

## The Role of Dance in the Functioning and Socialization of People with Cerebral Palsy: a Pilot Clinical Trial

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### Abstract

**Background:** Dance fosters a distinctive body language that enables communication by awakening sensations, emotions and thoughts that are fundamental to the listening body in various prisms. Dance practice can promote neuropsychomotor improvement, as well as fundamental attributes for social interaction and functional independence, in people with Cerebral Palsy (CP).

**Objective:** The purpose of this study was to determine the effectiveness of a specific dance program to promote body functioning and socialization of people with CP and how a systematization of dance protocol directed toward body dysfunctions is able to unlock the social potential inherent in every individual.

**Methods:** This pilot clinical trial was conducted on seven patients who have cerebral palsy were recruited at the Federal University of Sergipe, Lagarto city, Brazil, from January 03, 2019 to December 12, 2019. A specific dance program lasting 60 minutes was used. Evaluations were carried out before and after 12 months of intervention using instruments that assess dance efficiency, functional independence and social function in all participants. For statistical analysis, IBM-SPSS version 22 was used to apply the Shapiro-Wilk, Levene and Wilcoxon Matched Pairs test.

**Results:** After 12 months of intervention, those with CP who participated in the specific dance project and public presentations were evaluated. In the Functional Independence Measure, the locomotion value (T1: 6.71±1.94; T2: 8.20±1.93 (95% CI, p=0.03), communication (T1: 9.14±2.71; T2: 13.00±1.00 (95% CI, p=0.04), social cognition (T1: 9.00±2.19; T2: 18.00±1.51 (95% CI, p=0.01) and total value (T1: 74.40±14.15; T2: 86.20±14.54 (95% CI, p=0.008) were significant, and the difficulties in highlighting social participation decreased from 57% to 26% (95% CI, p=0.01).

**Conclusion:** Dance stimulates and contributes to social participation and functional independence through bodily dialogue. Individuals with CP can be encouraged neuropsychomotor, socio-educational and psychosomatic practice.

**Clinical Trial Registration:** The study is registered with the "Thai Clinical Trial Registry (Identification number: TCTR20200502002).

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**Keywords:** Dance, Socialization, Cerebral palsy, Body Functioning, Communication

### Abbreviations / Acronyms:

**CP:** Cerebral Palsy; **FIM:** Functional Independence Measure; **KAP:** Knowledge, Attitude and Practice; **TALT:** Técnica Aplicada Lavinia Teixeira; **WHODAS:** World Health Organization Disability Assessment Schedule

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## **1. Introduction**

Cerebral Palsy (CP) is well known in the positivist human biomedical area for being a neurological condition defined by a group of disorders that are located in the development of body posture and movement arising from damage to the Central Nervous System (CNS) in the early years of life. This condition impacts the child's development in the production of motor tasks, including speech articulation, and this is accompanied by learning disabilities arising from sensory disorders and cognitive behavioral changes that influence the physical, emotional and social aspects of the individual throughout their lives (1-3).

In terms of the physical aspects, changes here are due to neurological damage that impedes the mobility and independence of the individual. This has a direct influence on their quality of life as both mobility and independence affect the individual's cognitive, emotional, physical and social state (2, 4). According to Lipscombe et al. (5), deficits related to social participation affect the individual's ability to socialize and their perception of socialization; this then makes the barriers of social rejection even harder to overcome. Added to this is the fact that functional independence, which is impaired by CP, is an essential factor for social interaction, as movement is vital for non-verbal communication, and also enables freedom of movement, which is considered to be a fundamentally human entitlement. Motor disability consequently limits the possibilities for communication (3, 5, 6). It is therefore necessary to develop interventions aimed at improving cognitive-behavioral functionality, including the promotion of social interaction to boost self-confidence and self-esteem.

One possible intervention in CP to promote both functionality and social interaction is dance practice, as it has the ability to expand the body's potential through sensory, emotional and neuromotor processes. Dancing promotes functional independence, as it stimulates static and dynamic body balance; this is one of the principles of psychomotor learning because it reveals the body's ability to think and represent a movement, as well as promoting body perception (7). In addition, dance awakens body discourse through non-verbal communication, and thus aids neuropsychomotor development, physical and emotional well-being, education and body perception, self-confidence and self-esteem, social interaction and functional independence (8, 9). In terms of the social aspects, Agamben (10) explains that negative thoughts impair an individual's potential ability to perform certain tasks. During a dance intervention, it is possible for different bodies, rhythms and movements to express the art of dance without necessarily having the perfect body and motor skills that are dictated by social norms (7). Based on the above, the aim of this study was to determine the effectiveness of a specific dance program in benefiting socialization and functional independence in people with CP, and, as a secondary outcome, to demonstrate how the systematization of dance practice in psychomotor dysfunctions can influence neuropsychomotor improvement in CP.

