

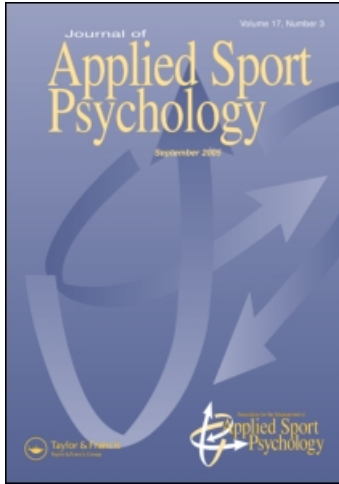
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### Do Performance Strategies Moderate the Relationship Between Personality and Training Behaviors? An Exploratory Study

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## Do Performance Strategies Moderate the Relationship Between Personality and Training Behaviors? An Exploratory Study

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The aim of the present research was to investigate the relationship between personality traits, performance strategies, and training behaviors. In two studies we distributed the International Personality Item Pool (IPIP), the Test of Performance Strategies-2 (TOPS-2), and the Quality of Training Inventory (QTI) to British gymnasts ( $n = 93$  and  $n = 71$ , respectively). The results revealed additive and interactive effects of personality and performance strategies on training behaviors. Conscientiousness and goal-setting each independently predicted quality of preparation, goal-setting moderated the relationship between extraversion and distractibility, and emotional stability and emotional control largely independently predicted coping with adversity. The results suggest that athletes' personalities and performance strategies should both be considered when attempting to maximize training effectiveness and that performance strategies are sometimes more effective for some people than for others.

### INTRODUCTION

Contemporary sport psychology research has typically moved away from examinations of global personality traits toward more specific models and measures such as mental strategies, skills, behaviors, and motives (Vealey, 2002). One exception is Hardy, Jones, and Gould's (1996) pyramid model of peak performance, which places personality at the base. Within this model, personality interacts with performance strategies (left side of the pyramid) and coping skills (right side of the pyramid) to lead to peak performance at the apex. Despite these

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conceptual efforts, to date little research attention has been given to understanding the ways in which these performance strategies may interact with personality (Weinberg & Gould, 2007). In this exploratory study, we aimed to explore this interaction in the specific context of training behaviors.

Although competitive athletes strive for excellence under the pressure of competition, they spend the vast majority of their time training for competition rather than in competition itself. McCann (1995) surmised that competitive athletes spend up to 99% of their time in training. Given that it takes approximately 10 years and 10,000 hr. of practice to reach expertise (Ericsson, 1990; Helsen, Starkes, & Hodges, 1998; Simon & Chase, 1973), this percentage is likely an underestimation. Nevertheless, despite the importance of training, research has typically focused on competition (Frey, Laguna, & Ravizza, 2003; McCann, 1995). Considering both Hardy et al.'s (1996) global interactive model of personality and performance strategies, and the relative paucity of training-specific research (see also Ericsson, Krampe, & Tesch-Romer, 1993), the objective of the present research was to begin to bridge the gap between personality, performance strategies, and training behaviors.

### **Training Behaviors**

Training is integral to the attainment of peak performance and, for the vast majority of athletes, the means to a competitive end. Thus, the quality of competition preparation should allow the athlete to focus on specific aspects of upcoming competitions. Such quality of preparation comprises a plan and routines that form a competition or training preparation strategy (Hardy et al., 1996) that the athlete prepares and practices in training. Another variable that can influence athletes' practice is the ability to cope with adversity (see Nicholls & Polman, 2007). Coping refers to "constantly changing cognitive and behavioral efforts to manage specific external and/or internal demands that are appraised as taxing or exceeding the resources of the person" (Lazarus & Folkman, 1984, p. 141). Although coping is a fundamental aspect of competition and performance generally (Anshel, Brown, & Brown, 1993; Gould, Finch, & Jackson, 1993; Krohne & Hindel, 1988; Poczwadowski & Conroy, 2002), we were specifically interested in investigating athletes' abilities to cope with adversity in a training environment. The ability to concentrate despite distractions is also a fundamental aspect of training (Nideffer, 1993). Concentration is the ability to focus attention on one or more specific things at a particular time (Hardy et al., 1996; Nideffer, 1993). Distractions can be both internal and external and when athletes train alongside each other they are particularly prone to becoming distracted from the task at hand. The susceptibility to distraction is commonly referred to as distractibility (Paulhus, Aks, & Coren, 2001). Although there are clearly other training behaviors that one could investigate (e.g., the intensity of practice), we chose to focus on quality of preparation, coping with adversity, and distractibility in the present investigation.

