

Study on the Effect of Mental Image Training on Precision Throwing Ability of Small Metal Ground Throw

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Abstract: The core of small metal ground throw is the accuracy of throw. The performance of athletes not only depends on the physical skills and physical quality, but also the depth of psychological state. The traditional training of ball throwing focuses on repetitive practice, neglects the function of psychological regulation on movement stability and throwing accuracy. Mental imagery training is an important intervention method in sports psychology. It can optimize motor cognition and neurocontrol under the condition of no limb movement. Based on the study of the precision throwing ability of small metal ground throwing, this paper analyzes the operation mechanism of mental image training and the adaptability of the items, probes into the internal mechanism of improving the throwing level, designs specialized and stratified training programs and puts forward scientific implementation strategies. The purpose of the study is to improve the scientific training system of ground throw, and to provide theoretical and practical reference for improving athletes' accurate throwing ability.

Keywords: Mental image training; Small metal ball throwing; Precision throwing; Motor skills

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1. Introduction

At present, the training system of small metal ground throwing in China is more traditional, and the training focus is on the sharpening of limbs and physical ability. Psychological problems such as attention laxity, on-the-spot anxiety, rigid movement and lack of self-confidence are easy to occur in the long-term training and competition. Mental image training can make up for the defect of pure physical training, optimize motor nerve memory and adjust the mental state of the competition field.

2. Mental image training and characteristics of small metal field throwing

2.1. Connotation and operating mechanism of mental image training

Mental image training, also known as sports image training, is a commonly used mental strengthening training method in

sports. The training requires athletes to rely on their own motion memory and sensory perception in a quiet and relaxed state, complete reproduction of the standardized technical movement process in the brain, to build a clear, coherent, and real sports picture, and to optimize their own sports skills through repeated imagination. Different from traditional limb training, this training does not need large-scale limb movement, and mainly utilizes multiple sensory systems, such as human vision, tactile sense, and proprioception.

There is a high degree of linkage between human limb movement and neurological activities in the brain. When athletes imagine mental images, the activated areas of the motor cortex of the brain are basically consistent with the field training. Continuous systematic image training can refine the athletes' ability to perceive technical details, eliminate superfluous exercise habits and correct irregular movement patterns.

2.2. Elements of precision throwing ability in small metal ground throw

The precision throwing ability of small metal ground throw is a compound competitive ability system, not a single limb movement ability, which is composed of explicit technical ability, body control ability and field judgment ability. Explicit technical ability includes the core contents of ball holding posture, range of arm swing, sequence of exertion, shot strength and shot timing, etc. Body control refers to the balance of posture, stability of the trunk, and the ability of breathing regulation, which can avoid the deviation of the landing point caused by body swaying.

The ability of psychological control is the core factor of precision throwing ability, which is easy to be ignored. It is also the key index to distinguish common athletes from high-level athletes. On the premise of the maturity of technical movements, the psychological state of athletes directly determines the completion quality of throwing movements. Anxiety, distraction, lack of self-confidence, negative psychological hints and other problems in the process of training and competition will disrupt the established rhythm of exertion, lead to movement deformation and prediction errors^[1].

2.3. Psychological factors in accurate throwing

The degree of concentration is the core psychological factor that affects the precision of small metal ball throwing, and directly determines the completion quality of throwing action. The small metal ground throw movement flow is short, the error tolerance rate is extremely low, from the position preparation, holding the strength to the release throw, the entire process needs the athlete to maintain high concentration, avoid outside factor influence, such as field noise, audience disturbance, and score pressure. In the long period of intensive training, the athletes are prone to mental fatigue, attention lag, disordered thoughts, and so on. They can't accurately control the details of firing force and the position of the landing point, and then make frequent mistakes, greatly reducing the accuracy of throwing and the training effect.

The dynamic fluctuation of emotional state is an important factor restricting the stability of throwing. Active and stable emotions can guarantee smooth movement, while negative anxiety will seriously interfere with physical exertion. Athletes tend to develop negative emotions such as irritability and self-abasement and form negative psychological hints. In the key stage of athletics competition, the athlete is easily prone to a state of tension and anxiety because of the pressure of winning or losing. Overlapping of negative psychological states will completely disrupt the standardized throwing action, lead to deviation from the intended path, uncontrolled exertion, and seriously affect athletic performance.

3. Mechanism of mental image training for optimizing throwing ability

3.1. Strengthening the gesture and muscle memory in throwing

The formation of muscle memory relies on long-term repetition of action and nerve reinforcement. Traditional field training accumulates action experience through repeated movement of limbs. In the standardized image training, the athletes will repeat the complete throwing process of small metal field throwing in the brain, and perceive the detailed changes of position, holding the ball, swinging the arm, exerting force, and releasing the hand. Through continuous picture reproduction and motion simulation, the refinement of movement image and the solidification of the standard movement

model enable fuzzy motion perception to become accurate, stable muscle memory.

