Current Status and Suggestions for Physical Training of Teenage Opera Actors: A Case Study of the Affiliated High School of the National Academy of Chinese Theatre Arts

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Abstract: This research takes the Affiliated High School of the National Academy of Chinese Theatre Arts as a case study, focusing on the current state of physical training for adolescent Chinese opera actors. It provides an in-depth analysis of existing issues and proposes systematic improvement recommendations based on theories of sports science. We found that current physical training for opera emphasizes experiential transmission and artistic expression, with insufficient adherence to the common principles of sports biology. In terms of content and methodology, training predominantly relies on the simple repetition of stage movements, lacking specialized physical conditioning, psychological guidance, and the application of diverse training methods. Regarding load management, there is a reliance on subjective experience due to the absence of scientific monitoring indicators. In terms of process planning, issues include a gap between the total training volume and the ideal target of the "10,000-Hour Rule," suboptimal course structure and sequencing, and insufficient monitoring of physical and mental fatigue. These factors, irrational motor technique, inadequate specialized physical fitness, insufficient warm-up activities, and unscientific load monitoring and recovery practices, collectively contribute to the widespread occurrence of sports injuries among students, primarily acute and chronic soft tissue injuries in the waist, ankles, and knees. Therefore, five core recommendations have been proposed, aiming to enhance the scientific rigor, systematization, and safety of physical training for adolescent opera actors, thereby providing support for talent development and the sustainable advancement of Chinese opera art.

Keywords: Young Chinese Opera Actors; Physical Training; Affiliated High School of the National Academy of Chinese Theatre Arts; Sport Injury

1. Introduction

Chinese opera, a cultural and artistic treasure of the Chinese nation and humanity as a whole, faces challenges in talent cultivation, particularly in the physical training of opera actors. [1][2] Due to the lack of natural science courses such as human movement biology in the training system of opera performance majors, the training process is prone to sports injuries and weak response. [3][4] Thus, this paper systematically investigates the current status of physical training for young Chinese opera actors, taking the Affiliated High School of the National Academy of Chinese Theatre Arts as an example. Utilizing relevant theories, it proposes recommendations for future training.

2. Essence of Physical Performance in Chinese Opera

2.1 Essence of Chinese Opera Performance

A deep understanding of the essence of Chinese opera performance is fundamental to guiding scientific physical training. The core of the Chinese opera performance system lies in the skills of "singing, reciting, acting, and martial arts," which involve shaping characters, creating scenarios, narrating stories, and conveying emotions through body movements such as eyes, hands, body, and steps [5]. These artistic means rely on bodily actions, such as vocalizations, stage walks, and somersaults, all accomplished through muscle contractions under neural control. Therefore, training actors to master and apply

these specific movements enhances their performance abilities. The essence of Chinese opera performance can be summarized as actors adhering to certain principles and using their bodily movements to portray characters, create scenarios, narrate stories, and convey emotions.

2.2 Essence of Physical Performance in Chinese Opera

Chinese opera performances can be categorized into fine and gross motor performance skills based on the muscle groups and amplitude involved. [6] The former primarily involves small muscle groups, such as special sound effects in singing or small-amplitude movements in form (e.g., turning, shaking sleeves), emphasizing precision and coordination. The latter involves large muscle groups, such as sweeping movements with a broadsword or acrobatics, requiring significant strength and amplitude. Current physical training predominantly focuses on large muscle group-dominated actions. Thus, the essence of physical performance in Chinese opera is the artistic expression through bodily movements dominated by large muscle groups, with corresponding physical training content centered on courses like "mat skills," "weapon skills," and "leg skills."

3. Current Status of Physical Training for Chinese Opera Actors

3.1 Training Philosophy

Training philosophy is the understanding of the essence of physical training and various factors influencing its effectiveness, serving as the ideological foundation for guiding physical training practices. Chinese opera performance fundamentally involves executing specific bodily movements, which induce changes in physiological structure and function, such as strength, coordination, and neural control abilities. [7] These biological improvements are prerequisites for artistic expression. Therefore, the basic logic of physical training for Chinese opera actors should be to first transform their biological characteristics following human motion biology principles before pursuing artistic expression. However, due to differences in personal training experiences and cognitive structures, teaching styles among Chinese opera teachers are highly individualized, with insufficient adherence to universal scientific training principles. [8] The main problem is that more reliance is placed on personal experience rather than following the laws of motion. Teachers' understanding of physical training often stems from an artistic performance perspective, with strong subjectivity and insufficient consideration of universal human motion biology principles. For instance, in training for somersaults, more emphasis is placed on the artistic "style" than on optimizing biomechanical aspects of take-off postures, utilizing sensory organs to control body states, and safe landing postures.[9] Only when these aspects are scientifically optimized can actors have sufficient time to complete artistic movements while ensuring bodily safety. In summary, the current training philosophy exhibits more personal experience than adherence to motion principles.