### **Personality**

Personality was once a fairly major topic in the sport domain (Eysenck, Nias, & Cox, 1982). For example, Morgan (1980) claimed that traits account for 20–45% of the variance in performance and suggested that their examination with other theoretical approaches would likely be useful in predicting behavior. However, because of numerous methodological flaws such as small sample sizes, failure to consider different types of sports, and failure to control for Type I error, researchers typically espoused other theoretical approaches (Eysenck et al., 1982; Vealey, 2002). Mainstream personality theory and research has revealed five major facets of personality, which are typically termed the Big Five (Goldberg, 1993; John, 1990). Despite the likely influence of personality on performance, the Big Five have not been extensively tested in

the sport domain. One exception is Piedmont, Hill, and Blanco's (1999) study, which revealed that neuroticism and conscientiousness were significantly related to athletic performance. Despite these personality findings in sport, it remains unclear to what degree personality may affect training behaviors and to what degree any such effects may be moderated by performance strategies.

### **Performance Strategies**

The most commonly used measure of performance strategies is Thomas, Murphy, and Hardy's (1999) Test of Performance Strategies (TOPS-2), which comprises seven distinct performance strategies that athletes can use both in practice and in competition: goal-setting, emotional control, automaticity, relaxation, self-talk, imagery, attentional control, and activation. One of the most commonly examined performance strategies in the sport literature is goal-setting (Burton, 1993; Burton, Naylor, & Holliday, 2001; Kingston & Hardy, 1997; Kingston & Wilson, 2008; Kyllö & Landers, 1995). Kyllö and Landers (1995) reported that the use of goal-setting improved performance by .34 of a standard deviation (see also Kingston & Wilson, 2008).

Although Krane and Williams' (2006) review of the psychological characteristics of peak performance included emotional control, this variable has received relatively sparse research attention in sport (Cohn, 1991; Thomas & Over, 1994). Simply put, emotional control reflects the emotion control strategies that people apply to cope with difficult situations and emotions (see Thomas et al., 1999). Hardy et al. (1996) reported that the ability to cope with such situations and emotions is important for athletic performance. Furthermore, in an attempt to construct a self-report instrument for measuring psychological and psychomotor skills, Thomas and Over (1994) found that handling emotions and cognitions was an integral aspect of golf performance.

Although personality, performance strategies, and training behaviors have received research attention, research has yet to explore the interplay between these variables. The purpose of the present research therefore was to examine the degree to which personality and performance strategies affect training behaviors. Specifically, we sought to explore the degree to which personality and training behaviors affect training behaviors in either an additive or interactive fashion. In other words, are training behaviors affected by performance strategies in the same way for everyone or do some athletes benefit from performance strategies more than others?

## **STUDY 1**

The first prediction was based on Barrick, Mount, and Judge's (2001) and Pervin and John's (2001) reports on conscientious individuals and Kalnbach and Hinsz's (1999) suggestions with regard to the important contribution of conscientiousness in examining the role of individual differences in goal-setting. Conscientious persons are usually relatively hard-working, responsible, and careful (Barrick et al., 2001; Pervin & John, 2001). Therefore, we hypothesized that conscientiousness would be positively related to quality of preparation. Although it would be tempting to assume that conscientious individuals would simply engage in more goal-setting, it is not likely this simple. For example, although conscientious athletes may arrive early to training and rarely "bunk off," they may lack some of the skills necessary to engage in effective goal-setting within their training regimen. Conscientious athletes may in fact feel little need to set goals for training because their personalities dictate that they will engage in quality training. That is, regardless of whether conscientious athletes set specific training goals, they are likely to remain focused on their competition preparation. Conversely, low conscientious

athletes are more likely to sway from their training regimen and, as such, are more likely to benefit from goal-setting.

The second specific prediction was based on Eysenck and Eysenck (1985) and on Paulhus et al.'s (2001) reports on the relationships between extraversion and distractibility. Although extraversion can be beneficial to performance (e.g., Woodman, Davis, Hardy, Callow, Glasscock, & Yuill-Proctor, 2009), we hypothesized that it would lead to the propensity to be distracted in a training environment. Specifically, we hypothesized that extraversion would be related to distractibility only when goal-setting was low. In other words, when goal-setting is low, extraverts will likely be easily distracted. When goal-setting is used, however, extraverts should benefit from a performance strategy mechanism that makes them less distractible.

The final prediction was based on McCrae and Costa (1986) and on Bolger's findings (Bolger, 1990; Bolger & Zuckerman, 1995) with regard to the effects of emotional stability (i.e., the converse of neuroticism; see Goldberg, 1999) on coping behaviors (see also Connor-Smith & Flachsbart, 2007). It was also based on Thomas et al. (1999) with regard to the beneficial effect of emotional control strategies on coping with adversity. Specifically, when emotional control strategies are used, emotional stability is less likely to be related to coping. Conversely, when emotional control strategies are less utilized, emotional stability is more likely to provide a trait-based coping mechanism.

