

# Dance therapy in autism: a case report

*Dançasaterapia no autismo: um estudo de caso*

*La danzaterapia para el autismo: estudio experimental*

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**ABSTRACT** | Autism is one of the most common neurological disorders that affects the neurological development of children. Therapeutic interventions may intervene in communication disorders and stereotyped behaviors such as dancing, which as therapy can activate sensory pathways that enable gesture improvement. This study aimed to observe the effects of dance therapy in motor performance and gesture, body balance and gait, as well as in the quality of life of an adolescent with autistic disorder. It is a case study of a fifteen-year-old male who participated in 120 sessions of dance therapy, lasting 30 minutes, twice a week, on alternate days, over a period of one year. The assessment instruments used were the Motor Function Measure (MFM), Tinetti test and Childhood Autism Rating Scale (CARS). According to the MFM, the total score increased 27.08%; the Tinetti test regarding balance increased from 68 to 75%, and gait, from 16% to 66%. CARS changed from 41.5 to 34 points, changing the severe disorder to moderate within the proposed parameters. The dance therapy can optimize the psychomotor behavior of young people with autistic disorders.

**Keywords** | Autistic Disorder; Dance Therapy; Gait; Complementary Therapies; Motor Skills

**RESUMO** | O autismo é uma das desordens neurológicas mais comuns que afetam o desenvolvimento neuropsicomotor de crianças. Intervenções terapêuticas podem intervir nos transtornos de comunicação e nos comportamentos estereotipados, desse modo a dança, como terapia, pode ativar vias sensoriais que viabilizam o aprimoramento do gesto. Este estudo visou observar os efeitos da dançasaterapia no desempenho motor e gestual, no equilíbrio corporal e na marcha, bem como na qualidade

de vida de um adolescente com autismo. Trata-se de um estudo de caso de um jovem com 15 anos de idade, que participou de 120 sessões de dançasaterapia, com duração de 30 minutos, duas vezes por semana em dias alternados, durante um ano. Os instrumentos de avaliação utilizados foram a Medida da Função Motora (MFM), Teste de Tinetti e Escala de Avaliação do Autismo Infantil (Childhood Autism Rating Scale – CARS). Segundo a MFM, o escore total aumentou 27,08%; o Teste de Tinetti referente ao equilíbrio aumentou de 68 para 75% e a marcha de 16% para 66%; o CARS foi alterado de 41,5 para 34 pontos, transferindo o transtorno de grave para moderado dentro dos parâmetros propostos. A dançasaterapia pode otimizar o comportamento neuropsicomotor de jovens com transtornos autistas.

**Descritores** | Transtorno Autístico; Terapia através da Dança; Marcha, Terapias Complementares; Destreza Motora.

**RESUMEN** | El autismo es uno de los trastornos neurológicos más comunes que afectan al desarrollo neurológico y psicomotor de niños. Diversas intervenciones terapéuticas pueden intervenir en las desordenes de la comunicación y en las conductas estereotipadas, tales como la danza, que como terapia puede activar la sensorialidad permitiendo la mejora del gesto. En este estudio se buscó observar los efectos de la danzaterapia al desempeño motor y del gesto, al equilibrio del cuerpo y de la marcha, así como a la calidad de vida de un adolescente autista. Se trata de un estudio experimental con un joven de 15 años de edad, el cual participó de 120 sesiones de danzaterapia, con duración media de 30 minutos, llevada a cabo dos veces por semana en días distintos, durante un año. Se utilizaron los instrumentos: la Medida de la Función Motora (MFM), la Prueba de Tinetti y la Escala de Evaluación del Autismo Infantil (Childhood Autism

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Rating Scale - CARS). De acuerdo a la MFM la puntuación total aumentó un 27,08%; la Prueba de Tinetti con respecto al equilibrio aumentó del 68% al 75% y la marcha del 16% al 66%; la CARS bajó del 41,5 al 34 puntos, pasando la clasificación del trastorno, según los parámetros propuestos, de grave a moderado. Así, la danzaterapia

puede optimizar la conducta neurológica y psicomotora del joven con trastornos autísticos. no hay comprobación suficiente sobre la eficacia de la VNI en el aumento de la tolerancia al ejercicio.