## **2. Material and Methods**

### **2.1. Study design and participants**

This study was a pilot clinical trial. It addresses dance practice during 12 months as an option for body discourse, which contributes to body perception and education, social interaction and functional independence in children and adolescents with CP. Individuals with CP who participated in the TALT group (Técnica Aplicada Lavinia Teixeira) and who were aged between 5 and 25 years were included. Those who did not participate in classes and / or assessments were excluded.

### **2.2. Assessment**

First, parents and/or caregivers signed the informed consent form which presented the objectives, proposed procedures and expected benefits. Subsequently, the first assessment of all the participants was performed, with responses by the caregiver if the child or adolescent was not able to respond for themselves for any reason (for example, cognitive impairment or aphasia) (1, 3). After signing the consent form, another form was completed to register the participants' important personal data (name, age, gender, weight, height, body mass index, professional occupation, marital status, name of the person responsible, telephone number for contact) and anamnesis (current, past, physiological, social, family and medication history).

To assess the impact of dance on functionality and socialization, we used the following assessment instruments at two different time-points: at the beginning of the study (T1) and after 12 months (T2) of dance practice. To assess the effectiveness of dance practice we applied the Knowledge, Attitude and Practice Survey (KAP). This is a semi-structured interview based on questions about knowledge, thinking and acting on actions by parents or caregivers before and during this study protocol. The KAP interview can offer a diagnosis of achievements in the educational, emotional and social dimensions that demonstrate the effectiveness of an intervention (11). To assess body functioning

we used the Functional Independence Measure (FIM), a scale that assesses functionality at different levels with or without help, verifying the individual's performance in 18 activities in the physical, cognitive and social domains. Rating is numerical: "1" represents total help; "2" maximum help; "3" moderate help; "4" minimum help; "5" supervision; "6" independence with technical help; and "7" complete independence. The FIM is divided into central themes, namely: [A-F] Self-care; [G-H] Sphincter Control and Hygiene; [I-K] Mobility; [L-M] Locomotion; [N-O] Communication; and finally, [P-R] Social Cognition. The range varies between 18 and 126 points, and the higher the score, the higher the level of functional independence (12, 13).

To analyze social function, we used the World Health Organization Disability Assessment Schedule (WHODAS), which corresponds to a practical instrument for social participation because it does not have the specific clinical condition as a focus, but rather a form of health and disability assessment, providing a level of functionality. It is directly related to the International Classification of Functioning, Disability and Health (ICF), not clearly distinguishing measures of symptoms and disability. The score obtained from the WHODAS (2.0 version) scale ranges from 0 to 4: the individual with a score of "0" has no difficulty for a given action; "1" represents mild difficulty; "2" moderate difficulty; "3" severe difficulty and "4" extreme difficulty or inability to perform (14, 15).

### ***2.3. Dance Protocol***

The dance classes were based on the concepts and proposals developed in the TALT (Técnica Aplicada Lavinia Teixeira) program, and took place twice per week, each session lasting 60 minutes, over a period of twelve months, in an appropriate room, alongside other dancers with or without disabilities. The educational focus was to carry out choreographic sequences in a playful way to promote socialization, body balance, functional independence, motor coordination, and neuropsychomotor development. Each dance class consisted of three stages: (I) warm-up: stretching and body conditioning; (II) choreographed sequences: encouragement of rhythm and body perception, choreographic montages for public presentations; (III) relaxation. As follows, three axes of components underlie the TALT technique: the self, the environment, and the other:

#### ***2.3.1. The self***

The practices that make up this axis are based on: (1) body image (mental representation that includes affective, cognitive and social aspects); (2) range of movements (represented by the planes and axes of movement for the use of the body in its full angular range); (3) motor coordination (implicit bilateral interactions in visomotor movements); and (4) ability and agility of movements (execution of bilaterally varied movements, exploring mechanisms of motor coordination and body and postural stability, with simultaneous activity of segments with and without alternation of upper and lower limbs) (6, 16, 17).

#### ***2.3.2. The environment***

Classroom with appropriate floor, a mirror and a stereo. It is better if the room in which the dance class takes place does not contain a lot of sensory information, such as noises (the volume of the music must not be loud), bright colors on the walls, paintings, lamps, or other devices that may distract the participants' attention. In order to trigger body image, range of motion, motor coordination and agility of movement, the dance class must contain Laban's planar levels (low, medium and high), the movements during the dance steps occur in all directions (front to back, side to side, and diagonals). In addition, devices and props should be used to enhance communication in dance, such as tambourines, rattles, fabric (16, 18-21).

