Innovative Therapies: Diverse Applications of Dance into Physiotherapy

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Abstract. While traditional physiotherapy focuses on functional restoration, this paper delves into the multiple applications of dance in physiotherapy, including its role in motor rehabilitation, neurological rehabilitation, pain management, cardiorespiratory rehabilitation, and emotional and mental health. This line of thinking emphasises not only the biomechanical structure of the body, but also the psychological, emotional and social dimensions. In addition, we present innovative physiotherapy approaches that combine dance and rehabilitation to provide patients with more comprehensive treatment options. Future research and practice will require a deeper understanding of the mechanisms of dance and physiotherapy and more extensive randomised controlled clinical trials to validate their effectiveness. It is also important to understand patients' perceptions of dance therapy to better meet their needs. Taken together, this paper highlights the potential of dance in the field of rehabilitation to provide promising therapeutic avenues for improving patients' quality of life.

Keywords: Dance; Rehabilitation; Physiotherapy.

1. Introduction

The existing physiotherapy literature is relatively under-theorised on the subject of the body and there is a need for a renewed focus on the significance of the body in the field. A relatively dialectical view of the traditional biomechanical perspective suggests a more pluralistic and inclusive approach that incorporates the dimensions of experience and the body at a socio-cultural level into physiotherapy practice. This suggests that the field of physiotherapy is increasingly considering the experiential and socio-cultural dimensions of the body in addition to the physical aspects of the body [1].

The idea of dance-based applications in physiotherapy was born out of necessity, and the positive implications of dance in physiotherapy are to improve physical function, enhance psychological state, facilitate social interaction, and stimulate creativity to comprehensively facilitate the rehabilitation process of patients. Despite the availability of relevant data to support the positive observations, the lack of detailed methodology and data makes it difficult to fully assess the scientific credibility and external validity of the study [2].

This thesis provides an insight into the importance of physiotherapy and how dance can be incorporated into the field of physiotherapy as an innovative approach. Aims to provide the reader with a comprehensive perspective to recognise the diverse applications and benefits of dance in physiotherapy. Exploring the potential role of dance in different areas of rehabilitation, including motor rehabilitation, neurological rehabilitation, cardiorespiratory rehabilitation and emotional/mental health aspects, positive impact on geriatric rehabilitation and social interaction, it demonstrates the potential for the future integration of dance and physiotherapy, as well as possible directions for research and application.

2. The Functional Role of Dance in Rehabilitation

2.1. Sports Rehabilitation and Recovery of the Musculoskeletal System

When research refers to "improved muscle function", it usually means positive changes in muscle strength and function. In the case of the Virtual Dance Game exercise study, this means that the

participants made some progress in their muscles. Below is a detailed breakdown of muscle function improvement.

2.1.1 Increased muscle strength

A key aspect of muscle function is muscle strength. By exercising through virtual dance games, participants may experience an increase in muscle strength. This means that they are able to more easily perform tasks that require a certain amount of strength, such as climbing stairs, lifting heavy objects, or maintaining balance.

2.1.2 Improve muscular endurance.

Dance exercises may involve prolonged movements that require continuous muscular work. This can help improve muscular endurance, making participants more able to consistently perform activities that require staying power, such as walking, standing for long periods of time, or performing daily chores.

2.1.3 Improve co-ordination and flexibility.

Dance exercises often include a variety of movements and steps, which can help to improve muscle co-ordination and physical flexibility. This is especially important for older people as it can reduce the risk of falls.

2.1.4 Enhance core stability.

Dance movements often require the involvement of the core muscles, which include the abdominal and back muscles. With this exercise, core stability can be enhanced, leading to improved posture, reduced back pain, and increased physical stability.

2.1.5 Reducing muscle imbalances.

Consistent dance practice over time can help reduce imbalances between different muscle groups. This can help prevent postural problems and sports injuries.