**Palabras clave** | Trastorno Autístico; Terapia a través de la Danza; Marcha; Terapias Complementarias; Destreza Motora

## INTRODUCTION

Autism spectrum disorder is one of the most common neurological disorders affecting neuropsychomotor development in children. This condition involves an array of neurological, behavioral disorders with three most evident factors: difficulty socializing, verbal and non-verbal communication disorders, and repetitive, stereotyped behavior patterns<sup>1,2</sup>. Moreover, autistic children have significantly damaged imitation skills and spontaneous use of descriptive gestures which prevent complex behaviors and socialization from being achieved<sup>3,4</sup>.

A study that was conducted with purebred rats<sup>5</sup> showed behavioral and social variations. Sensory difficulty is considered as one of the central problems in autism, as it is associated with barriers that are related to socialization and communication, and to a restricted repertoire of interests and activities<sup>6,7</sup>.

Autism is a disorder whose pathological base is unknown. Ramachandran and Seckel<sup>8</sup> explain that the main damage may be in the mirror-neuron system. Many cognitive neuroscience researchers consider that system provides the psychological mechanism for the interaction between perception and action. Mirror neurons may be important to understand the actions from other people, and to learn new motor acquisitions through imitation. Problems in that system are the base for cognitive disorders such as autism<sup>9</sup>.

Many autistic children have very early signs of sensory and motor damage. Therapeutic interventions which operate in the sensory stimuli have been found to display positive effects, as well as visual and auditory interventions, sensory-motor management techniques, and physical exercises<sup>2,10,11</sup>.

Synchronous repetitive movements may improve stimuli in the mirror-neuron system<sup>8</sup>. Pectrus, et al.<sup>2</sup> praise physical therapy as critical to find ways which can minimize neuromotor damage. Music and dance, in turn, exist in all cultures and are part of a series of creative behaviors<sup>12</sup>.

Dance as a therapy may stimulate the integration of sensation and perception, and, thus, predispose action<sup>13,14</sup>. Coordinated activities are fundamentally important for the progress of the neuromotor system<sup>10,15</sup>. Motor therapy, when it is associated with music, may make social interaction and communication easier<sup>16</sup>, as well as several systems which interfere in the perception of movement, and are fundamental for the social-emotional development and for the interconnection of areas which are responsible for the association of movement<sup>17-19</sup>.

Thus, this study proposes that dance and physical therapy be united as a possibility to develop and modify an array of irregular and uncoordinated movement patterns. The lack of studies with the proposed design has inspired a need for researching the effects which are caused by dance in autistic people's behavioral disorders through teleceptive stimuli which are imposed by music and dance.

Therefore, this study seeks to observe the dance therapy effects in a teenager with autistic disorders, to evaluate motor and gesture performance in the autistic spectrum through the motor function measure (MFM), to analyze body balance and gait through Tinetti Test, and to investigate the effects in the autistic teenager's quality of life through the Childhood Autism Rating Scale (CARS).

## METHODOLOGY

This is the case report of a 15-year old male individual, suffering from a pervasive developmental disorder in the autistic spectrum. The youngster took part in 120 dance therapy sessions of 30 minutes each, twice a week, in different days, for a year. The teenager's mother signed a Consent Form, agreeing with the application of the protocol and the publication of obtained images and data. The research was approved by the Ethics Committee of Universidade Federal de Sergipe.

The dance therapy sessions were conducted in a proper dance classroom, with mirrors, parallel bars, and sound equipment, at Academia Sergipana de Ballet, in Aracaju, Sergipe. Session comprised laterality, musical, and rhythmic perception tasks, with four series of eight repetitions for the following activities: anteroposterior and latero-lateral spreading of lower limbs; single-leg and double-leg squatting; weight shifting; spinning; anterior, lateral, and posterior gait. All activities are associated with movements and waving of upper limbs in ballroom dance styles. Choreographed sequences were changed, along with songs, at every 20 sessions, so that could result in changes in the teenager's routine.

The evaluation scales allow measuring the behaviors from children with pervasive developmental disorders, in a way to establish a more reliable diagnose<sup>20,21</sup>.

