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Performance strategies of greek track and field athletes: Gender and level differences

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ABSTRACT

Psychological skills play an important role in athletic performance. The aim of the present study was to examine possible differences in the use of psychological skills of Greek track and field athletes of different gender and level. The sample consisted of 364 track and field athletes (241 males, 123 females), aged 18.9 ± 3.9 years, with different level (elite - non elite). The Test of Performance Strategies (TOPS) was used. The participants completed the TOPS questionnaire during the precompetitive period. The results showed that elite level athletes were significantly better compared to non elite in emotional control, goal setting, imagery, activation, negative thinking and relaxation. Also, male athletes had better emotional control and used more relaxation, compared to females. Among elite level athletes, gender differences in psychological skills remained, with females displaying less effective emotional control and relaxation. The differences between athletes of different gender and level could be considered from coaches and sport psychologists in order to help athletes improve their athletic performance.

KEY WORDS: *test of performance strategies, psychological skills, athletics.*

INTRODUCTION

Sport specialists agree that athletic performance is influenced not only by physical skills but also by psychological ones. In order to achieve peak performance athletes need a "total package" including physical skills, psychological skills, fitness and injury prevention (9). Athletic performance could also be influenced by team or coaching variables and social support issues (8).

An essential part of research in Sport Psychology is the assessment of athletes' psychological skills (25). Although previous research focused primarily on the differences in personality characteristics between successful and unsuccessful athletes, recent studies examine those differences in terms of the psychological skills which athletes have practiced and used.

A common approach of measuring athletes' psychological skills is through questionnaires or inventories. Over the last years several psychological skill inventories have been proposed like the Psychological Skills Inventory for Sports –PSIS (18) and the Athletic Coping Skills Inventory–28 (21). However, the validity of some of the most popular existing inventories has not been demonstrated beyond doubt (17). Thomas, Murphy, and Hardy (23) created an inventory, the Test of Performance Strategies (TOPS), based upon psychological processes that are critical for successful athletic performance.

TOPS is a 64-item self-report instrument designed to measure the psychological skills and strategies used by athletes in competition and during practice. It consists of two scales, competition and practice. Each scale is consisted of eight subscales. The 8 competition subscales are: *self-talk* (maintaining a positive internal dialogue), *emotional control* (controlling emotions under pressure), *automaticity* (performing with little conscious effort, automatically), *goal-setting* (setting personal, specific goals), *imagery* (visualizing sport performance), *activation* (maintaining an optimal level of arousal), *relaxation* (practicing to remain calm under pressure), and *negative thinking* (thoughts of failure). The practice subscales are the same except negative thinking which is replaced by *attentional control* (focusing attention effectively). TOPS has been used in numerous studies in order to evaluate the psychological skills used by athletes from various sports. This inventory has also been used to examine the relationships between psychological skills and issues such as: top performance (8, 22), flow (14), competitive anxiety (6), mental toughness (15) and emotions (3).

Psychological skills have been found to differentiate successful and unsuccessful athletes. In general, elite performers have higher self-confidence, heightened concentration, can regulate arousal effectively, use systematically goal setting and imagery, and have high levels of motivation and commitment (8). It has also been found that elite athletes use more *goal setting*, imagery and *activation* compared to non-elite athletes (23).

Gender is an important interpersonal factor in competitive sport. Previous research showed that female athletes, compared with males reported higher cognitive anxiety (19, 20) and lower self confidence (16, 19). Also, males used more problem-focused coping strategies, while females used more emotion-focused coping (1, 10). Gill (7) stated that male athletes were more win oriented and focused more on interpersonal comparison, while females scored higher on goal orientation and focused more on personal goals. In addition, it was reported that female athletes in endurance activities use more dissociative cognitive strategies while male endurance athletes tend to be more associative (2). Vealey (26), although, found that self-confidence levels were not statistically different for male and female elite athletes.