## METHOD

### Participants

To avoid sport confounds, we chose to investigate gymnastics only. Ninety-three gymnasts agreed to participate in the study. The sample comprised 59 male and 34 female gymnasts aged between 14 and 34 years ( $M_{\text{age}} = 16.57$ ,  $SD = 3.55$ ), recruited from 17 gymnastics clubs around the United Kingdom. All gymnasts were competitive (club standard or higher) members of the British Gymnastics Association (BGA) and competed in different disciplines of gymnastics (e.g., artistic, acrobatic, rhythmic). At the time of the study, the distribution of gymnastic standards was 49 international gymnasts (52.7%), 33 national (35.5%), and 11 (11.8%) collegiate/regional. The mean competitive experience of the gymnasts was 9 years ( $SD = 4.26$ ).

### Measures

#### *Quality of Training Inventory (QTI)*

A Quality of Training Inventory (QTI) based on the current literature (Hardy et al., 1996; Lazarus & Folkman, 1984; Nideffer, 1993; Paulhus et al., 2001) was constructed for this study. For the purpose of constructing the item pool, *distractibility* was conceptualized as the propensity to become distracted in training; *coping with adversity* was conceptualized as the ability to cope effectively when training is not going as planned; *quality of preparation* was conceptualized as the strategies and goals that are practiced in training for use in subsequent competition. A pool of 30 items was initially created. The pool of items was reviewed by two sport psychology experts and two coaches, each of whom evaluated the wording of the items and the applicability of the items to training settings. Based on their recommendations, changes were made to the content and wording of the items. This list was then scrutinized by two BGA national coaches and 15 gymnasts who did not otherwise participate in the study. These individuals were asked to read the items and to add to the list any further items. From this list, we created a 20-item questionnaire. This questionnaire was then piloted on a further

**Table 1**  
**Fit indices for the three-factor structural models for the Quality of Training Inventory (QTI)**

Model	$\chi^2$	df	NNFI	CFI	IFI	SRMR	RMSEA
Model 1 (15 items)	157.31	87	.91	.93	.93	.08	.08
Model 2 (13 items)	96.50	62	.95	.96	.96	.06	.06

*Note.* NNFI = non-normed fit index; CFI = comparative fit index; IFI = incremental fit index; SRMR = standardized root mean square residual; RMSEA = root mean square error of approximation.

group of five gymnasts and two sport psychologists. Based on their comments five items were excluded because of their wording and their content. A final version of the QTI thus comprised 15 items scored on a Likert scale from 1 (*strongly disagree*) to 9 (*strongly agree*), with five items for each of the three subscales distractibility, coping with adversity, and quality of preparation. Examples of items are “I am easily distracted by other people in training” (distractibility), “I am good at dealing with problems during training” (coping with adversity), and “I always have a competition plan that covers all eventualities” (quality of preparation).

Given that we compiled the QTI for the purpose of this study, we wanted to ensure that it had reasonable construct validity. To this end, we conducted confirmatory factor analyses (Bentler & Wu, 2002) to examine the fit of the three-factor model with the data. The Maximum Likelihood (ML) method was chosen as the estimation procedure because it has been shown to perform reasonably well with multivariate normally distributed data (Chou & Bentler, 1995). The absolute fit indices used in this study were the chi square ( $\chi^2$ ) test, the Root Mean Square Error of Approximation (RMSEA), and the Standardized Root Mean square Residual (SRMR). The incremental fit indices were the Comparative Fit Index (CFI), the Non-Normed Fit Index (NNFI), and the Incremental Fit Index (IFI). Examination of the residual matrix indicated that the error variance of two items was highly correlated with the error variance of various other items. Consequently, these two items were removed. The revised 13-item (distractibility: 5 items; coping with adversity: 4 items; quality of preparation: 4 items) solution produced a reasonable fit. The fit indices for the two models are presented in Table 1 (see Appendix for the full list of items). The alpha coefficients ranged from .73 to .85 (see Table 2).

### ***International Personality Item Pool***

The IPIP (Goldberg, 1999; Goldberg, Johnson, Eber, Hogan, Ashton, Cloninger, et al., 2006) is based on the Big-Five factor markers (Goldberg, 1992) and has 10 items for each of the 5 factors. The Big-Five factors are surgency (or extraversion), agreeableness, conscientiousness, emotional stability, and intellect (or imagination). For the purposes of the present study, only the extraversion, emotional stability, and conscientiousness subscales were used. Item examples of these subscales are “I am the life of the party” (extraversion), “I get upset easily” (emotional stability), and “I pay attention to details” (conscientiousness). The IPIP uses a Likert scale ranging from 1 (*very inaccurate*) to 5 (*very accurate*). The alpha coefficients in the present study ranged from .75 to .83 (see Table 2).