3.2 Training Content and Methods

Training content, or "what to practice," often directly derives from stage performance movements and can be categorized into balance, planar jumping, and three-dimensional jumping and rotating types. Training methods commonly employ simple repetitive training. While "practicing what is performed" has its rationale, directly using stage movements as daily training content with simple repetition leads to methodological monotony, easily causing psychological fatigue and physical exhaustion, increasing injury risks. From a training science perspective, training content and methods should be diversely combined, guided by stage demands. For example, complex movements can be decomposed into components (e.g., separating take-off, flipping, and landing phases) or supplemented with auxiliary exercises (e.g., rapid stretch-shortening cycle training to enhance jumping ability, using foam pits for increased difficulty training). Research also reveals a current emphasis on technical movement repetition, with severe deficiencies in foundational exercises targeting motor qualities (especially strength), psychological guidance, and motor intelligence. Teachers report that students' insufficient core muscle strength leads to loose aerial movements and unstable landings, affecting technical quality and increasing injury risks. Additionally, psychological teaching methods (e.g., focal point guidance) and motor theory explanations are rarely employed, hindering students' formation of correct technical

concepts and proactive thinking abilities.

3.3 Control of Training Load

The fundamental mechanism by which physical training induces adaptive changes in physiological structure and function lies in the imposition of training loads. Training load refers to the comprehensive physiological and psychological stress endured by individuals during training activities. It encompasses two core dimensions: training volume and intensity. Scientifically and reasonably controlling training loads is crucial for achieving desired training effects and significantly reducing the risk of sports injuries. Therefore, precisely regulating training loads within a single session or an entire training cycle is key to substantially enhancing trainees' abilities. Excessive loads beyond the body's tolerance and recovery capacity easily lead to fatigue accumulation, resulting in various acute and chronic sports injuries. In competitive sports, simple physiological or psychological indicators, such as monitoring heart rate (or pulse) changes before and after exercise, using subjective fatigue feeling scales (RPE) for self-assessment, or testing reaction times, are commonly employed to monitor athletes' fatigue levels. However, research indicates that few Chinese opera teachers are familiar with these indicators, let alone applying them in actual training. They primarily rely on personal subjective experience, roughly estimating load conditions by observing students' external performances. This experience-based monitoring lacks objective data support, making it difficult to accurately assess fatigue levels, potentially affecting training outcomes and posing injury risks.

3.4 Planning and Arrangement of Training Processes

3.4.1 Medium- to long-term planning

Excellent performance abilities require long-term, systematic training planning. Training Volume: According to the "10,000-hour rule," becoming an expert requires approximately 10,000 hours of deliberate practice. (1)Based on the teaching schedule of Affiliated High School of the National Academy of Chinese Theatre Arts, the total guided classroom training volume over six years is about 2,880 hours (approximately 160 minutes daily, 36 weeks annually). Even including weekend and rehearsal training, the total still falls short of the ideal standard, potentially insufficient for cultivating top-tier physical performers. (2)Training Planning: Some teachers have clear plans (e.g., foundational qualities before technical skills), while others lack systematic planning due to significant individual differences among students.

3.4.2 Short-term (daily) planning

Several aspects of training arrangements require optimization. (1) Incomplete Class Structure. Scientific training sessions should include preparation, basic, and conclusion phases. Currently, insufficient attention is given to preparation activities (activating bodily functions) and cool-down relaxation (promoting recovery, preventing muscle adhesion). For instance, After the morning physical training session, a long interval often occurs before martial arts classes, during which the body cools down, yet effective secondary preparation activities are frequently lacking. (2) Inappropriate Class Sequence. Classes focusing on flexibility and balance are often scheduled before high-intensity martial arts classes requiring neural excitement, reducing the effectiveness of martial arts training. (3) Short Class Duration: A single class duration of 40 minutes may be too brief. If martial arts classes and basic courses are arranged continuously and teachers collaborate in lesson preparation, better training results will be achieved. (4) Cross-Arrangement of Classes. Physical training classes often leave students fatigued, immediately followed by academic classes, potentially affecting academic learning efficiency.