Psychological skills of track and field athletes were also explored in some research studies. In the Olympic US trials of 1988, track & field athletes who managed to qualify for the Olympic team used imagery more, compared to those who failed to qualify (24). A research study, using the Psychological Skills Inventory for Sports, revealed that elite Chinese track and field athletes had higher anxiety control and confidence than collegiate level athletes (4). Moreover, 15 Olympic track and field athletes were interviewed and their psychological characteristics were examined (27). The researchers reported that imagery was the most widely utilized mental skill. Also, elite athletes had hard work ethic, patience, persistence, self-confidence, pursued their dreams and enjoyed participating in their sport. To our knowledge no study has explored psychological skills of track and field athletes using TOPS.

The aim of the present study was to examine possible differences in the use of psychological skills between high-level (elite) and lower-level (non elite) Greek track and field athletes of both genders. The main hypotheses of this study were: (a) elite level athletes would score higher in psychological skills than non elite, (b) male and female athletes would differ in some strategies they adopt during competition and (c) there would be no gender differences between elite level athletes.

METHODS

Participants

In the present study the sample consisted of 364 track and field athletes from different parts of Greece, aged 18.9 ± 3.7 years. There were 241 males (71 elite level and 171 non elite) and 123 females (47 and 76 respectively). As ‘elite level’ were considered those Greek athletes who have participated in Greek track and field national teams. The criteria for participation in the study were: a) athletes should be over 15 years old, because the validity and relia-

bility of the TOPS (competition scale) in Greek athletes were not verified for athletes under this age (5) and b) at least two years of competitive experience in order for the athletes to be able to respond to the items of the TOPS questionnaire.

Data collection

The Test of Performance Strategies (competition scale), was used in order to evaluate the performance strategies of track and field athletes. The competition scale of the TOPS inventory is consisted of eight subscales: *self-talk*, *emotional control*, *automaticity*, *goal-setting*, *imagery*, *activation*, *relaxation* and *negative thinking*. All subscales consist of four items. Answers are given on a 5-point Likert type scale ranging from 1 (never) to 5 (always). The validity and reliability of the competition scale of TOPS in Greek athletic population has already been examined (5). The results supported the initial factorial structure and provided adequate evidence for the internal consistency, only for the competition scale (Cronbach's α values from .63 to .84), for athletes over 15 years of age, but not for younger athletes.

All coaches were informed and their permission was asked. Athletes provided informed consent for their voluntary participation. For athletes under 18 years old, their parents' informed consent was also provided. TOPS was distributed to the participants before or after training and before the beginning of the competitive season. Instructions to the participants included a reminder to respond to all items according to what happens "usually" during competitions.

Data analysis

Data were analyzed using multivariate analysis of variance (MANOVA) with the eight performance strategies (TOPS subscales) as the dependent variables and gender (male-female) and athletes' level (elite-non elite) as the independent variables. This was followed by univariate analyses (ANOVA) to clarify the nature of significant relationships. Statistical significance was set at the 0.05 level.

RESULTS

The 8 performance strategies (subscales of the TOPS) were tested for their internal consistency with Cronbach's alpha coefficient (Table1). All alpha values were higher than .70 (Nunally's criterion for satisfactory reliability coefficients) except automaticity subscale (.61).

Table 1. *Means values (± SD) and alpha coefficients for the competition strategies.*

TOPS factors	M	SD	Cronbach's α
Self-talk	3.25	1.00	.85
Emotional control	3.34	.81	.74
Automaticity	2.51	.75	.61
Goal-setting	4.13	.68	.73
Imagery	3.83	.93	.84
Activation	4.17	.67	.80
Negative thinking	1.96	.76	.77
Relaxation	3.25	.81	.74

The gender by level (2×2) MANOVA resulted in significant main gender effect (Wilks'$\lambda = .93$, $F_{8,351} = 3.3$, $p = .001$), and a significant main level effect (Wilks'$\lambda = .92$, $F_{8,351} = 3.8$, $p = .000$). Furthermore, there was no significant interaction between the two variables (Wilks'$\lambda = .97$, $F_{8,351} = 1.5$, $p = .15$). Follow-up univariate analyses of variance (ANOVA) were carried out separately for each performance strategy.

