Application of Personalized Sports Nutrition Program in Maintaining Dancers' Body Shape and Improving Their Artistic Expression

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Abstract: This paper focuses on the application of personalized sports nutrition programs in maintaining body shape and improving the artistic expression of dancers. It explains the improvement of physical fitness requirements for dancers in dance art, combining scientific developments in sports nutrition, and clarifies the theoretical and practical significance of the research. Drawing on the literature review, this study presents the relevant research results and their limitations, examines the body shape, artistic expression, and nutritional status of dancers, develops personalized sports nutrition programs, and proposes application strategies. The study demonstrates that personalized sports nutrition programs can effectively maintain dancers' body shape, enhance artistic expression, and serve as a reference for the development of the dance industry.

1. Introduction

As an art form that combines physical beauty with emotional expression, dance has placed increasingly higher demands on the physical fitness of dancers over time. The graceful coordination of body shape and artistic expression is crucial for dancers to showcase the charm of their work on stage. The continuous development of sports nutrition science has brought new opportunities to the field of dance. Through scientific and reasonable nutritional intervention, it is expected to better help dancers maintain a good body shape and improve their artistic expression.

From a theoretical perspective, this study can enrich the research content at the intersection of dance and sports nutrition, providing new perspectives and ideas for the development of related disciplines. In practice, the research results can provide effective nutritional support for dancers' daily training and stage performances, enabling them to better realize their potential and thus promote the overall progress of the dance industry.

Upon reviewing both domestic and international research, it is evident that some countries have made significant progress in understanding the nutritional needs of dancers. They have developed personalized nutrition programs that address these needs and their effects on body shape and artistic expression. Additionally, a systematic theoretical framework and practical experience are in place to support this area of study. While research on dance training and nutrition has addressed the relationship between them and the physical indicators of dancers, significant issues remain, such as the inadequate development of personalized programs [1].

This study aims to develop an effective personalized sports nutrition program and explore its specific role in maintaining dancers' body shape and improving their artistic expression. The innovations of this study are primarily reflected in three aspects: First, a personalized program is formulated based on multiple factors, including dancers' physical indicators, training and performance needs, and dietary preferences, to enhance the program's relevance and applicability. Second, new scientific and technological means are employed to monitor and evaluate the program's implementation process, ensuring the scientific validity and effectiveness of the program. Third, the program's effects are comprehensively evaluated from multiple dimensions, including body shape and artistic expression, to fully reflect the program's impact.

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2. Related Concepts and Theoretical Basis

2.1 Overview of Personalized Sports Nutrition Program

A personalized sports nutrition plan refers to a precise nutrition plan tailored to individual factors, such as physical characteristics, sports needs, and lifestyle habits. The core of this plan is "personalization", which means getting rid of the limitations of traditional general nutrition advice, taking into full account individual differences, and providing different people with the most suitable nutrition guidance for their situations [2].

There are many principles to follow when developing a personalized sports nutrition plan. The principle of individualization is the primary principle, which requires that the plan be closely tailored to the specific situation of the individual and adopt appropriate methods. The principle of scientificity emphasizes that the formulation of the plan must be based on relevant scientific theories, such as sports nutrition and physiology, to ensure the rationality of the plan. The principle of balance emphasizes that the combination of different nutrients in the plan must be proportional to meet the body's various needs. The principle of timeliness states that the plan should be adjustable based on changes in individual conditions and different stages of exercise.

There are some aspects to consider when implementing a personalized sports nutrition plan. First, the plan should be adjusted flexibly according to the actual situation, as individual physical conditions and exercise needs are constantly changing. Second, it is essential to consider the mutual coordination of diet and training, allowing nutritional intake to better support training and enhance training outcomes. Finally, it is essential to closely monitor the individual's response to the plan, identify problems promptly, and address them effectively.

2.2 Dancers' Body Shape, Artistic Expression and Related Theories

The body shape of a dancer is fundamental to the beauty of dance. It includes height, weight, body composition, and body proportions, etc. Appropriate height and weight can enable a dancer to present a coordinated visual effect on stage. The reasonable proportion of muscle mass and body fat percentage in the body composition helps the dancer complete various difficult dance moves. Having good body proportions can enhance the beauty of dance performances and increase their appreciation. These factors interact with one another and jointly influence the performance of dancers on stage.