3.5 Monitoring of Psychological Well-being and Prevention of Psychological Fatigue

Psychological fatigue, resulting from excessive depletion of psychological resources and a decline in psychological function, affects training quality and motivation. In competitive sports, psychological monitoring and effect evaluation (error detection and adjustment) are employed to address this issue. Research indicates a general lack of awareness in monitoring students' psychological fatigue states during physical training at the affiliated high school, with no established effective assessment and intervention methods, which is not conducive to students' long-term training persistence and mental health.

4. Analysis of Sports Injury Status among Chinese Opera Actors

4.1 Current Status of Student Sports Injuries

Research reveals a notable incidence of sports injuries among students in the Chinese opera performance program at the affiliated high school. Sports injuries in Chinese opera actors refer to all injuries requiring medical attention that occur during bodily training in theatrical performances, practice rooms, etc. Depending on the classification standard, sports injuries can be divided into various categories. Based on organizational structure: neural injuries, vascular injuries, internal organ injuries, and soft tissue injuries. Based on nature: open injuries and closed injuries. Based on disease duration: acute injuries and overuse injuries (also known as chronic injuries). According to research findings and relevant studies on Chinese opera sports injuries, students' sports injuries predominantly occur in the waist, ankles, and knees, with closed soft tissue injuries being most common, such as joint sprains, abrasions, and muscle strains. Both chronic and acute injuries are prevalent.

4.2 Etiology of Sports Injuries

4.2.1 Mechanisms of sports injuries

Acute injuries result from a single overloading event causing irreversible tissue deformation, while overuse (chronic) injuries arise from repeated loading exceeding the tissue's repair capacity. Both are related to the stress (internal resistance) and strain (deformation) experienced by the tissue exceeding its tolerance limits.

4.2.2 Etiology of sports injuries in Chinese opera actors

(1) Technical Reasons in Chinese Opera Movements

Chinese opera movements involve numerous complex techniques such as jumping, spinning, and somersaulting. Human movement is a coordinated sequence of multiple joints actuated by muscle contractions, with only one most rational force application sequence and joint movement order. Incorrect technical movements, disrupting the force application sequence or joint movement timing (e.g., improper braking sequence of ankle, knee, and hip joints during landing), can disrupt the biomechanical structure, potentially causing acute injuries in a single instance or chronic strain from repeated occurrences.

(2) Insufficient Physical Training, Especially Strength.

Muscle strength is fundamental for executing movements, stabilizing joints, and preventing injuries. Current training places insufficient emphasis on specialized strength training, particularly functional core strength. Students' weak core strength leads to poor control during aerial movements and unstable landings, a significant Etiology of acute injuries.

(3) Inadequate Preparation Activities.

Adequate preparation activities raise body temperature, reduce muscle viscosity, and activate the nervous system, preparing for high-intensity training. Currently, two issues exist: firstly, the effects of preparation activities have a time limit (approximately 20 minutes), but long intervals between classes lead to loss of effectiveness; secondly, preparation activities lack specificity, failing to effectively activate the neuromuscular system to an appropriate excitement level.

(4) Overuse of the body

First, Unscientific Load Monitoring. Teachers lack a clear understanding of training load volume and intensity and scientific monitoring methods (e.g., physiological and psychological indicators), relying solely on experience, which easily leads to excessive loads, fatigue accumulation, and chronic injuries. Second, Missing Recovery Phases. After high-intensity training, muscle fibers can become disordered and develop nodules (trigger points), affecting recovery and potentially causing pain. Currently, classes generally lack systematic cool-down relaxation (e.g., stretching), hindering fatigue elimination and leading to long-term accumulation of injuries. Thirdly, Inadequate Injury Treatment and Rehabilitation. Consciousness and ability in immediate injury treatment, subsequent rehabilitation training, and gradual resumption of normal training are lacking, potentially aggravating injuries or causing recurrences.