### ***Test of Performance Strategies-2***

(TOPS-2; Thomas et al., 1999). The TOPS-2 comprises 113 items that measure performance strategies in practice and competition. For the purposes of the present study we used only the practice scales of goal-setting and emotional control. Goal-setting items include “I set goals

**Table 2**  
**Descriptive statistics and zero-order correlations for personality (extraversion, emotional stability, conscientiousness), performance strategies (goal-setting, emotional control), and training behaviors (coping with adversity, distractibility, quality of preparation) in Study 1 ( $n = 93$ )**

Variable	1	2	3	4	5	6	7	8
1. Extraversion	—							
2. Emotional Stability	.13	—						
3. Conscientiousness	-.08	.19	—					
4. Goal-Setting	.14	-.17	.34**	—				
5. Emotional Control	-.01	.26*	.13	-.02	—			
6. Coping with Adversity	.03	.37***	.41***	.23*	.36***	—		
7. Distractibility	.16	-.13	-.57***	-.35**	-.24*	-.55***	—	
8. Quality of Preparation	.02	-.00	.43***	.52***	-.05	.22*	-.41***	—
Mean	3.34	3.41	3.31	3.48	3.46	5.90	5.06	5.48
(SD)	(.69)	(.60)	(.57)	(.84)	(.57)	(1.34)	(1.62)	(1.68)
Alpha	.84	.83	.75	.85	.85	.73	.85	.80

\* $p < .05$ ; \*\* $p < .01$ , \*\*\* $p < .001$ .

to help me use practice time effectively.” Emotional control items include, “During training sessions I use relaxation techniques to improve my performance.” Ratings are made on a five-point Likert scale from 1 (*never*) to 5 (*always*). The alpha coefficients in the present study were .85 for both subscales (see Table 2).

## Procedure

After gaining institutional ethics approval and obtaining assent and written informed consent (either from the gymnast or from a parent/guardian), we distributed the questionnaires and emphasized to respondents that they should describe themselves as they generally are *now*, not as they wish to be in the future. Participants were informed that there were no right or wrong answers and that their individual responses would remain anonymous and confidential.

## RESULTS

### Preliminary Analyses

To control for potential gender differences, all independent and dependent variables were centered within each sex and then collapsed across sexes. Descriptive statistics and Pearson correlations are presented in Table 2. We performed moderated hierarchical regression analyses (Cohen & Cohen, 1983; Jaccard & Turrissi, 2003) to examine the additive and interactive effects of personality and performance strategies on quality of training. Before creating product terms and subjecting the data to analysis, we centered all independent variables using  $z$ -score transformations (Jaccard & Turrissi, 2003). All regression models satisfied the homoscedasticity and normality of residuals assumptions.

## Training Behaviors

### *Quality of preparation*

The first hypothesis was that there would be a significant interaction between conscientiousness and goal-setting on quality of preparation. Step 1 of the moderated hierarchical regression revealed that conscientiousness significantly and positively predicted quality of preparation,  $R^2 = .19$ ,  $F(1, 91) = 20.62$ ,  $\beta = .29$ ,  $p < .001$ . In Step 2, goal-setting accounted for a significant proportion of further variance in quality of preparation,  $\Delta R^2 = .16$ ,  $F_{\text{cha}}(1, 90) = 21.88$ ,  $\beta = .42$ ,  $p < .001$ . The Conscientiousness x Goal-setting product term failed to account for any further significant proportion of quality of preparation variance once the main effects had been accounted for,  $\Delta R^2 = .00$ ,  $F_{\text{cha}}(1, 89) = .31$ ,  $\beta = -.04$ ,  $p = .58$ . This lack of interaction is the first indication that both conscientiousness and goal-setting affect quality of preparation, although they do so independently rather than interactively.

### *Distractibility*

Moderated hierarchical regression analysis with distractibility as the dependent variable revealed that extraversion did not account for a significant proportion of distractibility variance,  $R^2 = .03$ ,  $F(1, 91) = 2.51$ ,  $\beta = .22$ ,  $p = .12$ . Goal-setting significantly added to the model in Step 2,  $\Delta R^2 = .14$ ,  $F_{\text{cha}}(1, 90) = 15.24$ ,  $\beta = .44$ ,  $p < .001$ , and the Extraversion x Goal-setting product term accounted for a near-significant proportion of additional distractibility variance in Step 3,  $\Delta R^2 = .03$ ,  $F_{\text{cha}}(1, 89) = 3.21$ ,  $\beta = .17$ ,  $p < .08$ . The shape of the interaction was as hypothesized: extraversion was positively related to distractibility only when goal-setting was low.