The results of simple univariate statistics are shown in Tables 2 and 3.

Table 2. *Means values (± SD) and comparisons between the two level groups for the competition strategies*

	Gender comparisons				
Competition strategy	Male M ± SD	Female M ± SD	F	Df	*p*
Self-talk	3.18 ± 1.02	3.38 ± 0.94	3.34	(1,358)	.068
Emotional control	3.46 ± 0.77	3.11 ± 0.85	17.15	(1,358)	.000**
Automaticity	2.51 ± 0.74	2.50 ± 0.76	.22	(1,358)	.637
Goal setting	4.13 ± 0.69	4.14 ± 0.67	.08	(1,358)	.784
Imagery	3.76 ± 0.92	3.97 ± 0.94	3.24	(1,358)	.072
Activation	4.17 ± 0.68	4.18 ± 0.64	.04	(1,358)	.841
Negative thinking	2.45 ± 0.58	2.58 ± 0.61	2.42	(1,358)	.120
Relaxation	3.34 ± 0.79	3.08 ± 0.81	9.86	(1,358)	.002**

*$p < 0.05$, **$p < 0.01$

Table 3. *Means values (± SD) and comparisons between the two level groups for the competition strategies*

Level comparison					
Competition strategy	Elite M ± SD	Non elite M ± SD	F	df	*p*
Self-talk	3.32 ± 1.04	3.21 ± 0.98	.81	(1,358)	.367
Emotional control	3.45 ± 0.82	3.29 ± 0.81	4.03	(1,358)	.045*
Automaticity	2.56 ± 0.83	2.48 ± 0.75	.49	(1,358)	.484
Goal setting	4.29 ± 0.56	4.05 ± 0.73	7.86	(1,358)	.005**
Imagery	4.00 ± 0.89	3.74 ± 0.94	5.47	(1,358)	.02*
Activation	4.34 ± 0.65	4.08 ± 0.66	10.60	(1,358)	.001**
Negative thinking	2.41 ± 0.57	2.54 ± 0.60	7.30	(1,358)	.007*
Relaxation	3.44 ± 0.77	3.16 ± 0.81	11.17	(1,358)	.001**

*p < 0.05, **p < 0.01

In order to clarify if gender differences exist in performance strategies among the elite level athletes, MANOVA analysis was used and revealed that there was a significant gender main effect (Wilks'λ = .86, $F_{8,109}$ = 2.3, p = .026).

The results of the univariate analyses (ANOVA) separately for each factor are shown in Table 4.

Table 4. *Means values (± SD) and comparisons between the two gender groups of elite level athletes for the competition strategies*

Gender comparisons (elite level athletes)					
Competition strategy	Male M ± SD	Female M ± SD	F	df	*p*
Self-talk	3.21 ± 1.06	3.49 ± 1.00	2.03	(1,116)	.157
Emotional control	3.64 ± 0.77	3.19 ± 0.83	8.93	(1,116)	.003**
Automaticity	2.61 ± 0.73	2.49 ± 0.75	.64	(1,116)	.424
Goal setting	4.34 ± 0.55	4.22 ± 0.57	1.28	(1,116)	.260
Imagery	3.93 ± 0.85	4.13 ± 0.94	1.54	(1,116)	.217
Activation	4.36 ± 0.64	4.32 ± 0.68	.09	(1,116)	.767
Negative thinking	1.79 ± 0.72	1.82 ± 0.73	.04	(1,116)	.845
Relaxation	3.57 ± 0.79	3.26 ± 0.79	4.89	(1,116)	.029*

