

## A study of three-stage skills and pre-competition anxiety of Taiwan's college division B male table tennis players

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**Abstract:** the purpose of the study was to understand the technical indication value of the three-staged techniques by investigating its correlation with the pre-event anxiety of college table tennis players in men's division B. A total of 54 male tennis players from four different schools served as subjects of the study. With the registration form and analysis chart of table tennis three-staged techniques, Sport Competition Anxiety Test (SCAT, Lu Chun-Hong's version) and Competition State Anxiety Scale-II (CSAI-2, Huang Ying-Zhe's version) as analyzing tools, data were further verified by adopting three-staged techniques evaluation criteria and Pearson product-moment correlation. Study results could be concluded as followed: (1) By looking at three-staged techniques, Taiwan's college table tennis players in men's division B, both 'Scoring rate in stage of serving attack' and 'Using rate at stalemate' were at the level of 'failed'. Whereas 'Using rate in stage of serving attack', 'Scoring rate in stage of receiving-serve attack', 'Using rate in stage of receiving-serve attack' and 'Scoring rate at stalemate' were above the level of 'pass'. (2) The correlation between three-staged techniques and pre-event anxiety in Taiwan's college table tennis players in men's division B were: (2.1) In trait anxiety and three-staged techniques there were only 'Scoring rate in stage of serving attack' and 'Scoring rate in stage of receiving-serve attack' reaching obvious correlation ( $p < 0.05$ ). (2.2) In table tennis three-staged techniques and pre-event cognitive anxiety, there were only 'Using rate in stage of serving attack' and 'Scoring rate at stalemate' reaching obvious correlation ( $p < 0.05$ ). (2.3) In table tennis three-staged techniques and pre-event somatic anxiety, there was only 'Scoring rate in stage of serving attack' reaching obvious correlation ( $p < 0.05$ ). (2.4) In table tennis three-staged techniques and self-confidence, there were 'Scoring rate in stage of serving attack' and 'Scoring rate at stalemate' reaching obvious correlation ( $p < 0.05$ ).

**Keywords:** table tennis three-staged techniques, table tennis, trait anxiety, pre-event state anxiety.

### 1. INTRODUCTION

The purpose of competitive sports training is to exert human potential to the utmost extent. How to apply the most precious time in the human body growth development properly to sports training to develop sports potential to the extreme was the key point of competitive sports. The fundamental purpose of sports training was to discover the potential abilities of athletes and to enhance

the competitive abilities of athletes to win games.

Wu and Li [1] took the team of Chinese Mainland as the subject investigated, divided 24 skills of table tennis into service-attack stage, receive-attack stage and rally-attack stage skills, recorded the scoring rate and utilization rate of each stage of the athletes, and compared them with empirical mode to find out direction and emphasis of the future training.

The table tennis game is a sort of relative competition, there are variable skills and delicate actions in a match, the players have to respond quickly, and the long duration and the noisy playing condition are likely to cause the players anxiety. The anxiety is divided into two types, one is persistent trait anxiety, it is quite stable anxiety tendency of individuals, the people with higher trait anxiety are more likely to feel strong threat and context stress in a stress context; the other one is temporary state anxiety, it is a short emotional state, the nervous system causes individual unease and stress, to be brief, the state anxiety is transient anxiety varying with the match situations [2].

Taiwan's studies of table tennis players used to take elite players as subjects; they seldom took college division B table tennis players. The results of this study are expected to serve as a reference frame for the coaches or teachers of different levels of schools to train players in the future.

## 2. METHODOLOGY

### 2.1 Subjects

54 players served as subjects, including 12 players of the table tennis team of Qin Min Commercial and Vocational School, 10 players of Ta Hwa Institute of

Technology, 8 players of Yilan Institute of Technology and 24 players of National Formosa University.

