

The Effects of Perceived Coaching Ability and Coach-athlete Interaction on Sport Performance in Adolescent Martial Arts Sparring Athletes

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Abstract: To explore the effects of coaching ability and coach-athlete interaction on the athletic performance of youth Wushu sparring athletes, this paper selected 200 youth kickboxing players from Tianjin, China as the research subjects and randomly divided them into the experimental group and the control group. The experimental group adopted the integrated training method of coaching ability improvement and interactive communication, while the control group adopted the traditional training method. The research methods included a questionnaire survey, experimental observation, and data analysis, and the training effects were compared by evaluating the athletic performance and perceived coaching ability of the athletes in the two groups before and after training. The results showed that the athletic performance of the athletes in the experimental group was significantly improved, while that of the control group was only slightly improved. In addition, the perceived coaching ability of the athletes in the experimental group was significantly improved, and the quality of coach-athlete interaction was significantly enhanced ($P < 0.05$). The conclusion shows that the improvement of coaching ability and good coach-athlete interaction can significantly improve athletes' sports performance, which has a wide application prospect.

Keywords: Martial arts sparring; Coaching ability; Coach-athlete interaction; Sport performance

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1. Introduction

In recent years, with the rapid development of youth sports in China, the sport of Wushu, as a sport that combines traditional martial arts and modern competitive spirit, has gradually been favored by the majority of young people. However, in the training and competition of Wushu kickboxing, the ability of coaches and the quality of their interactions with athletes are regarded as important factors affecting sports performance. According to the statistics of the State General Administration of Sport, as of 2023, the number of youth

Wushu kickboxing athletes in the country has continued to increase, and the scale and level of youth Wushu tournaments have also continued to rise. However, how to effectively improve athletes' competitive level, especially by optimizing coaching ability and coach-athlete interaction, remains one of the key topics in current research on youth sports training. A large number of studies have shown that coaches not only play an important role in technical instruction but also their psychological counseling and emotional communication with athletes should not be neglected in the improvement of sports performance. Therefore, research on the influence of coaching ability and coach-athlete interaction on sports performance is not only of great significance to improve the scientific and systematic nature of youth Wushu training but also provides a theoretical basis and practical guidance for the overall development of youth athletes ^[1].

2. Research object and methodology

2.1. Objects of study

The subjects of this study were youth kickboxing players in Tianjin, China, who were randomly divided into an experimental group and a control group, with 100 participants in each group. All participants had at least 2 years of training experience in sparring and had participated in at least 5 provincial or municipal competitions in the last three years. The experimental group contained 100 athletes, including 82 males and 18 females, with athletes aged 16–20 years old, with a mean age of 17.35 ± 1.13 years. The years of training in sparring were 2–4 years, and the average training period was 2.08 ± 0.28 years. Among the athletes in this group, 36 were qualified for provincial competitions and 64 were qualified for municipal competitions. The control group also contained 100 athletes, 85 males and 15 females, with athletes aged 16–20 years, with an average age of 17.26 ± 1.20 years. The number of years of training in sparring was 2–5 years, with an average of 2.19 ± 0.19 years of training. Overall, the experimental and control groups were consistent in terms of gender, age, years of training, and competition experience ($P > 0.05$), and were comparable.

2.2. Research methodology

The control group adopts the traditional sparring training method, mainly through conventional technical instruction, confrontation training, and game video analysis. During the training, the athletes practiced the technical movements according to the instructions of the coach, who corrected and guided them, and the athletes also exchanged their experiences through competition sparring, but there was a lack of a systematic interactive feedback mechanism.

The experimental group adopted the training method combining coaching ability enhancement and coach-athlete interaction. Firstly, the coaches were given systematic ability enhancement training, focusing on technical guidance, psychological counseling, communication skills, and so on. The coaches were able to interact with the athletes more efficiently while teaching techniques. During the training process, the coaches participated in leadership courses, simulated communication training, and psychological counseling skills to learn how to give timely psychological support and emotional encouragement to the athletes under high-pressure environments. In the actual training, the coach adopted a one-to-one coaching approach, explaining and demonstrating each athlete's technical movements in detail, and gradually breaking down the movements to help the athletes master the correct technical essentials. A real-time feedback system was introduced into the training process, where the coach used portable equipment to capture every detail of the athlete's movements,

the system would automatically generate movement data, and the coach would provide instant feedback based on the data analysis, pointing out the athlete's deficiencies and making suggestions for improvement. In addition, the interaction between the coach and the athletes is not only limited to technical guidance but also after each round of training, the coach will have one-on-one psychological communication with the athletes to understand their feelings and pressure during the training, helping the athletes to maintain a positive state psychologically and enhance their self-confidence. The coach also adopts a collective feedback mechanism, organizing a group discussion after the collective training, in which the athletes can share their training experience and insights, while the coach summarizes the performance of each athlete and puts forward targeted improvement suggestions. To enhance the interaction between the coach and the athletes, the coach will also regularly use the form of video replay to analyze their performance in training with the athletes, replaying each key action frame by frame to help the athletes visualize their problems and gradually analyze the strengths and weaknesses of the action through the pause, slow playback, and other functions ^[2].