5. Recommendations for Future Training of Young Chinese Opera Actors

5.1 Strengthen Research on Motion Biology in the Chinese Opera Field to Provide Theoretical Basis for Practice

Disciplinary development often follows a path where practice precedes theory, which then reciprocally enhances practice. The same applies to Chinese opera art, which has achieved

remarkable success in practice but lags in theoretical construction, particularly in-depth research on performers from a biological perspective. [10] For instance, mechanisms of performers' movement learning, memory, and control, biomechanical principles underlying high-difficulty movements like jumping and flipping, occurrence mechanisms of common sports injuries, and how to effectively prevent injuries through scientific training arrangements and guidance. Currently, a mature theoretical system in the Chinese opera field is lacking, possibly due to the systematic absence of natural science knowledge such as human biology, medicine, and kinesiology in the professional discipline construction and talent cultivation system of Chinese opera. As mentioned earlier, the essence of Chinese opera performance can be summarized as the expression of specific bodily movements. Therefore, exploring Chinese opera performance from the perspective of action behavior becomes an important approach to revealing its laws and summarizing theories. Summarizing Chinese opera performance laws from a biological perspective will inevitably elevate the scientific level of physical training for Chinese opera actors and play a crucial role in preventing sports injuries. Thus, it is recommended to vigorously promote interdisciplinary research integrating artistry, biology, and training science to provide new insights for overcoming current research bottlenecks in Chinese opera performance.

As a human body expression art, the field of Chinese opera physical education has long been deficient in human science-related education and research; even against the backdrop of rapid development in human science in the 21st century, this area remains nearly blank in Chinese opera performance: Chinese opera institutions do not offer human science courses, and professional teachers generally lack systematic education in human science and sports science. Therefore, enhancing the scientific level of Chinese opera physical training inevitably requires the introduction of biological and other natural science knowledge. "Borrowing wisdom from others," interdisciplinary knowledge integration is expected to inject new scientific impetus into Chinese opera talent cultivation and artistic inheritance.

5.2 Improve the Curriculum System for Chinese Opera Professional Talent Cultivation

Talent cultivation is key to the development of Chinese opera. Currently, the curriculum system for cultivating Chinese opera professionals (including future teachers) severely lacks natural science knowledge. It is recommended to incorporate practical theoretical courses such as sports anatomy, sports biomechanics, sports physiology, and sports rehabilitation into the Chinese opera performance program (both secondary vocational and university levels). This will help students establish rational thinking, enabling them to scientifically understand and master performance movements, enhancing teaching and training efficiency.

5.3 Effectively Develop Existing Human Resources and Leverage the Role of "X + Chinese Opera"

The existing physical education teachers in schools represent a crucial human resource with knowledge in human movement science. The fundamental principles of body utilization in sports and Chinese opera share similarities. It is recommended that schools establish platforms (such as curriculum collaborations and research projects) to facilitate exchanges and collaborations between Chinese opera teachers and physical education teachers. This will enable the utilization of physical education teachers' professional expertise in scientific training design, load monitoring, and injury prevention, thereby forming a synergistic educational force. When recruiting physical education teachers, emphasis can also be placed on examining their professional backgrounds in scientific training and sports injury management.

5.4 Strengthen Physical Training and Enhance Emphasis on Warm-up and Cool-down Activities

It is recommended to introduce specialized physical training courses to systematically enhance students' foundational strength (particularly core strength), endurance, flexibility, and other physical attributes, thereby laying a solid physical foundation for technical learning. Simultaneously, it is imperative to attach great importance to and scientifically design warm-up and cool-down activities for each training session. Warm-up activities should be targeted and time-sensitive, while cool-down activities should incorporate stretching, massage,

and other techniques to promote fatigue recovery and prevent muscle stiffness and injuries.

5.5 Cultivate a Systematic and Scientific Approach to Life Health Maintenance and Protection

Students and teachers should be guided to develop a comprehensive perspective on health maintenance, viewing training as a systematic project that encompasses scientific load management, adequate recovery, nutritional support, psychological adjustment, injury prevention, and rehabilitation. Establishing a systematic approach to life health maintenance and protection should permeate the entire career of Chinese opera performers, ensuring the sustainable development of their artistic lives.

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