



PSYCHOLOGICAL SKILLS DURING TRAINING AND COMPETITION ON RECOVERY-STRESS STATE AMONG ADOLESCENT STATE ATHLETES

Garry Kuan[†] --- Yee-Cheng Kueh²

¹Sports Science Unit and Orthopaedic Department, School of Medical Sciences, Universiti Sains Malaysia

²Unit of Biostatistics and Research Methodology, School of Medical Sciences, Universiti Sains Malaysia, Kelantan, Malaysia

ABSTRACT

The relationship between self-report psychological skills and recovery-stress state was investigated. Seventy adolescent state athletes in Malaysia completed the Test of Performance Strategies (TOPS), and Recovery-Stress questionnaire (RESTQ-Sport). Correlation analysis was used to determine the significant relationship between the psychological skills and recovery-stress subscales. The results showed that there were significant correlations between the psychological skills and recovery-stress states. For psychological skills during practice, the strongest correlations were observed in attention control and general stress ($r = -0.48, p < 0.01$), goal setting and total recovery ($r = 0.72, p < 0.01$), and psychological skills during competition, the strongest correlations were observed in self-talk and general stress ($r = -0.55, p < 0.01$), goal setting and total recovery ($r = 0.57, p < 0.01$). The direction (positive or negative) of correlations showed that individuals reporting frequent use of psychological skills also reported lower state of stress and higher state of recovery in their sport during practice and competition. Future researchers should seek to establish the path relationships by investigating whether demographic variables, physical fitness level and other psychological measures that may associated with recovery-stress states and the use of psychological skills for athletes.

Keywords: Stress, Recovery, Psychological skills, Mental skill training.

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Contribution/ Originality

The study documents the psychological skills components, inter-correlated with the recovery and stress subscales among a group of adolescent state athletes. Next, this study attempted to identify the relationship between each component or aspect of psychological skills used during practice and competition on athletes' recovery and stress state.

1. INTRODUCTION

In sports, effective recovery plays a crucial role in determining the athletes' success or failure. Sport coaches recognized that the effective recovery is important to allow athletes to train more, and therefore improves their overall fitness level, skills, and efficiency in sport. If effective recovery was not implemented to support the athlete, further symptoms such as overtraining, burnout, increased fatigue, lack of concentration, injuries and illness, and disturbed mood could further impact the athletes leading to under performance in their sport (Kellmann, 2010). However, the effect of recovery has received comparatively little attention in the literature and research.

Psychological skill training packages play an important role to help athletes to enhance their sporting performance (Thelwell *et al.*, 2006), improved psychological state variables such as pre-competition anxiety (Fletcher and Hanton, 2001), enhanced self-efficacy during competition (Lowther *et al.*, 2002), enhanced motivation, and reduced stress level (Hanton and Jones, 1999). By practicing these skills, coaches believed that their athletes could potentially experienced lesser stress and higher coping skills, contributing to more effective recovery after competition or exercise. Even so, such use of the psychological skills is different between in practice and competition scenes. According to Frey, Laguna, and Ravizza, the role of mental skills among collegiate athletes during exercise and competition were significantly different (Frey *et al.*, 2003). Therefore, coaches should be cautious in implementing appropriate mental skill for their athletes so that athletes would use the mental skills in practicing their physical skills, to enhance their quality of practice, leading to applying the same mental skills, to further enhance their sporting performing during competition. In addition, coaches should also teach their athletes to use the mental skills in competition. There is a scant research examining the effect of psychological skills training during competition and training on the athletes' recovery-stress state, although there is a wealth of evidence of the effectiveness of using the psychological skills to enhance sporting performance leading to more faster and effective recovery after competition (Fletcher and Hanton, 2001; Kellmann, 2010). Given that the importance of effective recovery for athletes, the recovery-stress relationship, and the use of psychological skills are associated with enhanced sporting performances, it is possible that the use of the psychological skills would be associated with an athlete' recovery-stress state. The purpose of this study was to look into the relationship between psychological skills training, during training and competition and their recovery-stress state among adolescent state athletes.

2. METHODS

2.1. Study Design

A cross-sectional study design, self-administered questionnaires were conducted among adolescent state athletes during their psychological training session at the sport psychology laboratory, Universiti Sains Malaysia.

