BRIEF LITERATURE REVIEW ON RUMBA MOVEMENT ANALYSIS

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Abstract: *The analysis of sports dance mechanics is a topic of interest among researchers in recent years. Pengping Zhu (2004) studied classical ballet training combined with biodynamics and analyzed its correlation. Xiling Deng (2001) discussed mechanical issues in aerobic gymnastics.*
Latin dancers have radically different biomechanical demands than standard dancers (McCabe, T. R., Wyon, M., Ambegaonkar, J. P., Redding, E., 2013). In Latin American dances, both men and women follow a similar step pattern and often mirror each other's movements (Laird, W. & Laird, J., 2003).
In order to be able to understand the motor content that supports the technical executions specific to sports dance, we need to be guided by the movement analysis models. In this sense Bota A. (2007), citing Rasch and Burke, presents stages of the model of biomechanical analysis of movement.
Due to the complexity of dance steps and specific combinations, sports dance is an extremely demanding field, being approached by the performance field, so it requires many hours of training to achieve general and specific physical training.

Key-Words: rumba, literature review, mechanics analysis.

INTRODUCTION

Through this short review of the specialized literature, we aim to explore the existing body of knowledge regarding the analysis of movement in Rumba dance.
The analysis of sports dance mechanics is a topic of interest among researchers in recent years. Pengping Zhu (2004) studied classical ballet training combined with biodynamics and analyzed its correlation. Xiling Deng (2001) discussed mechanical issues in aerobic gymnastics.

Rumba is a passionate and expressive dance style originating from Latin America. The review provides an overview of relevant scientific literature, focusing on biomechanical aspects, motor control, technique, and performance factors associated with Rumba dance.

Rumba dance is a captivating style of Latin American dance that allures through its passion and expressiveness. Originating from Latin America, Rumba is a dance that combines elements of Cuban and African dance, characterized by rhythmic movements of the hips, legs, and arms.

The analysis of movement in Rumba dance holds fundamental importance in understanding and enhancing dancers' technique and performance. By studying the biomechanical aspects and motor control, we can gain a clearer perspective on the specific movements of Rumba and how they are coordinated and executed by dancers. Moreover, movement analysis can provide a solid foundation for the development of training and instructional methods, contributing to performance improvement and injury prevention.

By examining key aspects that highlight the importance of movement analysis in Rumba dance, we have reviewed the relevant literature associated with these aspects.

Biomechanics is an interdisciplinary field that deals with the study of human movement and the interaction between the skeletal, muscular, and joint systems. In the context of Rumba dance, biomechanics can be applied to understand and optimize the techniques and specific movements of this dance style.

In order to be able to understand the motor content that supports the technical executions specific to sports dance, we need to be guided by the movement analysis models. In this sense Bota A. (2007), citing Rasch and Burke, presents stages of the model of biomechanical analysis of movement. Latin dancers have significantly different biomechanical requirements compared to standard dancers (McCabe, T. R., Wyon, M., Ambegaonkar, J. P., Redding, E., 2013). In Latin American dances, both men and women follow a similar step pattern and often mirror each other's movements (Laird, W. & Laird, J., 2003).

Biomechanical studies in Rumba dance focus on analyzing the forces and momentums operating on the dancers' bodies, thereby assessing their distribution and magnitude in

different positions and specific movements. These studies often employ advanced measurement and analysis techniques, such as motion capture and computerized analysis, to understand and quantify relevant biomechanical parameters.

Important aspects of biomechanics in Rumba dance analyze body posture. Biomechanics allows for the evaluation and analysis of correct body positioning during Rumba dance. Proper body alignment ensures the stability and balance necessary for fluid and expressive movements. Biomechanical studies can provide insights into the correct alignment of the spine, shoulder position, hip positioning, and leg placement, enabling dancers to improve their posture and establish a solid foundation for specific Rumba dance movements.

Movement analysis allows for the identification of incorrect technical details and execution errors. By evaluating movements and the involved biomechanics, inadequate body positioning, incorrect posture, misalignment, or other aspects that may affect the quality of movements can be identified. By becoming aware of and correcting these errors, dancers can improve their technique and avoid injuries associated with incorrect movements.

The specialized literature offers limited research on the study of dance technique correction and movement analysis in sports dance, particularly in Rumba dance.