Long-term mental image training can stimulate the motor nervous system continuously, consolidate the standardized action program stored in the brain, and improve the speed and accuracy of movement retrieval. Athletes in the throwing process can quickly adjust their brains to the fixed standard action mode, reduce thinking pauses, and avoid habitual wrong actions. At the same time, imagery training can help athletes identify their own technical weaknesses, complete action correction ahead of time at the level of thinking, and effectively avoid long-term curing of wrong movements ^[2].

3.2. Improving the level of concentration in the throwing process

The process of mental image training is a systematic process of attentiveness training, which can effectively improve the ability of attention control of athletes. Image training requires athletes to isolate themselves from all external interference, abandon distractions, devote themselves to the construction of throwing action and sensory perception, and follow the technical process in an orderly manner. Long-term systematic training can effectively prolong the duration of concentration, improve the stability of concentration, and improve the problem of attention deficit in training and competition. Match small metal to throw the ball short, accurate throwing characteristics, to help athletes in the very short throwing cycle, to maintain a high degree of concentration, accurate technical action.

Mental image training can help athletes establish a scientific pattern of attention distribution and solve the problem of attention confusion and loss in throwing. Beginners often have the problem of unbalanced distribution of attention, excessive attention to hand exertion, neglect of body balance and respiratory coordination, resulting in inadequate coordination. Through layered image practice, athletes can be guided to distinguish the core focus of each phase of throwing, focus on body balance in the standing phase, control swing rhythm in the accumulating phase and accurately control the release phase. Scientific attention distribution can optimize the execution efficiency and improve the accuracy of throwing.

3.3. Relieving the throwing pressure and stabilizing the emotional state

Emotional disorder and excessive psychological pressure are the main causes of throwing errors, and psychological image training has a good emotional regulation and stress relief function. The standardized imagery training takes the relaxation of body and mind as the precondition, and guides athletes to relieve the whole body muscles and nerves through abdominal breathing and progressive muscle relaxation. Long-term relaxation imagery training can improve the athletes' emotional self-regulation ability, help them get rid of tension and irritability, and maintain a stable physical and mental state.

Situational mental image training can effectively improve athletes' field adaptability and reduce on-the-spot stress response. Simulation of the atmosphere in training, the decisive scene, and a high-pressure confrontation environment enables athletes to adapt to the pressure and rhythm of the game ahead of time, reducing the tension brought about by a strange field. At the same time, by repeatedly simulating the successful throwing screen, it can strengthen the athletes' self-confidence, eliminate fear of difficulties and negative prediction.

4. Design of psychological image training program for small metal ground throwing

4.1. Content setting of relaxation guidance at the early stage of training

Physical and mental relaxation is an important prerequisite to ensure the quality of mental image training. If athletes are tight in body and mind, it will be difficult to build a clear and complete movement image, directly reducing the training effectiveness. Before the formal image training, we should choose quiet, soft light, with less interference, to create a stable environment for psychological training. Athletes adopt a relaxed sitting posture, eyes closed, with uniform abdominal breathing to adjust the state of body and mind. Coaches slow the pace of progressive relaxation guidance, from the head, shoulders, and arms, gradually transitioning to the trunk and limbs, layer by layer, to ease muscle tension, calm impetuous mood, and help athletes quickly enter a focused, relaxed training state.

Relaxation guidance can be divided into two modes: general relaxation mode and specific relaxation mode. General relaxation is for routine training, focusing on body and mind relaxation, effectively digesting physical and mental fatigue accumulated in daily technical training. Special relaxation shall be carried out in combination with the characteristics of small metal ground throwing events, and targeted relaxation shall be carried out mainly for the main parts of strength such as the shoulder and neck, arms and wrists, so as to relieve the muscle stiffness and swelling brought about by special training^[3]. Pre-race training can extend the relaxation time, focus on emotional counseling and mental adjustment, relieve tension and anxiety, and lay a good physical and mental foundation for high-quality training.

4.2. Training flow of the whole process of throwing imagery

After the physical and mental relaxation, the athlete's mood is stable, the attention is concentrated, and they may formally enter the small mental imagery training link to throw the ball and complete the entire process. The whole training strictly follows the scientific training principle of step-by-step disassembly and step-by-step progress. Athletes need to reconstruct the scene in their mind. First, they should imagine the position of their feet landing smoothly, standing steadily and sinking the center of gravity. Then slowly simulate Fu Shen holding the ball movement, reasonably control the hand grip and ball loosening strength, keep the shoulders and neck naturally relaxed, and avoid a rigid body. Then carefully restore the complete process of arm swing, feel the rhythm of limb swing, force progressive law and muscle tension dynamic changes. Finally, focus on imagining the moment of hand strength control, fine-tuning movements, ball air trajectory, and the final landing position, all-round restoring the real throwing complete operation scene.