The sample was composed of 70 adolescent state athletes (61.4% male and 38.6%), ranging from 8 to 18 years ($M = 13.59$, $SD = 2.95$). Participants represented in sport such as wushu ($n = 13$), squash ($n = 4$), sepak takraw ($n = 4$), gymnastic ($n = 9$), gimrama ($n = 10$), bowling ($n = 13$), cycling ($n = 5$), and weightlifting ($n = 12$). The participants reported having an average 2 years ($SD = 2.54$) of competitive experience at state level.

3. MEASURES

3.1. Test of Performances Strategies (TOPS)

The Test of Performances Strategies (TOPS) is a 64-item self-report instrument designed to assess an athlete's use of psychological skills and strategies during competition and practice (Thomas *et al.*, 1999). The TOPS consisted of eight subscales, including activation, relaxation, imagery, goal-setting, self-talk, automaticity, emotional, attentional control. According to Thomas *et al.*, attentional control which is measured in practice contexts was not an appropriate solution in competition. Therefore, attentional control was replaced by the negative thinking subscale (Thomas *et al.*, 1999). Each subscale has four items, and the items were rated on a 5-point Likert scale, ranging from 1 "never" to 5 "always". Scores for each subscale were summed and divided by four, resulting in overall factor scores that could range from 1 to 5. The internal consistency (Cronbach alpha) of the TOPS subscales ranged from 0.66 to 0.81 (Thomas *et al.*, 1999).

3.2. Recovery-Stress Questionnaire in Sport (RESTQ-Sport)

The Recovery-Stress Questionnaire for athletes (RESTQ-Sport) was developed to assess the level of stress among athletes along with the recovery activities (Kellmann and Kallus, 2001). The RESTQ-Sport consisted of 53 items, assess various stressing agents of a general nature and general recovery activities during day-to-day life. The seven additional sport-specific scales focus on the aspects of recovery that related to sport. The preceding recovery-stress activities will influence the present stress state. Each item is a self-rated seven-point Likert scale with values ranging from 0 "never" to 6 "always". This shows how often the respondent participated in various activities during the past 72 hours. High scores in the stress subscales indicate that intense stress, whereas high scores in the recovery subscales reflects good recovery activities. The internal consistencies (Cronbach alpha) of the RESTQ-Sport subscales ranged from 0.72 to 0.93 (Kellmann and Kallus, 2001).

3.3. Statistical Analyses

The Statistical Package for the Social Sciences (SPSS) version 22.0 was used to do the statistical analysis for this study. Descriptive statistics, including mean, standard deviation, and frequency to describe the participants. Pearson correlation analysis was used to set the direction (positive or negative) and strength of the relationship between TOPS scores and RESTQ-Sport scores. The total scores for each TOPS's subscale were calculated by summing the score of all

items in each subscale respectively. The total scores for each subscale for general and sport recovery stress were obtained by calculating the mean of items' scores in each subscale respectively. The statistical significance was set at $p < 0.05$ and Pearson correlations, r were presented.

4. RESULTS

4.1. Relationship between Psychological Skills and Recovery-Stress States among Athletes

The relationship between psychological skills, which measured by TOPS, and RESTQ-Sport were presented in the following sub-section. The TOPS can be divided into TOPS-practice and TOPS-competition subscales. The RESTQ can be divided into recovery and stress states subscales. All possible relationship between these four variables was examined using correlation analysis.

4.2. Correlation between TOPS-Practice and Stress State Subscales

Correlations between the TOPS-practice and stress states subscales were presented in Table 1. The significant correlation coefficients ranged from $r = -0.25$ to $r = -0.48$. The strongest negative correlations were observed between attention control and general stress among the athletes. The higher the levels of attention control in TOPS-practice, the lower on general stress. The strong negative correlation was also observed between activation and conflict pressure, activation and emotional stress. The higher the levels of activation in TOPS-practice, the lower on the conflict pressure and emotional stress. The total stress of athletes was negatively correlated with self-talk, activation, relaxation, and attention control in TOPS-practices.

