

### TAEKWONDO COACH–ATHLETE INTERACTION AND PERCEIVED PERFORMANCE: A COMPARISON BETWEEN TWO TAEKWONDO STYLES, *GYEORUGI* AND *POOMSAE*

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#### Abstract

##### Background and Objective

This study aims to provide fundamental knowledge on approaches to enhance the performance of Taekwondo players by validating how the coach–athlete interaction affects perceived performance, and how its effect varies between *gyeorugi* (sparring) and *poomsae*.

##### Materials and Methods

A survey was conducted on 394 Taekwondo players from universities located in Seoul, Gyeonggi, Incheon, and Chungnam, all of which are official members of the Korea Taekwondo Association as of 2016. Participants were selected through purposive sampling, a type of non-probability sampling. Subsequently, 382 of 394 respondents, excluding 12 respondents who did not return the questionnaires, were selected for data collection (*gyeorugi*:  $n = 180$  and *poomsae*:  $n = 202$ ; 230 [60.2%] men and 152 [39.8%] women).

##### Results

Coach–athlete interaction had a statistically positive influence on perceived performance of University Taekwondo players ( $p < 0.05$ ). Furthermore, coach–athlete interaction showed a greater impact on perceived performance in a group of *gyeorugi* players than in their *poomsae* counterparts (19.6% vs. 6.5%). The result of pairwise parameter comparison exceeded the critical value ( $\pm 1.96$ :  $\alpha = 0.05$ ;  $\pm 2.58$ :  $\alpha = 0.01$ ), suggesting that the effect of coach–athlete interaction was statistically significant at a 99% confidence level.

## Conclusion

These results indicated that in Taekwondo training, coach–athlete interactions including instruction on technique, faith, encouragement, and passing on know-how were more effective in enhancing the performance of *gyeorugi* players than *poomsae* players.

**Keywords:** *Taekwondo, Gyeorugi, Poomsae, Coach–athlete interaction, Perceived performance*

All coaches and players in the field put strenuous effort to achieve satisfactory outcomes. Organized training programs for coaches as well as repeated practice of players are essential for players to achieve their full potential, but a positive coach–athlete interaction is one of the most important factors. Despite excellent innate talent, a player would not achieve outstanding performance in big competitions such as the Olympics without adequate coaching. Thus, in training and competition, coach–athlete interaction and athletic performance are closely related.<sup>1</sup>

Interaction during sports requires the concerted effort by coaches and players to fulfill a common goal with reciprocal effects on each other's emotions, beliefs, and behaviours.<sup>2–4</sup> A previous study suggested that coaches play a positive role in helping players to achieve their full potential,<sup>5</sup> whereas greater distance between the 2 parties can lead to poorer athletic performance.<sup>6,7</sup> Therefore, coach–athlete interaction requires scientific validation to offer fundamental knowledge on improving athletic performance.

Taekwondo is a global martial art, and *gyeorugi* has been selected as an official sport for 5 consecutive Olympics, thereby establishing it as a worldwide sport. In addition, The World Taekwondo Federation and The Asian Taekwondo Union have recently played a leading role in adding *gyeorugi* to official Olympic sports of the Universiade, world tournaments, and Asian Games, strengthening the status of *gyeorugi* as a global sport.

Unlike the past, when Korean athletes won many world championships, player's performance has levelled off worldwide, facilitated by a range of disciplinary approaches on enhancing performance. However, current research on Taekwondo players is mostly based on sports physiology and sports mechanics, focusing on enhancing techniques and fitness level through training.<sup>8–13</sup> Research on psychological variables such as coach–athlete interaction is lacking.

Therefore, research on validation of the impact of coach–athlete interaction on perceived performance is required. The 2 Taekwondo styles have distinguishing features, i.e., in *gyeorugi*, coaches can give players feedback on the spot about how to proceed, whereas in *poomsae*, players cannot receive feedback at the moment it is required. Therefore, the impact of coach–athlete interaction on perceived performance possibly varies between *gyeorugi* and *poomsae*. This study aimed to verify how the coach–athlete interaction affects the player's perceived performance, in *gyeorugi* and *poomsae*, in order to provide fundamental knowledge on enhancing performance.

