

Practical Exploration of Functional Physical Training in Improving Poor Posture Among Adolescents

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Abstract: Poor posture has become increasingly prevalent among adolescents and tends to emerge at younger ages as a normalized issue, severely hindering skeletal development and physical and mental health. Conventional physical training prioritizes fitness improvement while neglecting muscle balance and posture correction, failing to effectively resolve postural defects in adolescents. This study systematically sorts out the major types and contributing factors of adolescents' poor posture, and analyzes the adaptability of functional physical training for posture correction. Combined with the physical and mental developmental characteristics of adolescents, a scientific practical protocol of functional physical training is designed, and multi-dimensional implementation strategies including hierarchical targeted training, home-school collaborative education, classroom teaching integration and dynamic posture monitoring are proposed. The research outcomes provide practical references for adolescent posture correction and help enhance adolescents' physical health levels.

Keywords: Adolescents; Poor Posture; Functional Physical Training; Posture Correction; Physical Fitness Intervention

1. Introduction

With the transformation of modern educational models, the physical posture health of adolescents has shown a general downward trend, and poor posture has become a prominent common problem restricting adolescents' physical and mental health at the present stage. Burdened with heavy academic tasks, adolescents maintain static postures such as sitting over desks for long hours, reading with heads bowed and staring at electronic screens. Coupled with insufficient daily physical activity, single exercise modes and weak awareness of posture management, postural problems including kyphosis, forward head and rounded shoulders, scoliosis and abnormal lower limb force lines occur frequently and feature juvenilization and popularization [1,2]. Poor posture not only undermines adolescents' physical appearance, but also causes unbalanced muscle strength and abnormal joint stress, triggering chronic fatigue symptoms such as neck and shoulder soreness as well as lumbago. It also disturbs the normal growth and development of the spine and thorax, and in severe cases impairs cardiopulmonary development and physical motor function, exerting long-term negative impacts on adolescents' physical fitness, temperament and even mental health.

Functional physical training emphasizes dynamic body balance and joint stability, helps strengthen muscles, ligaments, tendons and other tissues, and improves joint range of motion and stability [3]. At present, functional physical training for adolescents generally suffers from homogenized training protocols, ignoring physiological differences among adolescents of varying ages in skeletal and muscular development, cardiopulmonary function and endocrine levels [4]. This study explores the corrective effects of functional physical training on adolescents' poor posture, enriches the theoretical system of adolescent posture correction and school physical training, and makes up for the limitations of traditional posture correction research to provide theoretical references and ideas for subsequent relevant academic studies. By designing feasible scientific functional physical training protocols and exploring implementation strategies, this study addresses core problems such as unbalanced muscle strength and disordered body force lines in adolescents, effectively corrects various types of poor posture, improves adolescents' ability to control body posture and overall physical fitness, and offers operable and promotable practical paradigms for physical education teaching and posture health intervention in primary and secondary schools.

2. Main Types and Causes of Poor Posture Among Adolescents

2.1 Main Types of Poor Posture among Adolescents

Poor posture is prevalent among adolescents. Affected by sedentary lifestyles and improper postures, postural problems present diversified and normalized characteristics, mainly concentrated in three core parts: spine, neck and shoulders, as well as trunk and lower limbs, with distinct manifestations for each category.

(1) Spinal poor posture. Spinal postural abnormalities are the most common postural disorders in adolescents, mainly manifested as scoliosis, reduced physiological curvature and kyphosis [5]. Long-term slouched sitting and desk work break the normal mechanical balance of the spine and result in uneven spinal stress. Such disorders not only disrupt the central axis of the body, but also compress thoracic viscera, interfere with adolescents' skeletal development and seriously endanger physical and mental health.

(2) Cervicobrachial poor posture. Typical manifestations include forward head, rounded shoulders and unequal shoulder heights, which are prevalent among junior and senior high school students. Long hours of bowing heads to use electronic devices or study keep neck and shoulder muscles in constant tension and spasm, leading to unbalanced tension between anterior and posterior muscles. Persistent abnormal postures cause chronic neck and shoulder soreness and stiffness, even cervical strain, and reduce the mobility of the cervical spine.

(3) Trunk and lower limb poor posture. Common manifestations include anterior pelvic tilt, posterior pelvic tilt, genu varum, genu valgum and leg length discrepancy. Adolescents' bones and muscles are immature; irregular standing and walking postures and long-term unilateral weight bearing lead to pelvic displacement and disordered lower limb force lines. These conditions not only damage physical appearance, but also weaken body balance and motor stability.