MFMM was used in order to evaluate motor and gesture performance, as it is a scale that comprises 32 static and dynamic items and it measures examined people's motor skills. Items are tested in lying, sitting, or standing positions, and they are divided in three dimensions: standing position and shifting, with 13 items (D1); axial and proximal motor skills, with 12 items (D2); distal motor skills, with seven items (D3), six of which regarding the upper limbs. Each item is classified in a four-point scale, as follows: unable to start the task or maintain the initial position (zero); performs the exercise partially (one); performs the required movement partially or performs it completely, albeit imperfectly (two) - offsetting, insufficient time maintaining the position, slowness, lack of movement control; performs the exercise completely and normally, with a controlled, perfect, objective movement, at a constant speed (three). The values in each dimension are: D1, 39 points; D2, 36 points; D3, 21 points, the three dimensions totaling 96 points<sup>22,24</sup>.

Tinetti test was applied in order to evaluate body balance and gait abnormalities. The test consist of 16 items, of which nine regard body balance and seven refer to gait. Tinetti test classifies gait aspects such as speed, step distance, standing symmetry and balance, spinning, and shifts with eyes shut. Counting for each exercise ranges from 0 to 1, or from 0 to 2, with lower numbers indicating poor physical skills. The total score is the sum of scores for body and gait balance, and it adds up to 28 points. Total score is broken down in 12 points for gait and 16 for body balance<sup>25</sup>.

In order to analyze the effects from aspects regarding quality of life and severity of autism, CARS was used - it is a 15-item scale which helps identify autistic children

and distinguishes them from non-autistic children with developmental problems. Its importance consists of identifying mild and moderate from severe autism. It is brief, and its use is adequate for any child who is older than two years of age. The results define the following scores: 15-30: non-autistic; 30-36: mild to moderate autism; 36-60: severe autism<sup>26,27</sup>. CARS was used at four moments: before the intervention, after a six-month intervention period, after a twelve-month intervention period, and six months after the intervention was finished, in order to observe whether observed changes were going to last.

## RESULTS

In the first evaluation, the teenager was found to have a 41.5-point score, and he was classified as been severely autistic, according to Pereira, et al.<sup>21</sup>. After a six-month intervention, the teenager's score was 37.5 points, and after twelve months of intervention, 32.5 points, causing him to fall into the mild to moderate autism classification. After twelve months of intervention, the protocol was interrupted for six months, when data were collected again, and those data showed the teenager scored 34 points (Figure 1).

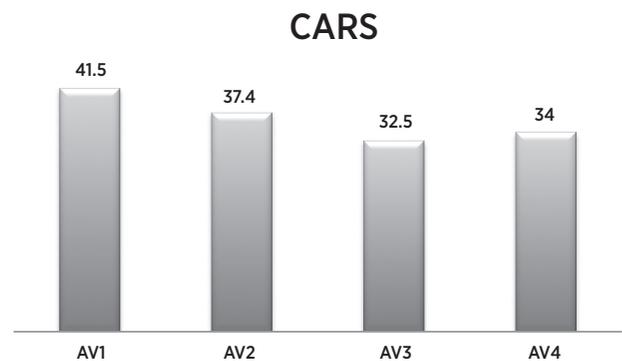


Figure 1. Values obtained through the Childhood Autism Rating Scale (CARS). At the beginning of the protocol (AV1), after a six-month intervention period (AV2), after a twelve-month intervention period (AV3), and a follow-up six months after the intervention was finished (AV4)

In the evaluation regarding the motor function, the data before the study protocol was started (AV1) corresponded to the following values: D1: 9 points (23.07%); D2: 18 (50%); D3: 4 (19.04%). The sum of all dimensions was 31 points (32.29%). After six months of intervention, another evaluation (AV2) was conducted, in which D1 reached 17 points (43.58%), D2, 24 (66.66%), and D3, 7 (33.33%), totaling 48 points (50%). At the end of the intervention

protocol, another evaluation (AV3) was conducted, in which D1 reached 21 points (53.84%), D2, 29 (80.55%), and D3 was not found to have changed, maintaining 7 points (33.33%), totaling 57 points (59,37%). Figure 2 shows the values that were obtained for the three dimensions at the moments of analysis and their respective total scores, which point towards a more marked increase in dimension 2 as compared to the remaining ones.