It is important to note that improvements in muscle function may take some time and consistent practice [3]. During dance, all muscles and joints are exercised, which improves muscle structure, prevents muscle contractures and atrophy, increases range of motion of joints, and prevents rheumatic pain, which is important for stabilising the skeletal system.

2.2. Neurological Rehabilitation and Motor Function Improvement

A study has confirmed the effectiveness of a novel integrated dance-physical therapy intervention called the DArT approach in patients with mild Parkinson's disease (PD). The study found that the DArT approach achieved significant results in improving motor dysfunction in PD patients relative to conventional physiotherapy, including reductions in MDS-UPDRS-III total score and upper body subscores. The results of this study highlight the potential benefits of integrated dance-physical therapy interventions in PD rehabilitation and provide a new approach to improving rehabilitation in patients with PD [4]. Dance can also provide older people with a greater link to society. Dancing rhythmically by listening carefully to music and memorising steps through choreography training can go a long way in preventing dementia [5].

2.3. Dance Movement in Pain Management

Dance therapy reduced pain to some extent and this improvement lasted for several months. Fibromyalgia is the main cause of pain, and reducing pain not only significantly improves physical function, but also increases the distance travelled in the step test, an effect that has also been demonstrated in osteoarthritis patients. In addition, weight loss in this group of patients played an important role in terms of pain indices, as it prevented the exacerbation of knee and lumbar spine pain [6].

2.4. Effects of Dance on Cardiorespiratory Rehabilitation

The value of aerobic dance in improving cardiovascular health has been questioned, but research suggests that moderate- and high-intensity aerobic dance can provide enough cardiovascular stress to improve health [7]. By dancing regularly, the body's oxygen uptake capacity is increased, and lung ventilation is improved, thus making oxygen available to all body cells. In addition, blood volume, heart rate frequency and maximum stroke volume and cardiac output are increased, thus improving circulation to a large extent. Improved efficiency of the respiratory system, resulting in a better supply of oxygen to the muscles, brain, etc. Enhances heart function, improves blood flow in the blood vessels, increases anti-inflammatory markers, and to a certain extent helps to normalise and better control blood pressure, resulting in a lower risk of blood clots and emboli [8-12], Increasing HDL cholesterol, lowering serum SAA concentrations, and significantly reducing inflammatory biomarkers can help reduce the 10-year risk of cardiovascular disease [13].

3. Emotional and Mental Health Perspectives

3.1. Dance as A Means of Emotional Expression

As one of the most primitive forms of human expression and communication, dance is considered one of the most synchronised activities of the human body [14]. The American Dance Therapy Association has said that dance enables psychological healing, promoting emotional, cognitive, physical and social integration of individuals through movement. [15]. It is based on learning motor sequences, implicit or procedural memory, attention, timing and physical strength, and cognition is an important part of its implementation. [16-17]. Therefore, there is relevant evidence that the use of dance as therapy in the rehabilitation process is beneficial for these different systems [18].

3.2. The Role of Dance in Reducing Anxiety, Depression and Stress

In a study exploring the effects of dance training on the motor function and mental health of an individual with severe cerebellar ataxia symptoms, results showed that after 8 weeks of partner dance training, the individual achieved improvements in independent standing balance, gait characteristics and functional mobility. In addition, the training significantly reduced depressive symptoms and improved quality of life. These findings suggest that partner dance training not only helps to improve motor function, but also positively affects mental health, providing a potential rehabilitation method for individuals with severe cerebellar ataxia [19].

In addition, many researchers have emphasised the effects of music on physiological changes in the body, including music-stimulated emotional responses and music-relieved anxiety and its accompanying phenomena. The former changes are manifested in measurements of pulse, blood pressure, heart rate, electrical skin response, and respiratory parameters, respectively. The latter are manifested in excessive acceleration of heartbeat and respiration, sweating, decreased pain threshold, decreased immunity, and increased stress hormones [5]. Therefore, this type of exercise performed to the accompaniment of music is not as tiring as other physical exercises, and it is motivating and strengthens one's stamina.