2.2 Main Causes of Poor Posture among Adolescents

Poor posture in adolescents is not induced by a single factor, but results from the combined effects of behavioral habits, physical development, environmental conditions and insufficient physical activity. These factors interact and exacerbate postural abnormalities.

(1) Daily behavioral habits. Improper daily behaviors constitute the core inducement of postural disorders. Adolescents often maintain sedentary lifestyles, hunch over desks, carry backpacks on one shoulder and cross legs, with little awareness of active posture correction. Repetitive improper postures continuously alter body stress patterns, causing uneven muscle tension and skeletal displacement, and gradually solidify poor posture.

(2) Physical development factors. Muscles, bones and ligaments of adolescents are in a rapid developmental stage with weak bodily stability and control. Most adolescents lack sufficient strength and endurance in core, shoulder, back and lower limb muscles, which fail to support bones to maintain standard posture. Uneven development of muscle groups, along with imbalanced strength between flexors and extensors or medial and lateral muscles, cannot counteract mechanical deviations caused by improper postures and easily trigger postural abnormalities.

(3) Academic and environmental factors. Heavy academic burdens and ill-suited learning environments aggravate postural disorders. Adolescents face heavy coursework and sit for extended study hours with few opportunities to move around. Meanwhile, mismatched desk and chair heights in schools and crude home learning environments fail to meet ergonomic standards, forcing compensatory body postures and inducing postural disorders.

(4) Insufficient physical training. Lack of physical exercise and targeted posture training is a major contributor to widespread poor posture. Currently, adolescents prioritize academic performance over physical activity with limited daily exercise time. Conventional physical training mainly focuses on fitness improvement without targeted posture correction and core stability training. Long-term lack of exercise degenerates muscle function and weakens body posture control, failing to prevent poor posture.

3. Adaptability Analysis of Functional Physical Training for Improving Adolescents' Poor Posture

Essentially, adolescents' poor posture is a functional disorder caused by unbalanced muscle strength, disordered kinetic chains and insufficient posture control. Compared with traditional training modes, functional physical training centers on human motor function and mechanical structure, precisely matching the demands of adolescent posture correction with strong intervention adaptability and practical application value.

3.1 Core Characteristics of Functional Physical Training

Centered on the human kinetic chain theory, functional physical training breaks the limitations of single-muscle and partial strength training, and emphasizes holistic, coordinated and functional physical development. Abandoning mechanical and isolated training movements, this training mode is based on daily body postures and motor scenarios, and comprehensively improves core muscle stability, balanced muscle strength, joint range of motion and body control. Meanwhile, training follows the principle of gradual progression, conforms to the laws of adolescents' skeletal and muscular development, and targets issues such as uneven muscle tension and compensatory force exertion, meeting the personalized and scientific training demands of adolescent posture correction.

3.2 Convergence Points between Functional Physical Training and Posture Correction

The core objectives of adolescent posture correction are to restore balanced muscle strength, regularize skeletal force lines and rebuild normal body posture control capabilities, which are highly consistent with the core goals of functional physical training. Functional physical training focuses on activating weak muscle groups, relaxing tight muscles and strengthening core strength, and can specifically improve postural problems such as kyphosis, mild scoliosis and forward head posture [6]. Featuring lightweight loads, low injury risks and high adaptability, it fits adolescents' physical developmental stage. Without damaging bones, it corrects improper force exertion habits, reshapes the correct mechanical balance of the body, and realizes long-term correction and maintenance of standard posture.

3.3 Comparative Analysis of Differences between Traditional Physical Training and Functional Physical Training

Traditional physical training mainly targets the improvement of explosive power, endurance, absolute strength and other physical qualities, adopting standardized and repetitive mechanical training focused on increasing partial muscle mass. It ignores overall bodily mechanical balance and postural defects, failing to provide targeted correction for poor posture. In contrast, functional physical training takes posture repair and functional optimization as orientation, stresses coordinated contraction of full-body muscle groups, and accurately improves muscle compensation and uneven strength. Traditional training easily leads to uneven muscle development and aggravated postural compensation, while functional training conforms to human motor laws, balances training safety and corrective effects, and is more suitable for intervening and correcting adolescents' poor posture.

4. Practical Protocol Design of Functional Physical Training for Improving Adolescents' Poor Posture

Based on the causes of adolescents' poor posture and their physical developmental characteristics, combined with the concepts of functional training, this chapter designs scientific and operable posture correction protocols from multiple dimensions including training principles, training cycles, pre-training posture screening and targeted training content.