One identified study is that of Gerdes (2009), which refers to the application of a questionnaire to Taiwanese students regarding a curriculum focused on ballet, modern dance, and stage movement in operettas. The main conclusion drawn was that "dance technique and their associated pedagogies not only affect the dancer but also impact the integration of dance technique with the rest of the dance field and, subsequently, the role of dance in general culture."

The paper, published in 2018 by Dryburgh, describes the learning experiences of students who undergo a somatically informed learning process through predetermined materials. The research concludes that contemporary dance technique study sessions can be perceived as inspiring and enriching, providing a process of self-discovery oriented towards self-awareness.

The movement analysis in Thai dance is presented by Iqbal, J., Sidhu, M. S. (2016). The proposed technology utilizes motion detection, emotion analysis, coordination analysis,

and interactive feedback techniques for a specific dance style chosen by the learner. The teaching/learning technique of Thai dance is facilitated through augmented reality and the Microsoft Kinect V2 module, which, according to the authors, provides a more enjoyable, user-friendly, and self-motivating experience.

Also Chinese authors (LinJuan Z.) present in 2022 a study that attempts to correct and analyze certain movements of Chinese classical dance by combining digital feature recognition technology. According to the authors' conclusions, this approach has a positive effect and can effectively promote the improvement of Chinese classical dance training outcomes.

I could not identify any research studies in the specialized literature that focus on Rumba dance and its technique analysis or the correction of athletes' techniques.

Another aspect related to movement analysis is the optimization of performance. Movement analysis can provide valuable information about the efficiency of movements and how they can be improved to achieve better performance. By understanding the biomechanics and principles of motor control, the ideal way to execute movements in a more fluid, precise, and controlled manner can be identified, leading to superior performance in Rumba dance.

The research conducted by Akemi (2018) highlights the differences in center of gravity positioning during walking figures in standard dances and the Japanese walking style in sports dances. This study contributes to a better understanding of the differences that coaches need to consider when teaching walking figures to Japanese athletes.

In 2023, Wanke and colleagues published a study aiming to demonstrate the statics of the upper body in specific and non-specific dance postures, taking into account gender differences. The study's applicability lies in gaining a clearer understanding of the muscular structures involved in Latin dances at the upper body level.

Rumba is a sensual dance that involves distinct movements of the pelvis and hips. By applying the principles of biomechanics, dancers can learn to coordinate the movements of these body areas in a harmonious and efficient manner, thus achieving expressiveness and grace in their dance.

By measuring and analyzing the forces and momentums applied to the dancer's body during different movements and figures, one can understand their distribution within the

dancer's body and how they influence the performance and efficiency of the movements. For example, in Rumba dancing, ground reaction forces, centrifugal forces, and muscular forces all play important roles in generating smooth and precise movements.

Rumba often involves rapid and precise weight transfer from one leg to another. Biomechanics can help understand how this weight transfer occurs and how to optimize its force and stability. Additionally, the angles and directions in which these movements are performed can be analyzed to achieve a visually pleasing effect and optimal fluidity. Rumba also includes rotational movements of the body in different directions. By applying biomechanical knowledge, dancers can better understand how to use their muscles and joints to achieve controlled and harmonious rotation.

Rumba dance involves repetitive and demanding movements, which can increase the risk of injuries. Motion analysis can help identify risk factors and develop injury prevention strategies. By evaluating and adjusting dance techniques, stress on the joints can be reduced, body alignment can be improved, and necessary modifications can be identified to minimize the risks associated with regular practice of Rumba dance.

McCabe et al. (2014) found that the majority of Latin dancers presented injuries in the lower limbs, trunk, and spine. In Latin American dances, steps are composed of movement patterns that typically involve rotational dissociations through the lumbar spine and pelvic girdle.

Rotational dissociation is created by the torsion of the bilateral sacroiliac joints, rotation of the lumbar spine, hip rotation, and rotation of the thoracic spine. Studies have shown high activation of the external oblique, internal oblique, and gluteal muscles during these specific movements (Liébana).

Motion analysis can serve as a basis for developing more efficient training programs. A detailed understanding of the movements and mechanisms involved can guide the development of specific exercises that develop and strengthen the skills required for Rumba dancing. By integrating motion analysis into the training process, dancers can benefit from more focused and tailored training that caters to the specific requirements of this dance style.

The study of proprioception in the training process of sports dance leads to a better understanding of how the body functions. Proprioception in sports dance has already

shown positive effects on improving balance skills (Ljubojević et al., 2012). The research conducted by Ljubojević A. et al. (2020) on the effects of proprioceptive training in conditioning sports dance fitness is highly significant considering how much agility affects dancers' performance. It is assumed that proprioceptive exercises increase dancers' awareness of including specific muscle groups in establishing better body posture.