Table-1. Correlations between psychological skills use in practice and stress scores

Stress states subscales	TOPS-practice subscales							
	Self-Talk	Emotional Control	Automaticity	Goal-Setting	Imagery	Activation	Relaxation	Attentional control
General Stress	-0.36**	0.01	0.03	-0.38**	-0.06	-0.43**	-0.37**	-0.48**
Emotional Stress	-0.39**	-0.15	0.10	-0.35**	-0.15	-0.45**	-0.19	-0.25*
Social Stress	-0.40**	-0.25*	-0.01	-0.23	-0.06	-0.30*	-0.38**	-0.41**
Conflicts Pressure	-0.43**	-0.21	0.21	-0.32**	-0.05	-0.47**	-0.32**	-0.36**
Fatigue	0.06	-0.07	0.18	0.18	0.10	-0.14	-0.01	0.00
Lack of Energy	-0.26*	-0.17	0.30*	-0.12	-0.09	-0.27*	-0.20	-0.18
Physical Complaints	-0.23	-0.17	-0.01	-0.06	0.09	-0.09	-0.26*	-0.36**
Disturbed Breaks	-0.11	-0.02	0.29*	-0.13	-0.20	-0.18	0.16	-0.06
Emotional Exhaustion	-0.20	-0.09	0.17	-0.23	0.04	-0.31**	-0.10	-0.20
Injury	-0.05	0.02	0.12	0.05	0.12	-0.07	-0.00	-0.04
Total Stress	-0.35**	-0.16	0.20	-0.23	-0.03	-0.40**	-0.31*	-0.34**

Note: ** $P < 0.01$, * $p < 0.05$

4.3. Correlation between TOPS-Competition and Stress State Subscales

Correlations between the TOPS-competition and stress states subscales were presented in Table 2. The significant correlation coefficients ranged from $r = -0.24$ to $r = -0.55$. The strongest negative correlations were shown between self-talk and general stress among athletes. The higher the levels of self-talk in TOPS-competition, the lower on the general stress. Strong

negative correlation was also shown between self-talk and conflict pressure. Similar with general stress, the higher the levels of self-talk in TOPS-competition, the lower was the stress on conflict pressure. The total stress of athletes was negatively correlated with subscales on self-talk, automaticity, goal setting, and relaxation in TOPS-competition.

Table-2. Correlations between psychological skills use in competition and stress scores

Stress states subscales	TOPS-competition subscales							
	Self-Talk	Emotional Control	Automaticity	Goal-Setting	Imagery	Activation	Relaxation	Negative Thinking
General Stress	-0.55**	-0.19	0.12	-0.38	-0.40**	-0.33**	-0.40**	0.39**
Emotional Stress	-0.28*	-0.28*	0.29*	-0.24*	-0.19	-0.23	-0.29*	0.19
Social Stress	-0.39**	-0.20	0.21	-0.36**	-0.37**	-0.23	-0.36**	0.31**
Conflicts Pressure	-0.49**	-0.23	0.36**	0.25*	-0.37**	-0.24*	-0.26*	0.22
Fatigue	0.14	-0.13	0.30*	-0.02	0.16	0.18	-0.04	-0.03
Lack of Energy	-0.28*	-0.11	0.43**	-0.24*	-0.18	-0.14	-0.11	0.10
Physical Complaints	-0.21	-0.07	0.28*	-0.19	-0.11	-0.10	-0.27*	0.10
Disturbed Breaks	-0.17	0.02	0.22	-0.21	-0.02	-0.01	0.05	-0.05
Emotional Exhaustion	-0.33**	-0.27*	0.33**	-0.15	-0.09	-0.17	-0.23	0.26*
Injury	-0.15	-0.08	0.14	-0.08	0.01	0.03	0.01	0.05
Total Stress	-0.39**	-0.23	0.39**	-0.31**	-0.24	-0.17	-0.28*	0.23

Note: ** $P < 0.01$, * $p < 0.05$

4.4. Correlation between TOPS-Practice and Recovery State Subscales

Correlations between the TOPS-practice and recovery state subscales were presented in Table 3. The significant correlation coefficients range from $r = 0.25$ to $r = 0.72$. The strongest positive correlations were observed between goal setting and total recovery among athletes. The higher the levels of goal setting in TOPS-practice, the higher on the total recovery. Strong positive correlations were also observed between goal setting and self-regulation, goal setting and self-efficacy. Besides goal setting, total recovery of athletes was also positively correlated with self-talk, activation, relaxation, and attention control in TOPS-practice.