### 2.2 Method

Friendly matches were adopted, the players were asked to fill in questionnaires before competition, and the players recorded the three-stage skills of each other in competition. The original data of various statistical tables and scales were analyzed by statistical software SPSS, and the following methods were used according to the research purposes.

2.2.1 The indexes of three-stage skills of players were evaluated by using descriptive statistics.

2.2.2 The correlation between three-stage skills of table tennis and pre-competition anxiety was tested by Pearson's product-moment correlation.

2.2.3 The significance level of all the statistical tests in this study was defined as  $\alpha = 0.5$ .

## 3. RESULTS

### 3.1 Basic statistical description of table tennis three-stage skills and anxiety variables

This study used ten variables of table tennis three-stage skills and anxiety. The average and standard deviation and three-stage skills evaluation index of the variables are shown in Table 1

Table 1 Descriptive statistical summary of table tennis three-stage skills

Variable	Matches	Min.	Max.	Average	Standard deviation	Three-stage index
<u>Table tennis three-stage skills</u>						
Service-attack stage scoring rate	476	0.00	1.0	0.54	0.17	Fail
Service-attack stage utilization rate	477	0.10	0.83	0.36	0.09	Pass
Receive-attack stage scoring rate	476	0.04	1.00	0.46	0.16	Good
Receive-attack stage utilization rate	477	0.09	0.65	0.35	0.09	Pass
Rally-attack stage scoring rate	474	0.00	1.00	0.50	0.16	Pass
Rally-attack stage utilization rate	474	0.01	0.75	0.30	0.14	Fail
<u>Anxiety variable</u>						

Trait anxiety	478	10.00	29.00	20.18	4.14
Cognitive state anxiety	478	5.00	24.00	15.80	4.30
Somatic state anxiety	478	6.00	24.00	12.16	3.75
Self-confidence	478	9.00	36.00	22.12	5.82

These result are in accordance with the findings of Chu [3] taking Taiwan's college national table tennis players as subjects, meaning Taiwan's division A and college division B table tennis players perform badly in "service-attack stage scoring rate" and "rally-attack stage utilization rate" of three-stage skills at present; this should be noticed by the coaches and players at all levels of Taiwan.

According to the aforesaid findings, the "service-attack stage scoring rate" was one of the key factors for defeating the rivals, and the "rally-attack stage utilization rate" was the approach to increase the win rate. However, Taiwan's division B players had no ideal performance in the two table tennis three-stage skills; this result might guide the

coaches and players to

improve and strengthen the training.

### 3.2 Table tennis three-stage skills analysis, correlation analysis of pre-competition anxiety variables

The correlations among the three-stage skills (service-attack stage scoring rate, service-attack stage utilization rate, receive-attack stage scoring rate, receive-attack stage utilization rate, rally-attack stage scoring rate and rally-attack stage utilization rate) and pre-competition anxiety variables (trait anxiety, cognitive state anxiety, somatic state anxiety and self-confidence) of college division B table tennis players was tested by using Pearson's product-moment correlation as shown in Table 2:

Table 2 Matrix of correlations among table tennis three-stage skills and anxiety variables

		Table tennis three-stage skills						Pre-competition anxiety variables			
		Service-attack stage scoring rate	Receive-attack stage scoring rate	Rally-attack stage scoring rate	Service-attack stage utilization rate	Receive-attack stage utilization rate	Rally-attack stage utilization rate	Trait anxiety	Cognitive state anxiety	Somatic state anxiety	Self-confidence
Table tennis three-stage skills	Service-attack stage scoring rate		.33*	.27*	.06	-.13*	.01	-.09*	-.03	-.09*	.16*
	Receive-attack stage scoring rate			.25*	.06	-.13*	.04	-.09*	-.03	-.12	.19*
	Rally-attack stage scoring rate				-.03	-.06	.06	-.08	-.05	-.01	.09*
	Service-attack stage utilization rate					.30*	-.76*	-.03	-.10*	-.08	-.03



The "rally-attack stage" started from the fourth ball for the server, and started from the fifth ball for the receiver. As table tennis involved diversified skills and dedicated actions, the players should react quickly, and the competition situation fluctuates frequently: the players took part in a lot of matches, the instruction of onsite coach, the noise of audience, frequent gains and losses and the influence of indirect and direct factors made the players' emotional experience very complex and the sports performance was significantly influenced by psychological factors. Therefore, this study found that the opinion of players with high self-confidence having higher scoring rate of "rally-attack stage" was acceptable, the findings were supported.