### *Coping with adversity*

To examine the hypothesis that emotional control would moderate the relationship between emotional stability and coping with adversity, we conducted a three-step hierarchical regression analysis. Emotional stability accounted for a significant proportion of variance in coping with adversity,  $R^2 = .14$ ,  $F(1, 91) = 14.60$ ,  $\beta = .31$ ,  $p < .001$ . Emotional control accounted for a significant proportion of variance over and above emotional stability,  $\Delta R^2 = .07$ ,  $F_{\text{cha}}(1, 90) = 8.12$ ,  $\beta = .25$ ,  $p < .01$ . The Emotional Stability x Emotional Control product term accounted for a significant proportion of variance over and above the main effects,  $\Delta R^2 = .03$ ,  $F_{\text{cha}}(1, 89) = 4.03$ ,  $\beta = .19$ ,  $p < .05$ . This interaction was contrary to the hypothesis: emotional stability was more strongly related to coping when emotional control was high.

## DISCUSSION

The analyses revealed consistent main effects between personality and quality of training and between performance strategies and quality of training. These effects were additive for quality of preparation, somewhat interactive for distractibility, and interactive for coping with adversity. Although the results of Study 1 are promising, they clearly need to be replicated. This was the aim of Study 2.

## STUDY 2

### Participants

Seventy-one gymnasts (33 males, 38 females;  $M_{\text{age}} = 14.59$ ,  $SD = 2.74$ ) from six different gymnastics clubs in the United Kingdom participated in the study. None of these gymnasts



Table 3

**Descriptive statistics and zero-order correlations for personality (extraversion, emotional stability, conscientiousness), performance strategies (goal-setting, emotional control), and training behaviors (coping with adversity, distractibility, quality of preparation) in Study 2 ( $n = 71$ )**

Variable	1	2	3	4	5	6	7	8
1. Extraversion	—							
2. Emotional Stability	-.02	—						
3. Conscientiousness	-.27*	.39***	—					
4. Goal-setting	-.04	.44***	.64***	—				
5. Emotional Control	-.23 <sup>a</sup>	.77***	.33**	.23 <sup>a</sup>	—			
6. Coping with Adversity	-.18	.58***	.58***	.61***	.54***	—		
7. Distractibility	.49***	-.34**	-.64***	-.57***	-.35**	-.58***	—	
8. Quality of Preparation	-.10	.15	.53***	.58***	.14	.50***	-.59***	—
Mean	3.29	2.99	3.16	3.06	2.87	5.09	5.06	6.14
(SD)	(1.11)	(1.06)	(1.00)	(1.11)	(1.12)	(1.93)	(2.05)	(1.98)
Alpha	.89	.77	.86	.94	.88	.81	.83	.73

<sup>a</sup> $p < .06$ ; \* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$ .

participated in Study 1. All gymnasts were competitive (club standard or higher) members of the BGA and competed in different disciplines of gymnastics (e.g., artistic, acrobatic, rhythmic). At the time of the study, the distribution of gymnastic standards was 8 international (11.3%), 28 national (39.4%), and 35 regional (49.3%). The mean competitive experience of the gymnasts was 8 years ( $SD = 3.75$ ). The coaches had been working with their gymnasts between one and nine years ( $M = 4.02$ ,  $SD = 1.89$ ).

## Measures

### *Quality of Training Inventory (QTI)*

To assess the quality of gymnasts' training behaviors, we used the same measure as in Study 1. The QTI demonstrated good internal consistency with all Cronbach alpha coefficients of .73 or above (see Table 3).

### *International Personality Item Pool (IPIP; Goldberg, 1999)*

For the purposes of the present study, we used only the extraversion, conscientiousness, and emotional stability subscales of the IPIP, as in Study 1. Alpha coefficients are presented in Table 3.

### *Test of Performance Strategies-2 (TOPS-2; Thomas et al., 1999)*

Participants were asked to complete the TOPS-2. As in Study 1, we used only the goal-setting and emotional control in practice factors for the purpose of the present analyses. Alpha coefficients were .85 for each factor (see Table 3).

## Procedure

This was the same as in Study 1. Each gymnast assented to participate and provided written informed consent either himself/herself or via a parent/guardian. Confidentiality and anonymity were assured throughout.