*p < 0.05, **p < 0.01

DISCUSSION

The aim of the present study was to examine possible differences in the use of psychological skills between higher and lower level, male and female track and field athletes. The results showed that elite athletes were significantly better compared to non elite in emotional control, goal setting, imagery, activation, negative thinking and relaxation. Previous studies have also found that elite athletes used more imagery (23, 24) and scored higher in activa tion and goal setting (23), compared to non elite. Harwood et al (13) suggested that elite athletes used more effectively self-talk and emotional control. In the current study elite track and field athletes had also better emotional control but did not score higher in self-talk compared to non elite athletes. A possible explanation of this difference could be that self talk is a multidimensional phenomenon with instructional and motivational functions (12). Probably, in the different track and field events (all-out effort in sprints, prolonged effort in long distances, repetitive efforts in jumps and throws), athletes may use very different kinds of self-talk. Thus, athletes of different levels could differ not generally in the use of self – talk but in the kind or the frequency of self-talk. In a recent study concerning performance strategies of US Olympic participants from 28 different sports, the strongest predictors of successful athletic performance (earning a medal) was emotional control, self-talk and imagery (22). Moreover, emotional control contributed significantly to the differences between medalists and non medalists in both the competition and practice analyses of the TOPS scales. It is clear that the athletes' ability to manage their emotions is critical to achieve optimal performance (11). In the current study it was expected that elite athletes would also score higher in the automaticity subscale, because this construct is basic to the description of top performance. However, this was not verified. The factor of automaticity seems also problematic in some other studies, and probably further research is needed. A proposed explanation is that athletes probably misinterpret the items designed to assess this factor, confusing the meaning of automaticity (e.g. "I don't think much about performing- just let it happen") with a disorganized attitude (14, 23). In the Taylor et al research (22) although the more successful athletes scored higher in the automaticity subscale than the less successful, automaticity scores were not as high as it was expected. The researchers suggested that athletes from different sports may judge automaticity with a different way, relatively to the demands of their own sport.

Research findings from previous studies, with regard to gender differences in psychological skills are conflicting. The data analysis in the present study showed that male athletes used more relaxation compared to females, which is in agreement with Harwood et al. (13). However, male athletes were not significantly better in the use of self talk, contradictory to previous findings (13, 22). In addition, females in the present study displayed less emotional

control but they did not have an enhanced function of imagery than males, contradictory to Thomas et al. (23).

From the present study it was concluded that the gender effect on psychological skills remained unchanged among elite level athletes. Harwood et al. (13) evaluated the psychological skills of elite young athletes, from various sports and concluded that males scored higher than females in relaxation and self-talk. In the present study elite level male track and field athletes used more relaxation as well, but also had better emotional control compared to female elite level athletes.

In conclusion, the results from the current study supported the hypothesis that elite level athletes use performance strategies more effectively, compared to non elite (except self-talk and automaticity). The differences in competition strategies between genders were found in the use of relaxation and emotional control, where males scored higher. The hypothesis that there would be no gender differences between elite level athletes was not supported.

A question that could not be answered in the present research is whether the more successful athletes have more advanced psychological skills as a result of an inherent "gift" or because of more practice in using psychological skills. Probably, the use of psychological skills is a complex function of genetic predisposition, deliberate training and formal instruction (22). In addition, a limitation of the current study is that it was conducted during the precompetitive period. A question remains if athletes would report the same performance strategies in the competitive season. This research was also conducted in track and field athletes over 15 years old, so it cannot be generalized for younger athletes. It would be interesting in a future research to explore the performance strategies of track and field athletes of top level (participants in Olympic Games).

The findings of the present study, hopefully, could help track and field coaches and sport psychologists to design more effective training plans, incorporating psychological skills that need to be enhanced. The training of the specific performance strategies, along with physical and technical components, could help track and field athletes of different level and gender to improve their performance.

REFERENCES

1. Anshel MH, Porter A, Quek J. Coping with acute stress in sport as a function of gender: An exploratory study. Journal of Sport Behavior 21: 363-377, 1998.
2. Antonini Philippe R, Seiler R. Sex differences on use of associative and dissociative cognitive strategies among male and female athletes. Perceptual and Motor Skills 101: 440-444, 2005.