For Taiwan's college division B table tennis players, the lower the "pre-competition cognitive state anxiety" was, the higher was the "service-attack stage utilization rate"; on the contrary, the higher the "pre-competition cognitive state anxiety" was, the lower was the "service-attack stage utilization rate".

Scanlan and Passer [7] took 9-14 years old wrestlers as subjects and the results showed that in the cognitive anxiety reaction, the teenage wrestlers had high trait anxiety because they worried about negative comments and blames of parents and coaches for loss, and the performance was lower as a result. Burton [5] and Krane [8] found that the cognitive anxiety was negatively correlated with sports performance.

The "service-attack stage utilization rate" referred to the score or loss of the server from the service (i.e. the first ball) to the third ball (the server's shot at the second ball hit back by the opponent was the third ball), including service, attack after service and being attacked after service, and including the utilization rate of defensive skills after service. The cognitive anxiety referred to negative ideas on undetermined results, so that the player was distracted to non-competition issues for worrying about loss; it changed only if the result changed, so it was

regarded as considerable influence on the performance. Therefore, the college division B table tennis players with higher "pre-competition cognitive state anxiety" might not venture to use "service-attack stage"; whereas the players with lower "pre-competition cognitive state anxiety" had higher utilization rate of "service-attack stage".

Finally, the results showed that the higher the "pre-competition cognitive state anxiety" was, the higher was the "rally-attack stage utilization rate"; on the contrary, the lower the "pre-competition cognitive state anxiety" was, the lower was the "rally-attack stage utilization rate".

Schwartz et al. [9] indicated that the cognitive anxiety and somatic anxiety had different preconditions and different modes influencing the sports performance. Chu [3] found that in a counterbalanced match, the rally-attack stage was the key to victory or defeat.

The "rally-attack stage" started from the fourth ball for the server, and started from the fifth ball for the receiver. The cognitive anxiety referred to negative ideas on undetermined results, so that the player was distracted to non-competition issues for worrying about loss. There were different levels of skill differences in the technical levels during college division B table tennis matches. Therefore, the victory or defeat was often determined in "service-attack stage" or in "receive-attack stage". Therefore, the emotional experience of the players with high "pre-competition cognitive state anxiety" was very complex due to the fluctuation of the competition situation, the instruction of onsite coach, the noise of audience, the frequent scores and losses, and indirect and direct factors, the sports performance was significantly influenced by psychological factors. Therefore, the "rally-attack stage" was passively adopted against the opponent, and the players with high "pre-competition cognitive state anxiety" had high "rally-attack stage utilization rate" during matches.

#### 4. CONCLUSION AND SUGGESTIONS

This study focused on the correlation between the three-stage skills and pre-competition anxiety of Taiwan's college division B table tennis players.

4.1 The subjects of this study were table tennis players from universities of science and technology, colleges and institutes of technology. Whether the different research backgrounds influences the research results shall be further discussed.

4.2 The table tennis three-stage skills evaluation method is applicable to college division B table tennis players. It is proved able to effectively evaluate the performance of table tennis players at different levels in three-stage skills, and it may be used by coaches at different levels as reference frame for the future training.

4.3 The coaches or teachers may often use SCAT scale and CSAI-2 scale designed for athletes, and use the measurement results of scales as reference frame of training or competition.

4.4 The future studies can use table tennis players at different levels to observe whether there are differences in their three-stage skills and anxiety or not.

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