4.1 Training Design Principles

Core design principles are formulated in line with adolescents' physical and mental developmental laws. First, the safety principle. Low-load and low-injury training methods are adopted, with strictly controlled training range and intensity to avoid secondary postural injury caused by compensatory movements. Second, the targeted principle. Focusing on different symptoms such as forward head and

mild scoliosis, tight and weak muscle groups are precisely located to customize differentiated training content and accurately resolve core postural problems including unbalanced muscle strength and deviated force lines of individuals. Third, the gradual progression principle. Training load and movement difficulty increase progressively from simple to complex and low to high intensity in accordance with adolescents' physical adaptation rules. The initial stage centers on muscle activation and posture correction training to rectify improper force exertion habits, while the later stage gradually adds core stability and strength training to prevent physical intolerance from sudden high-intensity exercise. Fourth, the holistic principle. Balance between anterior and posterior as well as left and right muscle groups is maintained, and coordinated correction of the neck, shoulders, trunk and lower limbs is integrated. Full-body functional training regulates overall mechanical balance to realize comprehensive and systematic improvement of body posture.

4.2 Training Cycle and Frequency Arrangement

A complete 12-week intervention cycle is set for this functional posture correction training, divided into three phases: adaptation, improvement and consolidation. Weeks 1–4 serve as the adaptation phase, dominated by muscle activation and posture correction training to rectify improper force exertion patterns. Weeks 5–8 form the improvement phase with moderately increased training load to strengthen weak muscle groups and optimize bodily force lines. Weeks 9–12 act as the consolidation phase to solidify correct postures and enhance body posture stability. Training is arranged three times per week with each session lasting 40 minutes, avoiding periods of heavy academic workload for students to guarantee training continuity and effectiveness and prevent accumulated exercise fatigue.

4.3 Pre-Training Posture Screening and Problem Classification

A combined approach of visual observation, posture ruler measurement and posture image collection is adopted to screen postural disorders in four major body parts of adolescents: neck and shoulders, spine, trunk and lower limbs. Specific manifestations and deviation degrees of forward head, rounded shoulders and kyphosis, scoliosis, pelvic abnormalities and disordered lower limb force lines are accurately recorded. Combined with screening data and adolescent posture evaluation standards, postural disorders are classified into three grades: mild, moderate and severe. Mild postural abnormalities only present postural deviations without physical discomfort; moderate abnormalities feature obvious postural deformation accompanied by muscle soreness; severe abnormalities are marked by prominent skeletal deformities that hinder physical movement and skeletal development.

4.4 Targeted Training Content for Different Types of Poor Posture

Based on the pathogenic characteristics and mechanical defects of four prevalent postural disorders among adolescents, targeted corrective training content is designed under the guidance of functional training concepts to realize precise intervention and targeted correction.

(1) Functional training content for forward head posture. Tight muscle groups including sternocleidomastoid and upper trapezius are relaxed through wall shoulder retraction and cervical stretching. Movements such as YTWL scapular activation and wall angels are matched to strengthen middle and lower trapezius and deep shoulder stabilizing muscles. Meanwhile, daily habits of bowing and protruding heads are corrected to balance neck and shoulder muscle strength, gradually restore the normal physiological curvature of the cervical spine and rectify forward head and protracted shoulder posture.

(2) Functional training content for mild scoliosis. Tight muscle groups on the convex side of the spine are stretched to release stiff compensatory muscles. Varied planks, unilateral glute bridges and side planks are applied to strengthen weak muscle groups on the concave side of the spine. Training focuses on adjusting trunk force exertion patterns, correcting spinal compensatory deflection, balancing muscle tension on both sides of the trunk, gradually regularizing spinal force lines, alleviating mild scoliosis and improving trunk stability.

(3) Functional training content for kyphosis. Chest stretching and thoracic spine mobility training release tight pectoral muscles and stiff thoracic vertebrae. Low-load functional training including bent-over flyes, wall scapular squeezes and quadruped back extensions strengthens latissimus dorsi, erector spinae and other core back muscles. Balanced tension between pectoral and dorsal muscles expands thoracic mobility, corrects collapsed chest posture and rebuilds upright trunk posture.

(4) Functional training content for abnormal lower limb force lines. Tight medial and lateral thigh muscles and iliopsoas are relaxed, paired with glute bridges, clamshells and straight leg raises to strengthen hip and thigh core stabilizing muscles. Improper habits such as unilateral weight bearing and slouched standing are corrected to adjust the force angles of lower limb joints, regularize lower limb force lines, improve pelvic tilt and leg deformities, and enhance stability during standing and walking.

5. Implementation Strategies for Optimizing Functional Physical Training for Adolescent Posture Correction

Drawing on practical training experience and based on adolescents' study and daily life scenarios, systematic and long-term implementation strategies for posture training are constructed from four dimensions: targeted training, home-school linkage, classroom integration and dynamic monitoring, to improve the effectiveness and stability of posture correction.