## RESULTS

### Preliminary Analyses

We centered all variables within sexes before submitting the data to moderated hierarchical regression analyses. Descriptive statistics and zero-order correlations are presented in Table 3. All regression models satisfied the homoscedasticity and normality of residuals assumptions.

### Quality of Training

#### *Quality of preparation*

Conscientiousness significantly predicted quality of preparation,  $R^2 = .29$ ,  $F(1, 69) = 28.16$ ,  $p < .001$ ,  $\beta = .30$ ,  $p < .05$ . Goal-setting significantly added to the model once conscientiousness had been accounted for,  $\Delta R^2 = .08$ ,  $F_{\text{cha}}(1, 68) = 8.67$ ,  $p < .01$ ,  $\beta = .37$ ,  $p < .005$ . No significant interaction was revealed over and above the main effects,  $\Delta R^2 = .00$ ,  $F_{\text{cha}}(1, 67) = .21$ ,  $\beta = -.05$ ,  $p = .65$ . The significant main effects and the non-significant interaction confirm the result from Study 1.

#### *Distractibility*

Extraversion accounted for a significant proportion of distractibility variance,  $R^2 = .24$ ,  $F(1, 69) = 21.73$ ,  $\beta = .50$ ,  $p < .001$ . Goal-setting significantly predicted distractibility over and above extraversion,  $\Delta R^2 = .30$ ,  $F_{\text{cha}}(1, 68) = 44.31$ ,  $\beta = -.53$ ,  $p < .001$ . Once the main effects had been entered, the interaction predicted a significant proportion of further variance in distractibility,  $\Delta R^2 = .03$ ,  $F_{\text{cha}}(1, 67) = 4.26$ ,  $\beta = -.17$ ,  $p < .05$ . This interaction was the same shape as in Study 1 (see Figure 1).

#### *Coping with adversity*

The results revealed a significant main effect for emotional stability upon coping with adversity,  $R^2 = .37$ ,  $F(1, 69) = 39.87$ ,  $p < .001$ ,  $\beta = .50$ ,  $p < .001$ . Emotional control did not significantly predict any coping with adversity variance,  $\Delta R^2 = .02$ ,  $F_{\text{cha}}(1, 68) = 2.08$ ,  $p = .15$ ,  $\beta = .16$ ,  $p = .47$ . Finally, the interaction failed to reach significance once the main effects had been entered,  $\Delta R^2 = .02$ ,  $F_{\text{cha}}(1, 67) = 1.77$ ,  $\beta = -.04$ ,  $p = .19$ . The lack of interaction contrasts with the interaction revealed in Study 1.

## DISCUSSION

The results of Study 2 largely mirrored those of Study 1. Conscientiousness and goal-setting independently predicted quality of preparation with no moderating effect, and goal-setting moderated the relationship between extraversion and distractibility. Furthermore, emotional stability predicted coping with adversity. However, in contrast to Study 1, this relationship was not moderated by emotional control.

To the best of our knowledge, this is the first examination of the combined effects of personality and performance strategies on training behaviors. The main purpose of the studies was to determine the degree to which personality and performance strategies affect training behaviors either additively or interactively. Despite some exceptions, which we will discuss in more detail later, the findings revealed three consistent findings. First, personality was consistently related to training behaviors. That is, conscientiousness was positively related to quality of preparation; extraversion was positively related to distractibility; and emotional stability was positively related to coping with adversity. Second, performance strategies consistently explained training behaviors over and above personality. Specifically, goal-setting