It has been argued that conventional dance studio exercises provide limited benefits in terms of strength development (Rimmer, Jay, Plowman, 1994). This hypothesis was tested by examining the effects of additional strength training programs on male and female professional dancers (Koutedakis, Cross, Sharp, 1996; Stalder, Noble, Wilkinson, 1990; Groer, Fallon, 1993).

Muscular hypertrophy is considered undesirable for a dancer's profession. However, strength training can lead to significant increases in muscular strength without proportional changes in muscle size (MacDougall, Elder, Sale, et al., 1980). Increased neural involvement may explain some of the strength gains induced by training, suggesting that, at least in the early stages of such training, hypertrophy is not a requirement for strength development (Koutedakis, Stavropoulos-Kalinoglou, Metsios, 2005).

The exercises involved in a dancer's training depend on the style of dance pursued in competitions. The physical preparation of the dancer involves speed, strength, endurance, flexibility, and coordination. These qualities are fundamental for the performance of any sport.

In 2007, the effects of a 12-week training program aimed at increasing quadriceps strength and knee tendon strength were studied to gather data that could be useful in injury prevention, as well as to examine the influence on certain anthropometric characteristics. These training programs influenced the prevention of knee torsion but did not lead to an increase in the aesthetic component of dance (Koutedakis & Sharp, 2004). On the other hand, evaluating the effects of a 12-week aerobic and muscular strength training program on certain performance and fitness parameters showed positive effects, demonstrating that the program led to increased aerobic capacity and leg strength (Koutedakis et al., 2007). However, there is currently no scientific evidence

suggesting that different strength training regimens should be used for different dance styles (Twitchett et al., 2009).

A proper analysis of the structure of sports dance training helps in incorporating key elements necessary for performance capacity and achieving excellent results in competition within the methodology of specific preparation (Aleksandrova, 2018; Egner, 2022).

In conclusion, movement analysis in Rumba dance is an essential component in improving and perfecting Rumba dance. By evaluating and understanding the specific movements, biomechanics, and motor control, dancers can correct technical errors, optimize performance, and prevent injuries associated with dance practice. Movement analysis provides valuable information about how the body moves, the distribution of forces, and the interaction between different parts of the body during dance. This enables dancers and instructors to develop more effective training strategies and techniques tailored to the specific needs and requirements of Rumba dance.

Furthermore, movement analysis contributes to understanding the biomechanics and mechanisms involved in performing fluid and expressive movements in Rumba dance. Dancers can benefit from a better body awareness, more precise coordination and motor control, and an improved ability to adapt to the specific requirements of this dance style. Through movement analysis, dancers can explore and experiment with various techniques and movement variations, thus discovering innovative ways to express their creativity and individuality in Rumba dance.

The performance factors in Rumba dance represent the key elements and aspects that contribute to an impressive and high-quality interpretation of this dance style. These factors are essential in creating a captivating, expressive, and memorable performance.

In Rumba dance, effective interaction and communication with the partner are essential. Dancers need to be synchronized and coordinated, establishing a strong connection and complementing each other's movements. This creates a special chemistry and transmits positive energy to the audience. Rumba is closely tied to Latin music, and dancers must be sensitive to the rhythm, melody, and musical subtleties. They need to interpret and highlight the key elements of the music through their movements, synchronizing with the beat and adding variations and accents in accordance with the music.

It is important to mention that these performance factors can vary depending on the dancer's style and personal interpretation, as well as the specific choreography or performance. Improving performance in Rumba requires time, dedication, and experience, as well as ongoing learning and creative exploration of this captivating dance style.

The literature review on movement analysis in Rumba dance highlights the importance of studying biomechanical aspects, motor control, technique, and performance factors in this dance style. However, there are still many aspects that can be further investigated in the future, including the use of advanced motion analysis technologies, the integration of Rumba dance into physical therapy, and the development of more efficient training and conditioning programs for dancers.

Indeed, this literature review contributes to a deeper understanding of movement in Rumba dance and provides a solid foundation for future research and development in this field. By combining theoretical and practical knowledge, a continuous improvement of technique and performance in Rumba dancers can be achieved. This review opens up possibilities for further exploration and innovation, paving the way for advancements in training methodologies, injury prevention strategies, and artistic expression in Rumba dance.

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