4. Innovative Physiotherapy Treatments

4.1. The Use of Creative Dance Elements in Physiotherapy

Creative dance offers a multidimensional approach in physical therapy. The multifaceted value of dance, both physically and socially, can address the patient's problems in an integrated manner. Classical ballet technique has interesting relevance to the field of physiotherapy. It provides a validated sequence of movement elements suitable for quantitative analysis, with an emphasis on static and dynamic stability, as well as defined positions and movements within the anatomical plane. This modular organisational structure, similar to the physiotherapy approach, contributes to improved

motor control and coordination by transitioning from slow movements to faster execution speeds. In addition, classical ballet emphasises the linguistic structure of movement where static positions play a key role in creating the basis for complex movements. These principles are also applicable in the field of rehabilitation, such as stroke rehabilitation, as they help improve motor control and help address selective muscle activation and coordination. The training goals of classical ballet, such as alignment, flexibility, core strength, postural control and selective motor control, match the needs of rehabilitated children, especially those with CP. These similarities make classical ballet technique a promising rehabilitation tool that offers new perspectives and approaches to rehabilitation through the use of its movement elements to compensate for deficiencies in joint position sense in rehabilitated patients, such as hip external rotation and adduction exercises [20].

Motivation is key to many treatments, such as childhood cerebral palsy. From a therapeutic perspective, creating environments that engage patients can increase their motivation and participation. Group environments facilitate natural peer modelling and promote social interaction, which can be invaluable for therapy clients who typically spend the majority of their time in a one-to-one therapy setting. Additionally, survey results indicated that all families enjoyed this activity on Saturdays, which demonstrated parental support and enjoyment of their children's participation in this dance programme. This dance programme encourages children's positive interest and appreciation of the arts, which may have a positive impact on their lives physically, creatively and emotionally. Overall, the therapeutic environment provided by this programme for the treatment targets and their families was very positive, and although better outcome measurement tools are needed, the dance programme, which incorporates movement and the performing arts, offers potentially rewarding experiences for the children's posture, motor skills and social participation.

4.2. Rehabilitation and Social Interaction in Old Age

With the increase in life expectancy per capita, societies are faced with the serious challenge of population ageing, which has become the most important factor in structural transformation. In the twenty-first century, attention to addressing issues related to senior citizens has become particularly urgent. In addition to the fulfilment of basic needs, attention also needs to be paid to the quality of life of senior citizens, including their physical health, mental health, level of independence, social interactions and living environment. More and more people are looking for active lifestyles in old age, and dance-based physical activities have recently become one of the most sought-after activities.

Dance involves two kinds of cognition (e.g. motor sequence learning, procedural memory, attention, spatial and temporal synchronisation, physical exertion, and socialisation [12], largely preventing Alzheimer's disease, improving the body's oxygen uptake and lung ventilation, stabilising the bones, and preventing the onset of a number of risky diseases such as obesity, osteoporosis, coronary heart disease, and diabetes mellitus. The survey shows that most of the participants have significantly improved their physical fitness (98%) and are energetic and vigorous (86%). In addition, the survey revealed that respondents generally felt that dance classes had a significant positive impact on their physical and mental health, and that they felt happier and more joyful even when they were sick, which may be related to happy hormones.

4.2.1 The Impact of Dance on the Quality of Life of Older Individuals

• Increases muscle strength, endurance and mobility, thus improving independence in daily life and maintaining motor skills.

• Increases bone density, reducing the risk of osteoporosis and lowering the likelihood of fractures.

• Increases the effectiveness of the respiratory system to better deliver oxygen to the muscles, brain, etc.

• Strengthens heart function and promotes blood circulation in the blood vessels, which is beneficial in maintaining normal blood pressure and control over blood pressure, thus reducing the risk of blood clots and embolism.

• Helps maintain cardiovascular health by increasing HDL cholesterol levels while lowering triglyceride and LDL cholesterol levels.