Table-3. Correlations between psychological skills use in practice and recovery scores

Recovery states subscales	TOPS-practice subscales							
	Self-Talk	Emotional Control	Automaticity	Goal-Setting	Imagery	Activation	Relaxation	Attentional control
Success	0.13	0.09	0.32**	0.25*	0.07	0.20	0.01	0.13
Social Recovery	0.27*	-0.26*	-0.07	0.40**	0.21	0.31**	0.17	0.12
Physical Recovery	0.35**	0.17	0.15	0.45**	0.17	0.41**	0.33**	0.54**
General Well Being	0.34**	-0.17	0.08	0.51**	0.01	0.36**	0.35**	0.31**
Sleep Quality	0.31**	0.20	-0.12	0.44**	-0.05	0.38**	0.20	0.27*
Being in Shape	0.37**	0.11	0.15	0.56**	0.19	0.43**	0.54**	0.34**
Personal Accomplishment	0.17	0.33**	0.03	0.38**	0.11	0.23	0.26*	0.21
Self Efficacy	0.28*	0.04	0.04	0.64**	0.32**	0.45**	0.34**	0.42**
Self Regulation	0.35**	0.09	-0.06	0.66**	0.26*	0.48**	0.52**	0.33**
Total Recovery	0.43**	0.08	0.08	0.72**	0.23	0.55**	0.45**	0.45**

Note: ** $P < 0.01$, * $p < 0.05$

4.5. Correlation between TOPS-Competition and Recovery State Subscales

Table 4 showed the results of correlation between the TOPS-competition and recovery state subscales among athletes. The significant correlation coefficients ranged from $r = 0.24$ to $r =$

0.57. The strongest correlation was shown between goal setting and total recovery among athletes. The positive correlation indicated that the higher the levels of goal setting in TOPS-competition, the higher on the total recovery. Strong significant correlations were also observed between goal setting and self-regulation, goal setting and being in shape. The higher the levels of goal setting in TOPS-competition, the higher on the self-regulation and being in shape. The total recovery was positively correlated with all subscales of TOPS-competition except for negative thinking.

Table-4. Correlations between psychological skills use in competition and recovery scores

Recovery states subscales	TOPS-competition subscales							
	Self-Talk	Emotional Control	Automaticity	Goal-Setting	Imagery	Activation	Relaxation	Negative Thinking
Success	0.12	0.14	0.05	0.16	0.17	0.37**	0.30*	-0.16
Social Recovery	0.23	0.13	-0.17	0.26*	0.38**	0.23	0.00	0.13
Physical Recovery	0.38**	0.11	-0.08	0.39**	0.33**	0.45**	0.40**	-0.16
General Well Being	0.30*	0.16	-0.21	0.36**	0.39**	0.46**	0.33**	-0.02
Sleep Quality	0.26*	0.30*	-0.26*	0.33**	0.11	0.14	0.28*	-0.16
Being in Shape	0.39**	0.30*	-0.19	0.55**	0.43**	0.53**	0.39**	-0.16
Personal Accomplishment	0.15	0.34**	-0.15	0.31**	0.18	0.29*	0.37**	-0.23
Self Efficacy	0.43**	0.22	-0.14	0.48**	0.53**	0.37**	0.37**	-0.25*
Self Regulation	0.49**	0.25*	-0.29*	0.56**	0.32**	0.34**	0.32**	-0.36**
Total Recovery	0.47**	0.32**	-0.24*	0.57**	0.48**	0.53**	0.45**	-0.22

Note: **P<0.01, *p<0.05

5. DISCUSSION

In this present study, significant relationships were found between psychological skills and recovery-stress state in practice and competition. This yielded an important insight for athletes, which indicates that they should continue to improve their psychological skills which can have an influence on their recovery and stress levels during training and competition. During practice and competition, the ability to handle and minimize stress and duration one could recover are also crucial for the success of an athlete. The performance strategies, which are a psychological skill, can be used among athletes to improve the recovery and stress levels during training and competition.

For psychological skills use in practice, results indicated that the use of self-talk, emotional control, automaticity, goal setting, activation, relaxation, and attentional control showed significant association with one or more subcomponents of stress state. For specific relationships between psychological skills use in competition and stress states, results indicated that the use of self-talk, emotional control, automaticity, goal setting, imagery, activation, relaxation, and negative thinking were significantly associated with two or more subscales of the stress states. These collective and specific results have lent to the support of the use of psychological skills is associated with lesser stress state from the athletes. In other words, by increasing their psychological skills, athletes may have lower stress levels during practice and competition.