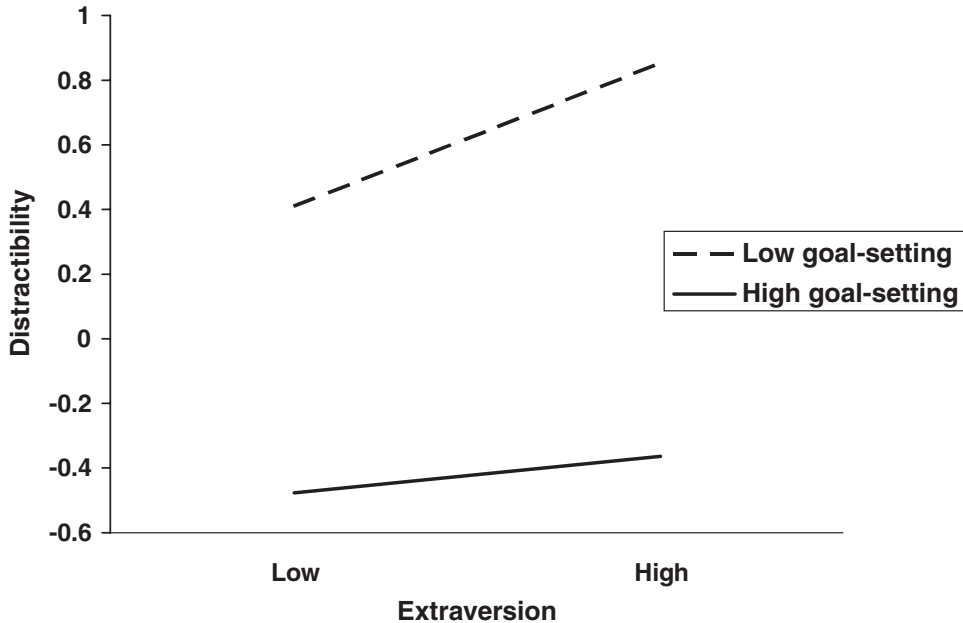


Figure 1. Regression slopes of the interaction between extraversion and goal-setting on distractibility. Regression slopes are derived from regression equations with hypothetical individuals who are one standard deviation below the mean (low) or one standard deviation above the mean (high).

(in both studies) and emotional control (in Study 1 only) predicted training behaviors over and above personality. These two findings alone demonstrate the importance of considering and investigating athletes' personalities and their use of performance strategies rather than performance strategies alone. Third, goal-setting consistently moderated the relationship between extraversion and distractibility (although this moderation failed to reach conventional significance in Study 1). This interaction suggests that extraverts can attenuate their distractibility with the use of goal-setting techniques.

Quality of preparation was consistently predicted by conscientiousness and goal-setting in an additive fashion. These results are in line with previous reports on the behavioral characteristics of conscientious individuals (Barrick et al., 2001; Kalnbach & Hinsz, 1999; Pervin & John, 2001) and of high-level athletes whose quality of preparation is related to daily goals and specific plans (e.g., McCaffrey & Orlick, 1989). The confirmed additive effect suggests that both personality and performance strategies are related to the quality of an athlete's preparation for competition and that the performance strategy (i.e., goal-setting) does not work more (or less) effectively for less conscientious athletes. In other words, when it comes to the benefits of goal-setting for preparing for competition, one size fits all. Of course, the picture is unlikely to be this simple. A more fine-grained approach might entail investigating the effectiveness of different types of goal-setting (Kingston & Wilson, 2008) and whether conscientious individuals engage in more process-type goal-setting, for example. Furthermore, specific motivational orientations or climates (Smith, Smoll, & Cumming, 2009) will likely differentially affect training behaviors. These avenues appear worthy of future research.

The interaction between extraversion and goal-setting suggests that extraverts will glean greater distractibility benefits from goal-setting than their comparatively introverted counterparts. This interaction is interesting in relation to the quality of preparation findings discussed in the previous paragraph because these findings run counter to the position of "one size fits all." Extraverts are typically talkative, active individuals (Costa & McCrae, 1992; Pervin & John, 2001) and this trait makes them more prone to being externally distracted in a training environment. Nevertheless, the results, from Study 2 especially, suggest that goal-setting provides an effective mechanism for buffering this distractibility thus allowing the athlete to focus more on the task at hand.

The least consistent finding concerns coping with adversity. Study 1 revealed significant independent and interactive effects between emotional stability, emotional control, and coping. Although Study 2 revealed a significant main effect for emotional stability also, no further coping variance was accounted for by emotional control or the product term. The robust personality relationship across studies indicates that emotionally stable athletes will cope better with adversity in training, which is consistent with previous findings and theorizing (e.g., Bolger, 1990; Bolger & Zuckerman, 1995; Cohn, 1991; Connor-Smith & Flachsbart, 2007; Kammeyer-Mueller, Judge, & Scott, 2009; McCrae & Costa, 1986; Thomas & Over, 1994). The inconsistency of the interactive effects across the two studies could be explained by the difference in percentage of variance accounted for by the main effects across the two studies. In Study 1, the main effects accounted for 21% of the variance in coping and the interaction term accounted for a further 3%. In Study 2, emotional stability alone accounted for over 36% of the variance in coping, thus leaving little remaining variance to be accounted for by emotional control and even less for the interaction term (McClelland & Judd, 1993). The findings from Study 2, however, suggest that personality is the overriding factor responsible for coping with adversity in training and we tend to favor this interpretation of the results especially given that the shape of the interaction in Study 1 was inconsistent with the hypothesis. Indeed, the interaction was such that emotional control strategies strengthened the association between emotional stability and coping, thus suggesting that the lack of use of emotional control strategies buffers the relationship between personality and coping, which is counterintuitive and counter to the hypothesis. Of course, it is possible that such strategies are used largely in response to a difficulty in controlling emotions in the first place, which would make the interaction logical. That is, when people feel the need to engage in emotional control strategies, their emotional stability allows them to cope better with adversity. Of course, such an interpretation warrants further research. Regardless, future research should attempt to disentangle the degree to which personality and performance strategies can explain coping in a training environment. An avenue that appears particularly worthy of exploration in this context is the degree to which different people engage in emotion-focused coping or problem-focused coping in response to adversity.