## METHODS

### Study Subjects

A survey was conducted on 394 Taekwondo players of universities located in Seoul, Gyeonggi, Incheon, and Chungnam, all of which are official members of the Korea Taekwondo Association (KTA) as of 2016. Participants were selected through purposive sampling, a type of non-probability sampling. Subsequently, 382 of 394 respondents, excluding 12 respondents who did not return the questionnaires, were selected for data collection (*gyeorugi*:  $n = 180$  and *poomsae*:  $n = 202$ ; 230 [60.2%] men and 152 [39.8%] women).

### Research Procedure

Prior to conducting the study, researchers obtained approval from the University Research Ethics Committee and proceeded to contact University Taekwondo instructors over the phone, to explain the purpose and meaning of the research and obtain consent for data collection. A research and 2 assistant researchers then visited the designated place at the appointed time to collect data. In the training field, researchers explained the purpose and meaning of the research to Taekwondo players and obtained their signatures on the research agreement form. The survey was carried

out by a self-administrated method and the questionnaires were collected upon completion on the spot.

## SURVEY TOOL

### *Coach–Athlete Interaction*

Researchers conducted the survey using the questionnaire tailored to the context of Korea by Kim and Chung in 2011,<sup>14</sup> which was developed based on the CART-Q developed by Jowett & Ntmoumanis in 2004.<sup>3</sup> This questionnaire consists of 5 sub-factors including conversation, technique instruction, faith, encouragement, know-how, and 24 questions with 5-point Likert scale answers (1 = strongly disagree, 5 = strongly agree).

In confirmatory analysis, all goodness-of-fit (GOF) indices met the standard [GOF:  $\chi^2 = 402.357$ , degree of freedom (df) = 160,  $p < 0.001$ , Tucker–Lewis index (TLI) = 0.923, root mean square error of approximation (RMSEA) = 0.063, root mean square residual (RMR) = 0.036]. Factor loading scores for each question ranged from 0.649 to 0.808. Construct reliability scores for sub-factors (conversation = 0.836, technique instruction = 0.848, faith = 0.845, encouragement = 0.883, know-how = 0.856) and average variance extracted (AVE) scores (conversation = 0.561, technique instruction = 0.548, faith = 0.636, encouragement = 0.654, and know-how = 0.600) were assessed as relatively fit. Cronbach’s alpha scores (conversation = 0.785, technique instruction = 0.811, faith = 0.838, know-how = 0.809) indicated that the items had relatively good consistency.

### *Perceived Performance*

Perceived performance was analyzed using the questionnaire developed by Mamassis & Doganis.<sup>15</sup> The questionnaire consists of a single factor, evaluated by 6 questions with a 5-point scale (1 = strongly disagree, 5 = strongly agree).

In confirmatory analysis, RMSEA score was rated as relatively poor but most of the indices were considered as good (GOF: = 12.553, df = 2,  $p < 0.001$ , TLI = 0.946, CFI = 0.982, RMSEA = 0.118, RMR = 0.031). Moreover, factor loading ranged from 0.620 to 0.888. Construct reliability scores for sub-factors (0.834), AVE score (0.561), and Cronbach’s score

(0.824) were relatively fit. Q5 and Q6 were deleted since their factor loading was below 0.3.

### *Validity and Reliability Analysis of Survey Tools*

SPSS and AMOS version 21.0 (IBM Corp., Armonk, NY, USA), and Window Excel version 2010 programs were employed to analyze collected data. In addition, frequency analysis, confirmatory factor analysis, Cronbach’s alpha, construct reliability analysis, AVE calculation, correlation analysis, structural equation modelling (SEM) analysis, measurement invariance validation, multi-group structural modelling, and pairwise parameter comparison analysis were performed.

## RESULTS

### *Results of Descriptive Statistics and Correlation Analysis for Sub-factors*

Table 1 shows the results of descriptive statistics and correlation analysis conducted prior to structural equation analysis. All sub-factors met the standard scores for mean, standard deviation, skewness, and kurtosis. In correlation analysis,  $r$  ranged from 0.220 to 0.712, suggesting a significant positive correlation among all factors.