Artistic expression is the ability of dancers to convey the emotions and connotations of dance works to the audience. It has rich connotations and encompasses various aspects, including body control, emotional expression, dance skills, and artistic accomplishment. Body control ability enables actors to perform dance movements accurately and show the rhythm and tempo of dance. Emotional expression ability enables actors to convey their understanding of the work through vivid body language and evoke emotional resonance in the audience. Strong dance skills form the basis of artistic expression, and great artistic achievements can elevate the level and depth of that expression [3].

Sports nutrition theory provides important support for the formulation of personalized sports nutrition programs. Among them, macronutrients (carbohydrates, proteins, and fats) are the main sources of energy for the body and are essential for maintaining normal physiological functions and athletic ability. However, micronutrients (such as vitamins and minerals) are required in small quantities; they play an irreplaceable role in regulating body metabolism and enhancing immunity. Energy metabolism theory helps us understand the body's energy production and consumption mechanisms during exercise, and provides a basis for rationalizing nutritional intake.

The principles of exercise physiology provide insight into how dance training affects bodily functions. Dance training can improve the body's cardiopulmonary function, muscle strength, and flexibility. At the same time, it can also cause physical fatigue. The fatigue and recovery theory guides us on how to accelerate the body's recovery and mitigate the impact of fatigue on training and performance through targeted nutritional interventions.

The training principles and methods in dance training theory also have significant guidance for designing personalized sports nutrition programs. For example, according to the principle of gradual progress in dance training, the nutrition program should be adjusted accordingly as training intensity increases. Additionally, the nutrition program should also focus on the training characteristics of

different dance types.

3. Analysis of Dancers' Body Shape, Artistic Expression and Nutritional Status

3.1 Body Shape and Artistic Expression

By measuring the body shape indicators of dancers from different dance styles and experience levels, the statistical results show that ballet dancers are generally slender and have a lower body fat percentage, which is closely related to the high standards of ballet in terms of body lines. The body shapes of folk dancers are more diverse. The style characteristics of different folk dances result in dancers having certain differences in height, body shape, and other physical attributes. In contrast, the body shapes of modern dancers are relatively flexible, and their muscle mass is typically moderate, meeting the diverse and fluid movement requirements of modern dance [4].

Judging from the results of the artistic expression assessment, experienced dancers performed better in terms of emotional expression and movement coordination. The results showed a certain correlation between various body shape indicators and artistic expression. For example, having an appropriate amount of muscle mass can help dancers better control their bodies and execute complex movements, thereby enhancing their artistic expression; a reasonable body fat percentage can make the body lines of dancers more attractive and improve the visual effect of dance.

In addition, non-physical dancers such as psychological factors, artistic understanding, and stage experience also have a significant impact on artistic expression. Dancers with good psychological qualities can remain calm on stage and fully utilize their abilities; dancers with a deep artistic understanding of dance works can more accurately grasp the emotions and connotations of the works, making the performance more engaging. Extensive stage experience enables actors to effectively handle emergencies and maintain consistent artistic expression. Table 1 illustrates the intrinsic connection between body shape and artistic expression.

Table 1. The core of sports dance, artistic expression, and the correlation between artistic expression and body shape.