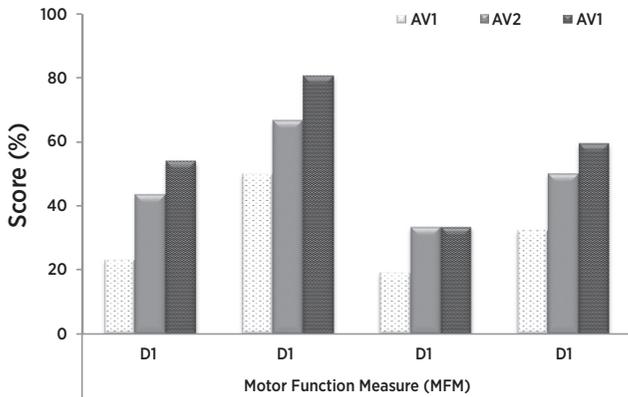


Figure 2. Values (%) of dimensions (D1, D2, D3 , and Total D) of motor function measure (MFM). At the beginning of the protocol (AV1), after a six-month intervention period (AV2), and after a twelve-month intervention period (AV3)

Figure 3 shows data as obtained by Tinetti test. In the first evaluation (AV1), the dimension regarding balance revealed 11 points (68%), and the dimension regarding gait, in turn, only 2 points (16%), which makes up 13 points total (46%). After the six months (AV2), balance was found to reach 11 points (68%), and gait, 3 points (25%). The total was 14 points (50%). After the twelve month-intervention, the last analysis (AV3) was conducted, and the obtained data were: balance - 12 points (75%); gait - 8 points (66%); total - 20 points (71%).

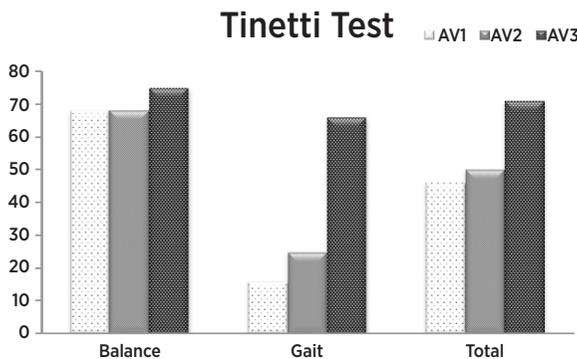


Figure 3. Data regarding the application of Tinetti Test at the beginning of the protocol (AV1), after a six-month intervention period (AV2), and after a twelve-month intervention period (AV3)

## DISCUSSION

The teenager’s mother watched a public presentation of the extension group from Universidade Federal de Sergipe, comprising children and adolescents with various disabilities. The mother was touched, and she requested that her son be included in the dance classes.

As soon as the boy signed up to the program, the evaluation instruments were applied, and he was assessed to need individual dance classes, to be included in the group afterwards, thus preventing him to feel inhibited or unable to perform the tasks that were proposed in the group classes.

The results above corroborate the findings from Weber and Newmark<sup>28</sup> regarding the efficient use of alternative and complementary therapies in the autistic spectrum. Pectrus, et al.<sup>2</sup> noted that sensory-motor treatments are used well beyond holistic intervention plans, as alternative therapies seek to improve performance considering sensory and motor difficulties, including other essential components, such as cognitive and psychosocial functions.

It is interesting to observe the data that were obtained by CARS. The instrument assess factors that are related to quality of life and to autistic spectrum severity, and it encompasses issues concerning personal relationships, use of the body, senses, and objects, response to changes, verbal and non-verbal communication, and cognitive consistency<sup>19,26</sup>.

The data obtained by MFM show that the teenager had better results in the items corresponding to dimension 2 (D2), which is related to axial and proximal motor skills, including changes regarding head directions - they are essential to guide the desired movement<sup>10,18,19</sup>. There was little alteration in regards to dimension 3 (D3), which involves distal motor skills - encompassing the handling of objects, for example. The teenager’s muscles are atrophied for lack of use, and the protocol involves global body movements. Besides that, he had trouble following the requests to execute the MFM tasks.

Autism leads to difficulties in the spontaneous process regarding imitation and description of gestures<sup>4,29</sup>. Dancing stimulates this spontaneous process from symbolic frames of reference which are systematically requested during classes. When they are needed in other daily contexts, they are easily identified as learning takes place<sup>2</sup>, and they are noticed in the significant

participation effects of autistic people in their social contexts. Finally, the choreographed sequences were modified at every 20 sessions, stimulating the symbolic frames of reference from songs in association with body movements. The teenager resisted strongly when the first modification took place, but in the following one he was already having fun with changes, as he noticed he was capable of adapting to the alterations in proposed sequences.

