

Challenges and Reform Pathways in Physical Education for Maritime Education

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Abstract

This study employs literature review, logical analysis, and empirical summarization to explore physical education reform in maritime programs. Given seafaring as the primary career path, health issues stemming from occupational peculiarities are particularly pronounced. This paper systematically examines prevalent health issues among seafarers and their root causes, providing a foundation for physical education reform. Findings indicate common health problems include obesity, hypertension, and respiratory/circulatory diseases, primarily attributable to irregular schedules, poor dietary habits, and insufficient physical activity. Based on these findings, physical education in maritime programs should prioritize: - Strengthening foundational physical fitness training to enhance disease resistance; - Intensifying occupation-specific physical conditioning to improve occupational adaptability and prevent work-related injuries; - Cultivating health awareness and promoting the development of healthy lifestyle habits.

Keywords

Maritime Programs; Seafarers; Physical Education; Teaching Reform

1. Introduction to Maritime Higher Education Programs

Oceans cover approximately 70% of the Earth's surface, and nearly 90% of global merchandise trade relies on maritime transport. A nation's capacity to understand, develop, and utilize the oceans has become a crucial indicator of its comprehensive strength. Since the reform and opening-up, China's maritime industry has experienced rapid development. As the process of the great rejuvenation of the Chinese nation advances, embracing the oceans and building a maritime powerhouse have become inevitable choices for national development. Against this backdrop, the shortage of specialized talent in China's maritime sector has become increasingly prominent, with a significant gap between talent supply and industry demand. To address this challenge, maritime institutions are continuously expanding enrollment and strengthening talent cultivation to meet the growing demand for maritime professionals. Graduates of maritime programs primarily pursue careers in ship navigation, engine room management, and vessel maintenance, broadly categorized into

shore-based management and shipboard operations—with the latter typically referred to as seafarers. Cultivating high-caliber maritime professionals is a critical pathway for propelling China toward maritime power status. In accordance with the requirements of the STCW 78/95 International Convention, it is imperative to advance comprehensive reforms in physical education for maritime majors. This initiative aims to enhance the physical fitness and occupational adaptability of personnel, thereby meeting the dual demands of industry development and international standards.

2. Analysis of Current Seafarers' Occupational Characteristics and Health Status

The seafarer profession is characterized by its distinct nature and high risk, with work and life conducted long-term within the confined space of a vessel. Influenced by the marine environment, ships continuously experience rolling and vibration during navigation, easily causing crew members to experience discomfort such as seasickness, nausea, fatigue, and dizziness. Simultaneously, complex and unpredictable sea conditions demand constant vigilance and readiness to respond to emergencies. This sustained state of tension can trigger anxiety, sleep disorders, and circadian rhythm disruption, posing direct threats to physical and mental health. The highly enclosed and isolated nature of the shipboard environment means that during extended voyages, seafarers lack social interaction and external stimulation. This can lead to psychological issues such as loneliness and depression, and may even result in communication difficulties and social functional decline. Moreover, the demanding nature of seafarers' work—combining continuous operations with high physical exertion—frequently leads to physical fatigue and work-related injuries. Regarding health indicators, a 1997 survey by Ji Sichao and Zou Jing from the Maritime College of Jimei University revealed that hyperlipidemia affected 28.9% of seafarers, with prevalence increasing with age to 37.8% among those over 40. hypertension prevalence was 15.6%, approximately four times that of the general population; gastric disorders and gastrointestinal tumors were also common. Seasickness, emotional stress, irregular eating patterns, chronic alcohol consumption, and smoking were primary contributing factors. Causes of death were predominantly linked to cardiovascular disease, maritime accidents, drowning, and occupational injuries. Beyond dietary habits and work environments, insufficient physical activity also constituted a significant influencing factor. Ye Zhenfan's 2015 study further indicates that, in addition to the aforementioned conditions, kidney and gallbladder stones and hemorrhoids have become significant causes for seafarers to leave ships due to illness. Regarding international research, an analysis based on 40 years of Danish seafarer health data reveals that seafarers' health issues span two dimensions: working conditions and lifestyle. Their accident mortality and morbidity rates are approximately four times higher than those of land-based workers.