Dance	Core features	Artistic expression	The correlation between artistic expression and body shape
Ballet	Height: Women 165-175cm, Men 175-185cm; Body fat percentage: Women 18%-20%, Men 10% -12%; Slender limbs, slender muscle lines	Focus on body control and line beauty, high movement accuracy, implicit emotional expression, relying on toe skills and body extension to convey elegant temperament	Low body fat percentage makes the body lines clearer, the slender body shape enhances the sense of movement extension, and the muscle endurance supports long-term toe movements, which directly improves the fluency and beauty of the performance
Folk dance	Height: 160-170cm for women, 170-180cm for men; Body fat percentage: 20%-22% for women, 12%-14% for men; Well-proportioned body shape, outstanding core strength	Emphasis on the rhythm and explosiveness of national style, passionate and direct emotional expression, large-scale movements and distinct cultural symbols	The well-proportioned body shape can adapt to various ethnic dance movements (such as the softness of Dai dance and the strength of Tibetan dance). The core strength supports fast rotation and jumping, which enhances the appeal of the movements.
Modern Dance	No strict height restrictions; Body fat percentage: 19%-23% for women, 11%-15% for men; moderate muscle mass, high joint flexibility, and strong body coordination	Emphasis on free expression and improvisation, diverse emotional expression (from repression to release), and movements that emphasize the interaction and tension between the body and the ground	Moderate muscle mass balances explosiveness and flexibility, high coordination supports complex action combinations, and joint flexibility improves the completion of improvisational performances
Breaking	No strict height restrictions; Body fat percentage: Females 19%-24%, Males 12%-16%; High muscle mass (well-developed upper limbs, core and lower limb explosive muscle groups), large joint mobility	Focuses on the combination of strength and skills, with highly impactful movements (such as Thomas spin), unrestrained emotional expression, showcasing personality and vitality through difficult skills	High muscle mass supports difficult floor movements and aerial skills; explosiveness determines the strength and quality of movements; joint flexibility improves the fluency of movement transitions, affecting the shock value of the performance.

3.2 Nutritional Status and Needs

A survey of dancers' daily diets and nutritional intake revealed that some dancers have irregular diets. For example, some dancers reduce their carbohydrate intake excessively in an attempt to control their weight, which can lead to an insufficient energy supply. Many dancers do not fully grasp the significance of protein and often consume inadequate amounts, which can hinder muscle repair and growth. In terms of micronutrients, many dancers have an unbalanced intake of vitamins and minerals, which may be related to their irrational diet [5].

From the perspective of nutritional cognition and behavior, some dancers lack a comprehensive understanding of nutritional knowledge and hold incorrect nutritional concepts. For example, some people believe they can control their weight by eating less, disregarding the importance of a balanced diet. They also fail to pay attention to timely nutrition after training, which affects their body's recovery.

Combined with the analysis of dance training and performance characteristics, the nutritional needs of dancers are somewhat special. Dance training is intensive and prolonged, requiring high flexibility and coordination of the body, which necessitates a sufficient energy supply. Therefore, the intake of carbohydrates should be guaranteed to maintain the body's energy metabolism. At the same time, a large number of dance movements will cause certain damage to the muscles, and sufficient protein is needed to repair and build muscle tissue. In addition, dancers expend a significant amount of physical energy during performances, and they also need to supplement their diet with the right vitamins and minerals to maintain the body's normal physiological functions and immune system.

4. Design of Personalized Sports Nutrition Program

4.1 Design Process

For designing a personalized exercise nutrition program, the first step involves assessing individual body indicators, including height, weight, body fat percentage, and muscle mass, in dancers. Actors of different heights and weights have varying energy consumption and nutritional needs; body fat percentage and muscle mass reflect the body's composition and have a significant impact on determining the proportion of macronutrients in the nutrition plan. Additionally, an appropriate amount of fat reserves in the body is an important source of energy. When carbohydrates are insufficient, fat will provide continuous power to the body through oxidative decomposition, helping dancers maintain a high-intensity exercise state and ensure the consistency of movements.

However, fat reserves must be controlled within a reasonable range, and sports dancers must not be too fat. Excess body fat increases physical strain, reducing movement flexibility. Ballroom dancers, for example, focus on the smoothness of the upright and rotating frame of the body. Obesity may destroy the balance of the body and affect the stability of the dance posture. Therefore, the body fat rate in individual body indicators needs to be accurately controlled. It is essential to maintain adequate fat levels as an energy reserve for physical activities, while also preventing the negative effects of excess body fat on body shape and exercise performance.

Dance training and performance requirements are vital components of program design. Various dance styles have distinct training intensities and focuses. For example, ballet training requires high limb control and increased muscle endurance. Nutritional programs should focus on protein supplementation to maintain muscle function. Modern dance training is intensive, involving large movements and high energy expenditure, so adequate carbohydrate intake is necessary. At the same time, the intensity of performance arrangements will also affect nutritional needs. When performance tasks are frequent, the body requires more energy and needs to increase its nutritional intake accordingly.