For psychological skills use in practice, results also indicated that the use of self-talk, emotional control, automaticity, goal setting, imagery, activation, relaxation, and attentional

control showed significant association with one or more subscales of recovery state. For specific relationships between psychological skills use in competition and recovery state, results showed that athletes who reported to have higher use of self-talk, emotional control, automaticity, goal-setting, imagery, activation, relaxation, and negative thinking were significantly associated with two are more subcomponents of recovery state. This finding had lent support for the notion that recovery state is associated with athletes' psychological skills use in both practice and competition setting. Therefore, athletes who have higher psychological skills may also have higher recovery in practice and competition.

In overall, the direction of relationships showed that individuals reporting frequent use of psychological skills also reported lower state of stress and higher rate of recovery in the sport they practiced and competed. Lower state of stress is essential during training and competition. This is because during high levels of anxiety, the main reason for under performance was the anxiety had an impact on concentration (Nideffer, 1976; Jones, 2000). Therefore, maintaining low stress and less anxiety during sport can help an athlete to focus and perform well

This study also yielded interesting findings that use of self-talk was significantly correlated with stress. This finding indicated that participants who uses self-talk are more likely to reduce tension or stress. Previous studies have shown that engaging in physical activity has a healthy impact on relaxation, blood circulation, reduce anxiety, and reduce tension (Husak and Hemenway, 1986; Zaichkowsky and Takenaka, 1993; Anshel, 2003). Goal setting was also negatively correlated with stress. Therefore, goal setting can be a powerful technique by setting realistic, long term and short term goals to reduce the stress level (Weinberg and Gould, 1999; Anshel, 2003; Ampofo-Boateng, 2009). In addition, according to Anshel, in a sport context, athletes who practice achievable goals is reflecting to be more relaxed and therefore their sport skills enhanced more rapidly compared to athletes who set unrealistic goals (Anshel, 2003). Therefore, worry about uncontrollable factors can be reduced by focusing on what can be controlled, and athletes become concentrated on immediate performance demands (Weinberg and Gould, 1999; Anshel, 2003).

It is postulated that athletes that have low stress and high recovery states during sport also recognized that the value of having psychological skills intervention, such as self-talk, emotional control, goal setting, imagery, and relaxation. Zizzi, Deaner, and Hirschhorn had proposed that psychological skills such as self-talk can act as a buffer between thoughts, feelings and behaviors (Zizzi *et al.*, 2003). This is because the individual that applied these psychological skills are capable of replaces negative thoughts with positive ones which also produce a positive change in emotions. Besides, athlete who use psychological skills such as imagery are more likely to reduce their anxieties level leading to improve performance by activating the muscles because imagery is also known as mental rehearsal or mental practice (Harris and Robinson, 1986; Cox *et al.*, 1993; Ampofo-Boateng, 2009).

We suggest that applied sport psychologists and coaches should consider enhancing psychological skills when working with athletes. Athletes should be instructed how to apply these

psychological skills effectively as the skills are associated with desirable state of recovery and stress during sport performance. As psychological skills are correlated with recovery-stress state, we suggest that reducing the stress and recovery level to break an individual's awareness of the need to use self-regulatory psychological strategies. These strategies include constantly rehearsing the psychological skills training programs, such as self-talk, goal setting, and relaxation.

An acknowledged limitation of this study is that the correlation analysis was used which does not determine the causal relationships between psychological skills use and recovery-stress state. Consequently, future researchers should seek to explore the causal relationships between psychological skills and recovery-stress states using more advanced statistical analysis such as structural equation modelling or path analysis. By using more advanced statistical analysis, other variables such as age, experience in sport, physical fitness should be considered in future research to determine its interrelationships with psychological skills, recovery and stress in athletes. In addition, future researchers should also consider the use of longitudinal design to determine whether an intervention designed to enhance psychological skills would lead to increase recovery and reduce stress, or whether an intervention designed to increase recovery and reduce stress would lead to higher use of psychological skills use in sport.

In conclusion, it is found that psychological skills use in competition and in practice was correlated with lower stress and recovery state among the adolescent athletes. Therefore, athletes should continue to enhance their psychological skills in sport and strive to improve their recovery and lower their stress level which may lead to higher performance enhancement in their sports.

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