3. Results

3.1. Analysis of athletic performance in the two groups

As shown in **Table 1**, before the experiment, the athletic performance scores of the two groups were the basically same, with no significant difference ($P > 0.05$); after the experiment, the athletic performance scores of the experimental group were significantly higher than those of the control group ($P < 0.05$), and the difference between the groups was statistically significant.

Table 1. Statistical table of athletic performance of the two groups (min, mean \pm SD)

Groups	Number of examples	Pre-training	Post-training
Experimental group	100	82.18 \pm 3.32	97.11 \pm 2.15
Control subjects	100	82.26 \pm 3.19	93.04 \pm 316
<i>t</i>		1.008	7.183
<i>P</i>		0.083	0.000

3.2. Analysis of perceived coaching competence in the two groups

As shown in **Table 2**, before the experiment, the perceived coaching ability scores of the two groups were basically the same, with no significant difference ($P > 0.05$); after the experiment, the perceived coaching ability scores of the experimental group were significantly higher than those of the control group ($P < 0.05$), and the difference between the groups was statistically significant.

Table 2. Statistical table of perceived coaching competence of the two groups (points, mean \pm SD)

Groups	Number of examples	Pre-training	Post-training
Experimental group	100	85.57 \pm 2.75	94.25 \pm 1.78
Control subjects	100	85.60 \pm 2.44	91.38 \pm 2.26
<i>t</i>		1.243	7.982
<i>P</i>		0.084	0.001

3.3. Analysis of the quality of coach-athlete interactions in the two groups

As shown in **Table 3**, before the experiment, the coach-athlete interaction quality scores of the two groups were basically the same, with no significant difference ($P > 0.05$); after the experiment, the interaction quality scores of the experimental group were significantly higher than those of the control group ($P < 0.05$), and the difference between the groups was statistically significant.

Table 3. Statistical table of the quality of coach-athlete interactions in the two groups (points, mean \pm SD)

Groups	Number of examples	Pre-training	Post-training
Experimental group	100	84.33 \pm 4.55	95.56 \pm 2.90
Control subjects	100	84.41 \pm 4.19	90.42 \pm 2.98
<i>t</i>		0.992	8.965
<i>P</i>		0.086	0.000

4. Conclusion

In this study, the sports performance of the experimental group was significantly higher than that of the control group, a result that suggests that the enhancement of coaching ability and good coach-athlete interaction have a positive contribution to the sports performance of youth Wushu athletes. Compared with the traditional training method, the coach not only enhances the effectiveness of technical instruction through systematic ability improvement, but also utilizes one-on-one communication and collective feedback mechanisms to more comprehensively understand the athletes' psychological state, physical condition, and training needs. This comprehensive training method breaks the one-way directive communication mode between traditional coaches and athletes, enabling athletes to not only improve on the technical level but also receive timely support and regulation on the psychological level. The results of this study support the theory of situational interaction, which has been widely used in the field of competitive sports, that good coach-athlete interaction can enhance the self-efficacy of athletes, and thus improve their sports performance^[3].

The enhancement of coaching ability is not only limited to technical instruction but also covers multi-dimensional abilities such as psychological counseling, communication skills, and emotional support. With the introduction of leadership programs, psychological counseling skills, and situational simulation in training, coaches can respond more flexibly and accurately to the pressures and challenges encountered by athletes during training and competition. This result is consistent with the theoretical framework of the Multidimensional Coaching Competency Model, which states that coaching competency not only affects athletes' technical development but also influences athletes' psychological state and self-confidence level through communication and interaction. Especially in Wushu, a highly confrontational sport, athletes' emotional fluctuations, and psychological pressure often affect their on-field performance in competitions. Adopting systematic psychological counseling and emotional support strategies can help athletes better regulate their psychological state, enhance their resilience in high-pressure environments, and ultimately contribute to the improvement of sports performance. The improvement of the quality of coach-athlete interaction in this study is also one of the important factors for the significant improvement of the performance of the experimental group. Based on the real-time feedback system and the collective discussion mechanism, the coach carried out a comprehensive

interaction with the athletes, and found and corrected the deficiencies of the athletes in the technical movements promptly, which greatly enhanced the athletes' depth of understanding of the training content, and enabled them to be more actively involved in the training process, which in turn increased the training effect.

In summary, the enhancement of coaching ability and coach-athlete interaction provides a new scientific training model for youth Wushu kick-boxing training, which effectively improves athletes' sports performance, and also promotes athletes' physical and mental health and all-around development by utilizing systematic psychological guidance and interaction mechanism.

Disclosure statement

The authors declare no conflict of interest.

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