### THE EFFECT OF COACH-ATHLETE INTERACTION ON PERCEIVED PERFORMANCE

Structural equation model analysis was performed to validate the effect of coach–athlete interaction on perceived performance. As shown in Table 2, GOF for all factors was comparatively good [GOF:  $\chi^2 = 68.575$  (df = 26),  $p < 0.001$ ,  $Q(\chi^2/df) = 2.638$ , CFI = 0.972, TLI = 0.962, RMSEA = 0.066, RMR = 0.034]. In addition, coach–athlete interactions perceived by Taekwondo players showed significant positive impact on the perceived performance ( $\beta = 0.332$ ,  $R^2 = 0.110$ ,  $t = 5.461$ ,  $p < 0.001$ ).

### COMPARISON BETWEEN TWO TAEKWONDO STYLES, GYEORUGI AND POOMSAE

#### *Measurement Invariance*

Measurement invariance validation, for validating multi-group structural equation modelling, was

**TABLE 1** Result of Descriptive Statistics and Correlation Analysis

	Mean	Standard deviation	Skewness	Kurtosis	a	b	c	d	e	f
a	3.300	0.655	-0.328	0.360	1.000					
b	3.530	0.685	-0.405	0.406	0.553**	1.000				
c	3.620	0.694	-0.118	-0.127	0.560**	0.634**	1.000			
d	3.520	0.743	-0.097	0.259	0.510**	0.608**	0.712**	1.000		
e	3.530	0.683	-0.094	0.001	0.497**	0.577**	0.586**	0.543**	1.000	
f	2.930	0.781	-0.312	-0.534	0.279**	0.232**	0.220**	0.296**	0.276**	1.000

\*\* $p < 0.01$

a = conversation; b = technique instruction; c = faith; d = encouragement; e = know-how; f = performance.

**TABLE 2** The Effect of Coach–Athlete Interaction on Perceived Performance

	Path	Path coefficient	R <sup>2</sup>	Standard error	t
Interaction	→ Performance	0.332	0.110	0.093	5.461***

Goodness-of-fit test:  $X^2 = 68.575$  ( $df = 26$ ),  $p < 0.001$ ,  $Q (X^2/df) = 2.638$ , CFI = 0.972, TLI = 0.962, RMSEA = 0.066, RMR = 0.034

\*\*\* $p < 0.001$

performed before comparing the effect of coach–athlete interaction between *gyeorugi* and *poomsae*. Measurement invariance validation was performed as follows. First, configuration invariance was measured to validate whether the confirmatory factor model and path were identical across coach–athlete interactions for *gyeorugi* and *poomsae*, and perceived performance. Second, factor loading invariance was measured to validate whether factor coefficients were identical across the observed variables.

In configuration invariance validation, GOF indices for *gyeorugi* and *poomsae* were rated as relatively good in both coach–athlete interaction ( $X^2 = 621.938$ ,  $df = 320$ ,  $p < 0.001$ , TLI = 0.908, CFI = 0.923, RMSEA = 0.049) and perceived performance ( $X^2 = 12.437$ ,  $df = 4$ ,  $p = 0.014$ , TLI = 0.956, CFI = 0.985, RMSEA = 0.75). Factor loading scores for

validating coach–athlete interaction for *gyeorugi* and *poomsae* were 0.543–0.802 and 0.622–0.859, respectively. Factor loading scores for validating perceived performance were 0.669–0.889 and 0.563–0.881, indicating that configuration invariance was identical between the 2 groups.

After validating configuration invariance, factor loading invariance was examined. Factor loading analysis was based on configuration invariance model as the baseline-model; subsequently, the constrained model was analyzed using validation, since the model was latent in baseline-model. The scores of unconstrained model (coach–athlete interaction:  $X^2 = 621.938$ ,  $df = 320$ , TLI = 0.908, CFI = 0.923, RMSEA = 0.075) and scores of constrained model (coach–athlete interaction:  $X^2 = 629.949$ ,  $df = -335$ , TLI = 0.982, CFI = 0.990, RMSEA = 0.048) showed

no significant between group difference [ $\alpha = 0.5$ ,  $df = 15$ , critical value = 25.00;  $df = 3$ , critical value = 5.99; coach–athlete interaction: = 8.011,  $p > 0.05$ ; perceived performance = 0.579,  $p > 0.05$ ].

