.21*)
Performance approach
Race performance

[Figure 3]