### **Limitations and Future Research Directions**

This study was an exploratory investigation of the potential additive and interactive relationships of personality and performance strategies on training behaviors. Given its exploratory nature, there are a number of limitations that further research should address. First, the findings are limited to gymnastics at present. We chose to limit the investigation to a single sport to avoid the threat of sport confound particularly in relation to training behaviors. Of course, such control comes at a cost in generalizability and more research is needed to determine the degree to which performance strategies and psychological skills can moderate the effects of personality on training behaviors across other sports. Furthermore, given the training environment

where gymnasts typically train together for long periods of time, the training behaviors under study here (e.g., distractibility) lend themselves particularly well to gymnastics. Researchers interested in training behaviors in other sports would do well to ensure that the training behaviors under study are applicable to the sport of interest. A second limitation of the study resides in the difference across samples between the two studies. The standard of gymnastics in Study 1 was superior to the standard in Study 2. This difference was largely an artifact of finite sampling; we had largely exhausted the international gymnastics sample pool in Study 1 such that the balance of the sample in Study 2 was toward national and regional gymnasts. Although this sampling heterogeneity is a limitation in terms of sample comparisons across studies, one could argue that it simply serves to render the results more reliable and generalizable, particularly within this sport. Indeed, the results were very similar across studies and the percentage of training behavior variance accounted for suggests that this sampling heterogeneity did not result in a statistical limitation.

A third limitation concerns the potential for conceptual overlap between the independent variables. One could argue that there exists considerable and problematic conceptual overlap between the independent variables. For example, conscientious individuals are more likely to engage in goal-setting. Indeed, the data in Tables 2 and 3 support this position with up to 41% shared variance between these two variables. To argue that this is a problem in the context of the present study, however, would be misguided. First, two variables that share up to 41% common variance are more independent than they are co-dependent and there is no reason why they should not contribute unique proportions of variance either additively or interactively. Second, conscientiousness and goal-setting accounted for distinct proportions of training behavior variance, in both studies, such that they cannot be considered confounded in relation to the dependent variable.

The practical importance of this study is clear. First, given that athletes spend the vast majority of their time in training rather than in competition (McCann, 1995), it is imperative to understand how to maximize that training effectiveness. Athletes first and foremost must be able to handle the demands of training to develop the technical, physical, and mental aspects of performance that they wish to transfer into the competition domain. Both personality and performance strategies can maximize this training effectiveness. Second, the studies suggest that performance strategies can be effective even for those athletes who may appear to need them less. For example, although associated, conscientiousness and goal-setting influence training behaviors in an additive fashion. Nevertheless, it is insufficient simply to apply performance strategies without first taking into consideration the personality of the athlete; with regard to goal-setting in particular, performance strategies may be more effective for the more extraverted athlete.

In summary, both personality and performance strategies affect training behaviors. Goal-setting appears particularly effective for limiting the distractibility of extraverted athletes. Conscientious athletes and those who adopt goal-setting strategies are those who engage most fully in planning for competition within the training environment. Future research on training behaviors, and how personality and performance strategies affect such behaviors, appears particularly worthwhile given the proportion of time that athletes spend in that environment.

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## APPENDIX

### Quality of Training Inventory (QTI)

- 1.) I am easily distracted by other people in training.
- 2.) I always have a competition plan that covers all eventualities.
- 3.) When people are chatting in training, I have a tendency to stop training and join in.
- 4.) I mentally rehearse my competition plan a lot in training.
- 5.) When my training session isn't going well, I try to overcome the problem.
- 6.) It is easy for me to focus in training even when there are distractions.
- 7.) I have a competition plan that I prepare and practice in training.
- 8.) I find it hard to keep trying if I make a mistake in training.
- 9.) I rarely get distracted from my training program.
- 10.) When something goes wrong in training I find it difficult to carry on with my training program.
- 11.) When training, nothing distracts me from my training program.
- 12.) I always prepare very carefully for competitions.
- 13.) I am good at dealing with problems during training.

Note: *Distractibility* items are 1, 3, 6R, 9R, and 11R; *Coping with adversity* items are 5, 8R, 10R, and 13; *Quality of preparation* items are 2, 4, 7, and 12. "R" denotes those items that are reverse-scored. Items are scored on a Likert scale from 1 (*strongly disagree*) to 9 (*strongly agree*).