#### ***2.3.3. The other***

The positioning of dance class members in a circle enables interpersonal experiences and intercorporeal dialogue. The attitude embodied during dance duets is taken as an example of active non-verbal attunement between partners during performance interaction. Choreographic performances trigger the sense of intersubjectivity and differentiation of self and otherness through shared and synchronized features of motion. Public presentations emphasize the naturalness of a human being in the world with others and of being perceived as the center of expectation by others who have not experienced the dance class themselves. This contributes to the important properties of engagement and motivation, which can be considered as a mutual phenomenon between the individual and the other/others. This condition greatly influences the social being, who is mostly on the sidelines unaware that his/her actions can be reflected in the other - this can come about through the eloquent clapping of the audience, as he/she perceives themselves as a central actor, with a positive character. This in turn has an effect on self-esteem.

#### 2.4. Research ethics

The Ethics Committee on Research with Human Beings of the Federal University of Sergipe under CAAE (Certificado de Apresentação de Apreciação Ética) number 06154012.4.0000.0058 (approval number 1.056.806) approved the assessment and intervention methods used in this study. Patients and parents and/or caregivers were aware of the research and its objectives, but they were not directly involved in the design of this study. Parents and/or caregivers signed the informed consent form which presented the objectives, proposed procedures and expected benefits.

#### 2.5. Statistical analysis

The variables are presented with measures of mean and standard deviation - Mean (SD). All tests were performed using IBM® SPSS® Statistics version 22 (IBM® Corp., Armonk, NY, USA). All analyzes were conducted using data from participants who completed the post-intervention assessment (e.g. endpoint assessment). Thus, participants without data recorded for a given parameter were automatically excluded from the analysis of that parameter. To verify the normality of the data, the Shapiro-Wilk test was applied. Homogeneity was calculated from the Levene test. Wilcoxon Matched Pairs test analyzed baseline differences. Comparisons between value pairs where the global test reached a significance level of  $p < 0.05$  (two-tailed) were corrected for multiple comparisons using Bonferroni correction.

### 3. Results

Seven children and adolescents with a clinical diagnosis of CP underwent the study, four female and three male, with an average age of 17.28 (6.87) years. After 12 months of classes and some public dance performances, re-assessments were performed. In the FIM (Functional Independence Scale), the total values increased from 74.40 (14.15) to 86.20 (14.54). This increase represents a development in functional independence. The indicators that showed the most progress was in locomotion ( $p=0.03$ ), communication ( $p=0.04$ ) and social cognition ( $p=0.01$ ), as seen in Table 1. Regarding social participation, the WHODAS values ranged from 57% to 26%, meaning that there was a reduction in the difficulties faced in some situations for social interaction.

**Table 1.** Functional Independence Measure (FIM) values, before and after dance classes, over a period of twelve months.

MIF Domains	BEFORE	AFTER	p-value
Self-Care	23.00 (5.19)	23.00 (5.70)	0.31
Sphincter Control	12.00 (2.19)	12.00 (2.00)	0.36
Mobility	10.66 (3.90)	12.00 (3.83)	0.17
Locomotion	6.71 (1.94)	8.20 (1.93)	0.03*
Communication	9.14 (2.71)	13.00 (1.00)	0.04*
Social Cognition	9.00 (2.19)	18.00 (1.51)	0.01*
Total Value	74.40 (14.15)	86.20 (14.54)	0.008*

Mean (SD). Wilcoxon Matched Pairs Test for Dependent Variables

The fundamental finding was the adherence of the participants to the dance program, and the parents' and/or caregivers' confidence in the proposal suggested by the study. With regard to the KAP survey, most showed no knowledge of the clinical condition of CP, but reported it to be "a lack of oxygen in the brain" and "paralysis of some limbs". The initial attitude of all individuals was to seek treatment in a therapeutic form, for example, dance, physical therapy, speech therapy, horse therapy, and neurological monitoring. Over time, the children and adolescents showed more involvement with the members of the dance program, as well as being more willing to participate and engage in public performances, thus verifying the impact of dance on autonomy, self-confidence and self-esteem.