3. Cohen A, Tenenbaum G, English R W. Emotions and golf performance. An IZOF- Based applied sport psychology case study. Behavior Modification 30: 259-280, 2006.
4. Cox R, Liu Z, Qiu Y. Psychological skills of elite Chinese athletes. International Journal of Sport Psychology 27: 123-132, 1996.
5. Donti O, Katsikas C, Psychountaki M. Reliability and Validity of the Greek version of the TOPS in Greek athletic population. Athlitiki Psichologia 17: 69-79, 2006.
6. Fletcher D, Hanton S. The relationship between psychological skills usage and competitive anxiety responses. Psychology of Sport and Exercise 2: 89-101, 2001.
7. Gill D L. Gender differences in competitive orientation and sport participation. International Journal of Sport Psychology 19: 145-159, 1988.
8. Gould D, Dieffenbach K, Moffett A. Psychological characteristics and their development in Olympic champions. Journal of Applied Sport Psychology 14: 172-204, 2002.
9. Gould D, Eklund R C. The application of sport psychology for performance optimizations. Journal of Sport Sciences 1: 10-21, 1991.
10. Hammermeister J, Burton D. Gender differences in coping with endurance sports: Are men from Mars and women from Venus? Journal of Applied Sport Psychology 27: 148-164, 2004.
11. Hanin Y L. Emotions in sport, ed. Y.L. Hanin. Champaign, IL: Human Kinetics, 2000.
12. Hardy J, Hall C, Hardy L. A note on athletes' use of self-talk. Journal of Applied Sport Psychology 16: 251-257, 2004.
13. Harwood C, Cumming J, Fletcher D. Motivational profiles and psychological skills use within elite youth sport. Journal of Applied Sport Psychology 16: 318-332, 2004.
14. Jackson S, Thomas P R, Marsh H W, et al. Relationships between Flow, Self-Concept, Psychological Skills, and Performance. Journal of Applied Sport Psychology 13: 129-153, 2001.
15. Jones G, Hanton S, Connaughton D. What Is This Thing Called Mental Toughness? An Investigation of Elite Sport Performers. Journal of Applied Sport Psychology 14: 205-218, 2002.
16. Krane V, Williams J M. Cognitive anxiety, somatic anxiety, and confidence in track and field athletes: The impact of gender, competitive level and task characteristics. International Journal of Sport Psychology 25: 203-217, 1994.
17. Lane A M, Harwood C, Terry P C, et al. Confirmatory factor analysis of the test of performance strategies (TOPS) among adolescent athletes. Journal of Sport Sciences 22: 803-812, 2004.
18. Mahoney M J, Gabriel T J, Perkins T S. Psychological skills and exceptional athletic performance. The Sport Psychologist 1: 181-199, 1987.

19. Martens R, Vealey R, Burton D. Competitive anxiety in sport. Champaign, IL: Human Kinetics, 1990.
20. Russel W D, Robb M, Cox R. Sex, sport, situation, and competitive state anxiety. Perceptual and Motor Skills 86: 816-818, 1998.
21. Smith R, Schutz R W, Smoll F L, et al. Development and validation of a multidimensinal measure of sport-specific psychological skills: The Athletic Coping Skills Inventory-28. Journal of Sport and Exercise Psychology 17: 379-398, 1995.
22. Taylor M, Gould D, Rolo C. Performance Strategies of U.S Olympians in practice and competition. High Ability Studies 19: 19-36, 2008.
23. Thomas P, Murphy S, Hardy L. Test of performance strategies: Development and preliminary validation of a comprehensive measure of athletes' psychological skills. Journal of Sport Sciences 17: 697-711, 1999.
24. Ungerleider S, Golding J M. Mental practice among Olympic athletes. Perceptual and Motor Skills 72: 1007-1017, 1991.
25. Vealey R. Current status and prominent issues in sport psychology intervention. Medicine and Science in Sport and Exercise 26: 495-502, 1994.
26. Vealey R. Future directions in psychological skills training. The Sport Psychologist 2: 318-336, 1988.
27. Vernacchia R A, McGuire R T, Reardon J P, et al. Psychosocial characteristics of Olympic track and field athletes. International Journal of Sport Psychology 31: 5-23, 2000.

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