• Helps to regulate high blood sugar levels, improve cellular utilisation of glucose, enhance the effectiveness of insulin in the body and reduce the risk of developing type 2 diabetes.

• Enhances the body's immunity to infections.

• Reduces body fat, improves bowel movements and regulates bowel habits, which in turn promotes slimming and maintenance of proper body weight.

• Improve physical and mental health and reduce stress, thus improving sleep quality and reducing the risk of depression and anxiety, etc.

4.2.2 Dance as a Platform for Social Interaction and Collaboration

Participation in dance classes is akin to group therapy, facilitating the coming together of people facing the same `sufferings' and making it easier for them to deal with problems together and engage with society. As a result of dance, many of the respondents have become less shy, so that it is now easier for them to build relationships (46.5 per cent). The vast majority of respondents noticed an increase in their attractiveness, with more than 70% of them regularly socialising with other students outside of class, and the remainder not doing so on a regular basis [5].

Dance faces some major obstacles as an engaging way to keep the mind and body healthy. The most prevalent is a lack of motivation and willingness, which accounts for many people. There are also challenges faced by those with a lower standard of living, coupled with a proportion of people who find it difficult to participate due to lack of time. It is worth noting that a proportion of older people are unable to enjoy the benefits of dance due to health issues. Encouraging the overcoming of these barriers to active participation in dance and physical activity is therefore essential for health promotion.

5. Future Developments and Perspectives

5.1.Exploring the Potential of Combining Dance and Physiotherapy

More and more dance schools are offering a wide range of different courses so that everyone can choose a course that suits them, regardless of gender, age or social status. Dance courses are offered at different levels so that everyone can choose the right course for them, regardless of skill or ability. This inclusivity gives opportunities to a wider range of people whilst also giving you a sense of fulfilment and enjoyment. Dance is a natural movement that is a physical necessity for the body as well as a source of health. Dance has been used by humans since the dawn of time and throughout every stage of life [16].

5.2.Suggest Possibilities For Further Research and Application

Diverse applications of integrating dance into physiotherapy have been shown to be effective however research has been limited to only a small number of participants, and there is a need to fully understand the musculoskeletal mechanisms of dance limb movement and physiotherapy and to clarify the functional significance of the repertoire choreography for replication [21]. There is a need for randomised controlled clinical trials to provide data support for observable outcomes to assess effectiveness. In addition to this, there is a need to study the perceptions of the population towards dance therapy in order to gain a fuller understanding of the impact of this therapy on self-efficacy assessments.

6. Conclusion

When considering the functional role of dance in rehabilitation, it is undeniable that it has a positive impact in several ways. This thesis delves into the role of dance in motor rehabilitation and recovery of the musculoskeletal system, neurological rehabilitation, pain management and cardiorespiratory rehabilitation, as well as its impact on emotional and mental health. In addition, this

dissertation describes some innovative physiotherapy approaches that combine dance and rehabilitation to provide a more holistic treatment programme.

From the research in this thesis, it can be concluded that dance has a wide range of applications as a comprehensive rehabilitation tool. Not only does it help individuals improve muscle strength, endurance and coordination and increase physical functioning, but it can also play an active role in neurological rehabilitation, reduce pain levels and improve cardiorespiratory health. In addition, dance serves as an avenue for emotional expression, helping to reduce anxiety, depression, and stress and improve quality of life.

In the future, further research is needed to gain a deeper understanding of the mechanisms of dance and rehabilitation and to conduct more extensive randomised controlled clinical trials to validate its effectiveness. In addition, a more comprehensive understanding of patients' perceptions of dance therapy is needed to better meet their needs. Taken together, the potential of dance in rehabilitation is encouraging and offers the field of rehabilitation an innovative therapeutic approach that promises to improve the quality of life for many patients. More future research and practice to fully utilise the role of dance in rehabilitation is highly anticipated.

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