### 4. Discussion

In terms of functional independence, participants improved in overall scores in FIM and in the locomotion, communication and cognition domains. After 12 months, social participation increased, probably as a result of taking part in a regular activity in a social environment, as well as performing choreographies in public spaces, such as theaters, schools and convention centers. As in the studies by Teixeira-Machado & DeSantana (7) and Teixeira-Machado, Azevedo-Santos, DeSantana (4), we reported that dance practice positively influenced functional capacity, emotional aspects and social interaction in individuals with physical limitations. With regard to physical aspects, the main focus of dance is body awareness rather than feeling as a function that underlies the perception of the body in spacetime, without excluding the influence of weight and the flow of movement. Laban (1, 8) highlights four primordial pillars for the movement of dance: space, time, weight and fluency that generate the internal participation

of attention, intention, decision and progression, affecting the human faculties of thinking, perceiving, intuiting and feeling. Therefore, the focus of dance is on body movement in different forms of individual creative movements that enable the acquisition of practical motor skills due to the dialogical action of body listening and internalized movement; this is based on movement of expression arising from the actual organization that comes from thought-body-action. According to Koch et al. (22), dance can develop positive effects on affection, well-being, body image and mood. Taking into account the reports of people with everyday experience of the participants of this study, i.e. their parents and caregivers, who revealed the impact of dance practice on their mood, reflecting affectivity. They noticed behavioral changes in the children during dance classes that were also seen in other social spaces that the participants attended, such as school and family environments. It is noteworthy that parents themselves feel trapped by society's judgment, and even they often do not believe that their child is capable of dancing or performing on a stage, for example. The dance program envisioned in this study has gone some way in overcoming the stigma surrounding the ability of people with disabilities (PWD) to express themselves through their bodies and perform on stage. Laban (18) states that: "A simple gesture from any part of the body reveals an aspect of our inner life." Bearing this in mind, dance can foster body expression, enabling the collective participation of various corporal conditions in the same social context. Thus, the ability of the participants in this study to dance and express their emotions through facial expressions, body involvement and group energy is ratified, especially the impact of the audience's warm applause. According to Le Breton (23), social status is dependent on the representations of the body and worldview, a person definition. Thus, dance is a practice that integrates and provides the inclusion of being in the world that is given to it, encompassing personal, social, cultural, emotional, cognitive and psychological factors. Dance practice promotes the recognition of the individual's place in a society that is rightfully their own. Through self-confidence, autonomy and self-esteem they are able to tackle the barriers imposed by society on their social condition.

It is also possible to relate Foucault's (24) discourse with the lived reality, showing that the prejudiced society hinders the social interaction of people with CP, as they have a principle of exclusion through rejection and prohibition to the different. Durkheim (25) says the body expresses one's autonomy without following the cultural and social environment in which it lives. This becomes an important statement for dance performed by the PWD, for instance, on a stage the stigmatized physical condition supersedes the disability paradigm. Analogously to the mathematics cited by Foucault (24) in the work "The Order of Discourse", metaphorically, dance can be a method of social interaction for PWD that is adverse to the arithmetic of society, that is, to eliminate inequality and insert them into social geometry as a way of overcoming barriers and providing equality within society. We can then allude to the psycho-sociological taxonomy of body techniques elucidated by Marcel Mauss (26) about what is expected of a person with disability. Although Mauss<sup>26</sup> did not elucidate contextualization about PWD, he describes the term "technique" as an effective traditional act, the body being the first and most natural and, at the same time, technical means. More than this, everything in us is imposed by the contest between body and moral and intellectual symbols. In this way, dance practice inexorably promotes a series of acts of physical-socio-psychological montage and suppresses the socio-psychological marginalization of the stigmatized person, since social influences substantially affect the human body defined by social and cultural experiences. Moreover, artistic presentation can break institutionalized precepts in society and encompass a different reality through body movement, a fact that fosters social and cognitive performance in PWD, reflecting in their functional independence. The limitation of study lies in the low number of participants with this clinical condition. Therefore, further studies are needed to demonstrate the effects of dance on functionality in people with CP from the psychosocial aspect.

## **5. Conclusions**

These feasible findings show that dance is an encouraging and facilitating option for social interaction and functional independence, as it offers a chance for body dialogue, autonomy, self-confidence, self-esteem, physical and emotional well-being, fundamental to health promotion and quality of life in people with CP. Studies with more consistent methodological designs and with a larger number of participants are needed, so that we can identify the role of dance in the functioning and socialization of people with Cerebral Palsy.

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## **Conflict of Interest:**

There is no conflict of interest to be declared.

**Authors' contributions:**

Both authors contributed to this project and article equally. Both authors read and approved the final manuscript. Conception or design of the work (LTM), Acquisition of data (both authors), Analysis or interpretation of data (both authors), Drafting the manuscript (both authors), Revising the manuscript (both authors), Revising the manuscript (both authors), Accountable for all aspects of the work (both authors).

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