Personal dietary preferences and taboos should be acknowledged and respected. Respecting dancers' dietary preferences can enhance their compliance with the nutrition plan and make it easier to implement. Additionally, food allergies and other sensitivities must be strictly avoided in the plan to prevent adverse health effects on the dancers.

4.2 Specific Contents

In terms of a reasonable combination of nutrients, the proportion of macronutrients, such as carbohydrates, proteins, and fats, should be determined according to the dancers' physical indicators and training needs. Generally speaking, carbohydrates should account for 50%-60% of the total energy, providing the body with the main energy source; proteins account for 15%-20%, which is used to repair and build muscle tissue; and fat accounts for 20%-30%, providing essential fatty acids and energy reserves. At the same time, it is essential to ensure an adequate intake of micronutrients, such as vitamins and minerals, which can be achieved by consuming more fresh vegetables, fruits, whole grains, and other healthy foods.

In terms of nutrient collocation, it is necessary to design carefully according to the individual differences, training stages, and dance characteristics of dancers. And the metabolic level and growth needs of dancers of different ages are completely different. Young dancers are in a critical period of growth and development, and the growth of bones and muscles needs a lot of protein. It is suggested that the daily intake of protein should reach 1.6-2.0g/kg body weight, and at the same time, trace elements such as calcium and zinc should be supplemented. Calcium can be ingested through milk and bean products, while zinc can be obtained from lean meat and nuts to support bone development and immune system function. Older dancers, on the other hand, have gradually decreased their metabolic rate and energy consumption. Therefore, it is necessary to appropriately reduce their total calorie intake, especially the ratio of carbohydrate to fat, and at the same time increase their dietary fiber intake (25-30g per day), to delay the rise of blood sugar.

Gender differences also affect the formulation of nutrition programs. Male dancers have a higher basal metabolic rate, and their daily energy consumption is 10%-15% higher than that of women. Especially in high-intensity training, the demand for carbohydrates is more prominent. Protein intake should also be increased accordingly (1.4-1.8g/kg body weight) to help muscle repair. Female dancers have low basal metabolism and are affected by the physiological period, so they need to pay attention to iron supplements (18mg per day), which can be ingested through red meat and animal liver.

The dietary plan, consisting of three meals a day and snacks, should be both scientific and reasonable. Breakfast should be nutritious, containing carbohydrates, protein and a small amount of fat, such as whole wheat bread, eggs, milk, etc., to provide energy for a day's training; lunch should ensure sufficient calories and nutrition, and can be paired with staple foods, vegetables, such as rice, chicken, green leafy vegetables; dinner should be relatively light, avoid excessive calorie intake, and choose whole grain rice, soy products and vegetables. Snacks before training should consist of easily digestible foods, like bananas and yogurt, to provide energy for the workout. After training, snacks should focus on replenishing protein and carbohydrates. Good options include protein powder and whole wheat biscuits, which help the body recover [6].

Nutrition plans need to be adjusted appropriately for special periods. Carbohydrate storage before training is very important, especially for dancers in the preparation period. They need to gradually increase carbohydrate intake 1-2 days before training, and increase muscle glycogen storage through compound carbohydrates such as sweet potatoes, to store energy for high-intensity training or competition. During training, the body loses a significant amount of water and electrolytes, making it necessary to supplement foods rich in trace elements like potassium and sodium promptly. For example, bananas can supplement potassium (to prevent muscle spasm), sports drinks or glucose water can quickly replenish energy and maintain blood sugar stability. It is recommended to supplement 300-500ml of liquid every hour for training. Moreover, pay attention to muscle repair after training, and supplement the combination of protein and carbohydrates within 30 minutes, such as protein powder with whole wheat bread. Dancers in their menstrual period are weaker and should pay attention to supplementing their diet with nutrients such as iron and vitamins, and avoid eating raw, cold, and irritating foods. At the same time, they should adjust their diet accordingly to their physical condition.

There are also significant differences in the nutritional requirements of different dance species. Ballet dancers aim for optimal body lines, needing to manage body fat while maintaining muscle strength. Therefore, the supplement of high-quality protein is particularly critical, and low-fat and

high-protein foods such as chicken breast, fish, shrimp, and eggs can be selected. Sports dance is a round event that combines aerobic and anaerobic exercises, consuming a lot of physical energy. In addition to the regular intake of carbohydrates and protein, a small amount of nuts can be added between training sessions to properly store energy and cope with the demands of competition.