Dexterity and balance could be evaluated through Tinetti test, especially in regards to gait quality<sup>25</sup>. The youngster used to neglect the following gait and walked in an asymmetric way, and that justifies the better response in the score involving gait criteria, as the teenager now executes the following gait fearlessly, even though with some help.

The benefits from physical activity in this population are widely documented in the literature<sup>4,11,17-19</sup>. Dancing, as a physical activity, fosters the reduction of atypical behaviors, as it physiologically modulates stereotyped actions through the release of specific neurotransmitters<sup>17-19</sup>. Such speculations generated interest regarding the inclusion of regular physical education in autism treatment<sup>2</sup>. Although that is a result from the commitment level, it is plausible that diminishing stereotyped behaviors may contribute for autistic people to participate more in their environments, in order to develop their skills.

The results from studies by Ingersoll, et al.<sup>4</sup> reinforce the effectiveness of interventions including natural movements for learning and imitating gestures. Dancing really stimulates the imitation of gestures. Despite the sensory alterations not being specifically from autistic disorders, their prevalence is very high, and Dawson and Watling<sup>29</sup> mention the prevalence of abnormalities in the sensory integration, and that therapies which focus on approaching the training of sensory integrations that are focused on the auditory system may contribute to resolve abnormalities in the autistic spectrum.

The replacement of bizarre and repetitive movements that are peculiar to the autistic universe predisposes the annulment of those stereotyped behaviors, as those actions are performed with a purpose. Therefore, the delayed behavioral maturity may be reversed through the intervention of activities which propose the integration of several attention systems, so they can contribute to develop the social communication ability in autistic people<sup>6</sup>.

Despite physical therapy using many exercises, it is necessary to investigate their effects in the development and in the application of proper treatments to the autistic spectrum<sup>2</sup>. This case report is just a draft of a therapeutic program which may contribute to the investigations about the autistic spectrum. Our biggest difficulty was to try and minimize the stereotyped behavior, which interferes in the response actions from other appropriate behaviors.

The sequences proposed in our study interfered in these inadequate behaviors, above all. We used songs with lyrics in order to imply meaning for specific actions, and that substantially affected the following stereotyped behaviors. Besides that, we contributed to movement coordination and dexterity, as the data that were obtained through MFM and Tinetti point out. The scores obtained in CARS showed the reduction of stereotyped movements in this teenager, as well as issues regarding social interaction, even after the dance therapy sessions had been finished.

The results that were obtained in this study stress the fundamental importance of dance therapy intervention in order to improve sensory-motor function, thus allowing autistic individuals to demonstrate their full cognitive, behavioral, social, and communicative behaviors.

## CONCLUSION

Dance therapy favored motor and gesture performance, even in body balance and gait. Besides that, it contributed to improve the quality of life of the teenager with autistic spectrum.

Both his static and his dynamic motor skills were improved, which demonstrates the importance of the rhythmic movement in the development of the motor skill that had been neglected due to the autistic spectrum condition.

Body imbalance and gait abnormalities were minimized in the teenager after the dance therapy sessions, probably due to the stimuli that were proposed by the dance, such as alternated exercises and various directions.

Dance therapy also contributed greatly to the improvement of quality of life and reduction of autistic spectrum severity, which indicates the fundamental importance of the application and participation in projects of that profile, in order to foster substantial

improvements in the disorders that were visualized in the teenager who took part in this study.

## CLINICAL IMPLICATIONS AND STUDY LIMITATIONS

The study showed the importance of using dance therapy, and how it can effectively operate in the autistic spectrum disturbances. This pragmatic judgment can only generate results that can be generalized in the clinical practice through a study with a more robust design.

In order to have that, a larger sample would be needed, and so would the formation of two groups in order to compare the effects from the interventions, to check whether dance, as a therapy, can contribute to the neuropsychomotor and quality of life enhancement in the autistic spectrum.

Interventions which operate in various systems which are based on rhythm and on dancing activities may be used to alleviate social communication impairments, as well as sensory, motor, and behavioral comorbidities in autism. However, future research must extend this study in order to examine the effects from the various systems dance can intervene in, thus solidifying the findings in this investigation.

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