5.1 Hierarchical Implementation: Targeted Training for Diverse Postural Abnormalities

Adolescents present diverse types and varying severities of poor posture, so unified training modes fail to meet personalized correction demands, requiring hierarchical implementation and precise intervention. Based on grading results from pre-training posture screening, students are grouped according to postural disorders including forward head, mild scoliosis, kyphosis and abnormal lower limb force lines, and further divided into training levels by mild and moderate disorder severity. Differentiated training protocols are formulated for each group: mild postural disorders adopt daily posture maintenance and muscle activation training, while moderate disorders focus on strengthening weak muscle groups and rectifying compensatory force exertion modes. One-size-fits-all training content is abandoned, and training load and movement difficulty are dynamically adjusted according to students' posture improvement progress to guarantee training pertinence and adaptability, avoid ineffective or excessive training, and effectively boost the precision and effects of posture correction.

5.2 Home-School Collaboration: Establish a Routine Posture Training System

The formation of adolescents' poor posture is closely related to daily home and school life, necessitating a collaborative home-school long-term training system. Schools popularize knowledge about the hazards of poor posture and functional training via theme class meetings, posture science posters and short videos to reverse parents' inherent mindset of prioritizing academic performance over physical posture. Meanwhile, simple equipment-free home functional training tasks are designed for adolescents' spare time, with parents supervising daily completion of basic training including posture relaxation and core stability exercises. A home-school communication and feedback mechanism is established: teachers regularly report students' in-school postural conditions, and parents submit records of home training outcomes. Bidirectional linkage rectifies improper postures of students both on campus and at home, breaks the spatial and temporal limits of training, and integrates posture correction into daily life.

5.3 Integrated Teaching: Embed Functional Training into Physical Education Classes

Integrating functional physical training into regular physical education classes effectively addresses insufficient exercise and weak posture management among adolescents. Combined with primary and secondary physical education curriculum standards, physical education teachers embed adolescent-oriented functional training content into warm-up, basic drills and cool-down sessions to replace partial traditional mechanical training. Pre-class warm-ups add muscle activation training for the neck, shoulders, spine and lower limbs; core stability and posture correction special movements are interspersed in class; post-class cool-downs are equipped with muscle stretching and shaping exercises. Special classroom teaching targeting common adolescent postural disorders explains the force exertion defects of improper postures and key correction points, enabling students to master basic posture management skills and continuously optimize body posture in daily physical education classes, realizing organic integration of physical education teaching and posture correction.

5.4 Dynamic Monitoring: Set Up Regular Posture Screening Mechanisms for Adolescents

Adolescents' bones and muscles are in a dynamic developmental stage, and postural disorders are

prone to recurrence. Establishing a normalized dynamic monitoring and screening mechanism is critical to consolidate corrective effects and prevent posture deterioration. Schools build physical health files for each student and conduct two full-student special posture screenings every semester to continuously record postural data of the neck, shoulders, spine, trunk and lower limbs, and compare and analyze trends of postural changes. Students with postural disorders are tracked with regular re-examinations and updated files, and training protocols are adjusted timely according to posture improvement or deterioration. Meanwhile, data from posture monitoring are applied to summarize developmental laws of adolescent postural disorders, optimize campus physical training and posture intervention modes, and form a closed-loop management of "screening – intervention – adjustment – consolidation" to prevent poor posture among adolescents from the source.

6. Conclusions

Adolescent posture health constitutes a vital component of adolescent physical fitness development and a key focus of school physical education education in the new era. Under the dual influences of heavy academic workload and unhealthy lifestyles, postural imbalance among adolescents has become increasingly prominent. Reliance merely on daily posture correction and traditional physical training cannot achieve long-term and systematic posture correction. Different from traditional physical training modes, functional physical training is based on kinetic chain and core stability theories, emphasizes balanced muscle strength, optimized joint range of motion and improved posture control capabilities, and highly matches the corrective demands of adolescents' postural disorders with unique advantages of safety, pertinence and systematicness. This study explores the types and causes of adolescents' poor posture, constructs functional physical training protocols suitable for adolescents, and proposes multi-dimensional optimized implementation strategies, which can effectively make up for the deficiencies of traditional posture intervention and comprehensively improve various types of poor posture among adolescents. In the future, school physical education should further popularize and apply functional physical training, improve normalized posture screening and training mechanisms, build a collaborative home-school education system, normalize and dailyize posture training, continuously support healthy skeletal development and physical fitness improvement of adolescents, and promote their all-round physical and mental development.

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