Male seafarers exhibit higher mortality rates, primarily due to accidents, suicide, and disease. Accidents are often caused by maritime disasters, suicide is more common among deck personnel, and diseases predominantly include cirrhosis, ischemic heart disease, and lung cancer. The most prevalent injury and illness types involve respiratory and circulatory system disorders, with musculoskeletal injuries such as rotator cuff syndrome and carpal tunnel syndrome also common, frequently occurring during deck operations and movement. Engine room personnel experience the highest incidence of hearing loss, followed by officers and deck personnel. Regarding physical condition, approximately 77% of seafarers are overweight, with 30% classified as obese, and the risk of overweight is particularly pronounced among males. Despite continuous improvements in working conditions and support mechanisms, seafarers' health status remains significantly worse than that of land-based workers, reflected in higher rates of mortality, hospitalization, cancer, infections, injuries, and overweight prevalence. Young male deck and engine room personnel constitute high-risk groups—deck personnel primarily face maritime accident risks, while engine room personnel are more exposed to occupational hazards like asbestos, polycyclic aromatic hydrocarbons, and oil mist, potentially leading to diseases such as mesothelioma and lung cancer. The high incidence of lung cancer is also linked to smoking habits, while cirrhosis is associated with alcohol consumption. Additionally, skin diseases caused by sun exposure and sea winds are relatively common. Overall, poor health and high injury rates have become defining characteristics of the seafaring profession.

3. Optimizing Seafarer Occupational Protection Based on Health Data

3.1. Strengthening Basic Physical Fitness Training

Basic physical fitness is fundamental to maintaining human health and functionality, and it is particularly crucial for seafarers. Strong foundational fitness not only facilitates the successful completion of maritime tasks but also enhances resistance to disease and the ability to cope with maritime risks. Basic physical fitness encompasses multiple aspects, including strength, speed, endurance, and balance. Physical education in maritime programs should be closely aligned with the occupational characteristics of seafarers, systematically improving these physical qualities. For strength training, weight-bearing exercises and bodyweight resistance drills are recommended. Speed can be developed through short-distance sprints. Endurance training benefits from activities like long-distance running, swimming, and orienteering—the latter simultaneously honing navigation skills and stamina. Balance can be specifically trained using equipment such as balance pads, balance boards, fitness balls, and balance beams. In summary, maritime physical education should fully leverage traditional foundational disciplines like track and field, gymnastics, and swimming to comprehensively enhance seafarers' physical fitness through system-

atic training. Particular emphasis should be placed on aerobic exercises to strengthen cardiorespiratory endurance and improve physiological balance, thereby holistically enhancing bodily functions and adaptive capacity.

3.2. Vocational-Oriented Physical Training

Seafarers perform work and daily activities within the confined spaces of ships, where occupational demands impose unique physical requirements. To excel in their roles, they must develop specialized physical attributes aligned with their profession. These primarily include strength for heavy lifting, climbing ability, resistance to vertigo and balance, as well as aquatic skills such as diving, swimming, and lifesaving. Consequently, physical education in maritime programs extends far beyond general fitness training, exhibiting distinct vocational orientation and professional specificity. In practical implementation, training must closely align with maritime occupational demands through targeted methods. Examples include: - Strength training with equipment to enhance muscular power - Rock climbing, rope (pole, ladder) ascending to improve climbing skills - Balance beams and similar apparatus to develop equilibrium and vertigo resistance - Boat handling, diving, and swimming to reinforce water operations and survival techniques Crucially, physical education must deeply integrate maritime profession characteristics and actively collaborate with maritime faculty. Take maritime survival skills as an example: this competency requires not only swimming ability but also practical skills like donning lifesaving equipment, diving, climbing lifeboats, submersion, and first aid. Conducting instruction solely through conventional swimming courses would severely undermine its practical value. Therefore, it is essential to promote collaboration between physical education teachers and specialized instructors to organically integrate athletic skills like swimming into vocational training curricula such as maritime survival. This ensures effective alignment between physical conditioning and real-world occupational demands.

3.3. Cultivating and Guiding Healthy Lifestyles

With rapid advancements in modern ship technology, maritime accident rates have significantly decreased. Consequently, seafarers now face greater health threats stemming from lifestyle issues caused by prolonged working conditions, such as insufficient exercise, unbalanced diets, and irregular schedules leading to physical and psychological ailments. Specific manifestations include irregular meal times, disrupted circadian rhythms, preferences for high-salt, high-fat, and spicy foods, as well as harmful habits like excessive alcohol consumption and smoking. Therefore, physical education in maritime programs should transcend traditional skill training to embrace the educational role of promoting healthy living. Systematic instruction should convey the importance of healthy lifestyles, guide students in adopting scientifically appropriate exercise methods, and teach simple on-board workout tech-

niques. Specific measures include: promoting dietary optimization, advocating balanced nutrition, cultivating regular eating habits, and encouraging smoking cessation, alcohol moderation, and proactive rest. For onboard exercise, moderate-intensity, easily accessible individual or partner sports are recommended, such as yoga, martial arts, jogging, qigong, light weight training, and table tennis. These activities not only enhance seafarers' physical fitness but also help alleviate psychological stress, maintain emotional stability, and foster a positive, healthy outlook on life.

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