Additionally, in response to the demand from ballet dancers and folk dancers for reducing fat in the months before performances, this study has formulated a healthy and safe fat-reducing plan. First, ensure that the daily calorie gap is controlled at 300-500kcal to avoid excessive dieting leading to metabolic decline. It is achieved by reducing high-calorie foods such as refined sugar and fried foods. It is necessary to maintain satiety and stabilize blood sugar. Moreover, during the period of reducing fat, they should pay more attention to the supplement of vitamins and minerals, and consume more than 500g of vegetables and 200-350g of fruits every day to ensure the normal operation of the body machine and avoid the influence of lack of nutrition on training and performance.

5. Application Strategies of Personalized Sports Nutrition Programs

Combined with the dancers' training cycles and performance arrangements, personalized sports nutrition programs should have different application focuses at different stages. During the daily training period, dancers' training is relatively regular. At this time, the nutrition program should focus on balanced nutrition intake to ensure the body obtains sufficient energy and various nutrients, thereby maintaining a good body shape and normal training status. Macronutrients, such as carbohydrates, proteins, and fats, should be reasonably balanced. It is important to ensure an adequate supply of vitamins and minerals to provide support for the body's metabolism and muscle repair. [7].

Prior to the performance, the dancers will gradually increase the intensity of their training to finalize their preparation for the stage performance. Currently, the nutrition plan should focus on strengthening energy supplementation to meet the needs of high-intensity training. Additionally, pay attention to a balanced diet to avoid physical damage caused by overtraining. It is recommended to increase carbohydrate intake appropriately to improve the body's glycogen reserves and prepare for high-intensity physical exertion during performance. At the same time, ensure adequate protein intake to help muscles recover quickly after high-intensity training.

In the process of applying personalized sports nutrition programs, it is crucial to regularly evaluate body shape indicators and artistic expression. The artistic expression is evaluated through expert assessment and audience feedback to determine the program's impact on improving artistic expression. According to the evaluation results, the nutrition program is adjusted promptly to align it more closely with the actual situation and needs of the dancers, ensuring the program's effectiveness and adaptability.

Nutrition education for dancers should also be enhanced to improve their understanding of and compliance with individualized sports nutrition programs. Dancers should understand the crucial role of nutrition in dance training and performances, acquire basic nutrition knowledge, and actively participate in implementing the program. In addition, a professional nutrition guidance team should be established to provide dancers with timely consultation and guidance, and promptly solve problems that arise during the application process.

6. Conclusion

Personalized sports nutrition programs have significant value in maintaining dancers' body shape and enhancing their artistic expression. According to the individual characteristics of dancers, such as physical indicators, training and performance needs, dietary preferences, and other factors, reasonable nutrient combinations and scientifically designed diet plans are formulated to actively maintain the dancers' body shape. A reasonable nutritional intake helps maintain an appropriate weight, body fat percentage, and muscle mass, allowing dancers to perform various dance movements more effectively and exhibit a beautiful, coordinated body shape.

Moreover, personalized sports nutrition programs can help enhance the artistic expression of dancers. Adequate and balanced nutrition provides dancers with the energy needed to control their

bodies and perform complex movements effectively. In addition, proper nutrition supplementation can enhance physical recovery, reduce fatigue, increase dancers' energy and attractiveness on stage, and enable them to convey the emotions and themes of dance works more accurately.

The research findings offer practical insights for improving the training and performance of dancers. They provide scientific nutritional guidelines that help dancers plan their diets more effectively during daily training sessions. This approach enhances the effectiveness of their training, allowing them to fully maximize their potential during stage performances. At the same time, it also serves as a valuable resource for dance training institutions, industry associations, and other related organizations, helping to promote the standardized and scientific development of the dance industry through nutritional support.

In future research, it is recommended to further investigate the effects of personalized sports nutrition programs on the physical functions and physiological indicators of dancers, to elucidate their mechanism of action at a more detailed level, and to provide a scientific basis for optimizing and improving the program.

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