**COMPARISON OF THE EFFECT OF COACH-ATHLETE INTERACTION ON PERCEIVED PERFORMANCE**

Coach–athlete interaction contributed to perceived performance of *gyeorugi* players by 19.6% and of *poomsae* players by 6.5%. Thus, coach–athlete interaction had a significant positive impact on perceived performance in the 2 groups. The result of pairwise parameter comparison was 2.774, exceeding the critical value ( $\pm 1.96$ :  $\alpha = 0.05$ ;  $\pm 2.58$ :  $\alpha = 0.01$ ), as shown in Table 3. The result showed that the path from coach–athlete interaction to perceived performance was statistically significant at a 99% confidence level.

**DISCUSSION**

The results of data analysis indicated that coach–athlete interaction had a positive impact on perceived performance, and that the effect varied between the Taekwondo styles, *gyeorugi* and *poomsae*.

First, Taekwondo players’ perception of coach–athlete interaction had a positive influence on perceived influence. This result was consistent with previous reports that suggested a strong correlation between positive coach–athlete interaction and performance.<sup>1,16</sup> It also suggested that positive aspects of coach–athlete interaction, including technique instruction, faith, encouragement, and passing on know-how, are very effective to enhance performance. Based on the reported reciprocal effect of emotions and behaviour of coaches and athletes,<sup>17,18</sup> coaches should avoid autocratic styles and seek to build a favourable relationship with players.

Second, the effect of coach–athlete interaction on perceived athletic performance varied depending on 2 Taekwondo styles, with a bigger effect in a group of *gyeorugi* players than in a group of *poomsae* players. A comparative analysis of the 2 different Taekwondo styles is currently lacking, making direct detailed comparison difficult; however, the different effect between each group of players is attributed to the features of each style.

For example, in the case of *gyeorugi*, competition consists of 3 rounds with each round lasting for 2 minutes. During recess time, coaches can give players on the spot direct feedback about tactics or strategies. In contrast, in *poomsae* competition, players demonstrate form assigned to them in right order; in addition, while coaches are allowed around players in competition, they cannot give feedback at the moment it is required. Likewise, different rules are applicable to *gyeorugi* and *poomsae* competition. Coach–athlete interaction had greater impact on perceived performance of *gyeorugi* players than their *poomsae* counterparts due to the distinguishing features of the 2 styles.

Therefore, Taekwondo coaches require style-based approaches; for example, *Gyeorugi* coaches should establish tactics or strategies tailored to the characteristics of each player to cope with various challenges and seek to build positive relationship with players through effective communication, and *poomsae* coaches should offer appropriate feedback and simulated environment, leading to mastery of form to the extent of acquired muscle memory.

Previous studies have focused on enhancing fitness level through Taekwondo training and progress in technique based on sports physiology or mechanics. However, this study has significant meaning in that

**TABLE 3** The Result of Validation for Coach–Athlete Interaction to Perceived Performance

Path	<i>Gyeorugi</i>	<i>Poomsae</i>	Pairwise parameter comparison <sup>z</sup>
	$\beta$	$\beta$	
Interaction → Performance	0.442***	0.254**	2.774**

\*\*\* $p < 0.001$ , \*\* $p < 0.01$

Comparison critical value  $\pm 1.96$  ( $\alpha = 0.05$ ),  $\pm 2.58$  ( $\alpha = 0.01$ )

it validated the effect of coach–athlete interaction on perceived athletic performance and analyzed the correlation of the 2 factors, in order to provide fundamental knowledge on enhancing performance. The limitations of the study were selection of players from Korea, the origin of Taekwondo, and not players from other countries; in addition, the study focused solely on coach–athlete interaction and perceived performance among a range of psychological factors.

Follow-up study with reinforced research on players of all ages and a range of variables is required. Importantly, subsequent comparative study on players with different levels of performance, on different features of Korean players and players from other countries would provide further knowledge for enhancing performance.

### CONCLUSION

In conclusion, coach–athlete interaction had a positive impact on perceived performance. In addition, coach-athlete interaction had a greater impact on perceived performance of *gyeorugi* players than of *poomsae* players. These findings suggested that a positive coach–athlete interaction, including instruction on technique, faith, encouragement, and passing on know-how, enhanced perceived performance of Taekwondo players, with greater effect in *gyeorugi* players than in *poomsae* players.

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