The whole training process can be divided into two progressive stages: basic disassembly training and complete reproduction training. At the initial stage of the training, the core of the training is the fine step disassembling exercise, and the repetitive imagery exercises are carried out for the key single movements such as standing, holding the ball, swinging the arm and releasing the hand. When the single action image is sufficiently skillful and the picture is clear and stable, each action link is connected orderly and integrated into a coherent and complete throwing process, which is in line with the real rhythm and movement law of the field throwing. In the middle and late stages of training, gradually integrate into the real visual images of the competition field, and carry out all-round stereoscopic image simulation in combination with the field environment, spherical shape and target position, so as to realize the deep integration of kinesthetic perception of limbs and visual scenes, effectively enhance the reality and sense of substitution of psychological images, and effectively enhance the actual effectiveness of imagery training for special technical improvement.

4.3. Arrangement of stratified image exercise in different throwing difficulty

There are two kinds of core skills in small metal ground throw: roll and throw. Different skills vary greatly in distance, way of exertion and difficulty of movement. The basic stage is based on image training, which is simple in structure, stable in exertion and high in error tolerance. It can help athletes adapt to image training mode and establish clear and stable movement representation. Along with the advancement of training, gradually transition to long-distance rolling training, gradually improve control, and gradually increase the difficulty of controlled distance, refining accurate long-distance throwing movement awareness.

Throwing technique is a kind of advanced technique with complex movement and high precision. It needs to construct an independent training system of layered images. At the primary stage, we should carry out close-distance light-force throwing image practice, focusing on familiarity with throwing height, rhythm, and impact point, and accumulate throwing special sense. In the advanced stage, the distance and strength of throwing are gradually increased to consolidate the high-precision throwing action memory^[4]. In order to improve the ability of correcting errors and adjusting mentality of athletes, it is necessary to set up an image training system to simulate the error of throwing and the passivity of playing.

5. Implementation points and application strategies of mental image training

5.1. Control image training duration and frequency

Mental image training belongs to the fine mental training mode, which is not that the longer the training time and the more frequent the training, the better the effect. The whole training should be controlled within 15 minutes. Five minutes of relaxation and ten minutes of action imagery training should be separated to adapt to the psychological tolerance. At the end of the training, the athletes have the deepest memory for the throwing action, and the image simulation is more suitable for the real technical sense.

The training frequency should be adjusted dynamically according to the training cycle and follow the core principle of moderate and moderate training. Daily normalization of training to maintain a daily frequency of training, steady accumulation of psychological training results, and continue to optimize the performance of the game and mentality. The training rhythm can be adjusted in the preparation period, and the short-term imagery training can be carried out twice a day to reduce the training time and focus on mental adjustment and action consolidation. It is necessary to observe the state of the athletes in real time during the training process, and terminate the training in time when there are problems such as distraction and irritability.

5.2. Distinguishing between daily training and image training

The core goal of mental image training in the daily training stage is to polish technical details, perfect the movement system, and lay particular emphasis on the long-term improvement of technical ability. In this stage, the image training is mainly based on pure technique simulation, which weakens the imagination of the competition pressure and the environment. Through repeated repetition and correction of movements, correct the habitual wrong movements, solidify the standard throwing mode, consolidate the technical foundation of athletes, and gradually solve the core problems existing in daily training, such as irregular movements and unstable exertion.

The core goal of image training in the pre-competition stage is to adjust the mentality, match the field, and play stably, which is obviously different from daily training. Before the competition, the training no longer excessively tangles the technical detail revision, and avoids deliberate adjustment movements to cause spot movement distortion. The training contents include scene simulation, repetition of successful movements and emotional relaxation. By simulating high-pressure competitive scenes and key decisive rounds, the adaptability of athletes is improved^[5].

5.3. Integration of image training and field technical training

Mental imagery training belongs to auxiliary training means, which must be combined with practical training in depth and build a training mode of combination of virtual and real to maximize training value. The routine training can adopt the training mode of “first practical operation, then image”. After finishing a group of field-throwing training, the athletes immediately carry out short-term image resumption, recall the advantages of the throwing action and the shortcomings of the error, simulate the standard action after correction in the brain, and realize the two-way combination of practical correction and psychological optimization. Using instant action memory to carry out image training can quickly solidify correct actions and avoid the accumulation of bad habits.

At the same time, we can adopt the pre-training mode of “first image, then practice”. Before the daily training, we can build up a standardized movement model through short-term image training. Training needs to be clear about the relationship between primary and secondary; field training is the core, and mental imagery training as a supplement can not replace practice. The closed-loop training system of “practice-practice, image resumption and improvement of practice-practice” is constructed to complement psychological training and technical training.

6. Conclusion

The improvement of precision throwing ability of small metal ground throw is the result of technical training, physical training and psychological training. Mental image training can make up for the deficiency of traditional training and optimize the throwing skills and mentality of athletes from the three dimensions of action memory, concentration control and emotional relief. Based on the special characteristics of the project, this paper designs a systematic and stratified mental image training program, clarifies the differential implementation strategy of daily training and pre-competition training, and establishes the integration mode of mental training and field training.

Disclosure statement

The author declares no conflict of interest.

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