

## **Inclusion, physical activity and quality of life for people with disabilities**

**Luis Henrique Almeida Castro** ([nutricao.luishenrique@gmail.com](mailto:nutricao.luishenrique@gmail.com))

PhD in the Health Sciences Graduate Program, Federal University of Grande Dourados  
Dourados, Mato Grosso do Sul – Brazil.

**Diego Bezerra de Souza**

Local Development Graduate Program, Dom Bosco Catholic University  
Campo Grande, Mato Grosso do Sul – Brazil.

**Fernanda Viana de Carvalho Moreto**

MSc., Nutrition, Food and Health Graduate Program, Federal University of Grande Dourados  
Dourados, Mato Grosso do Sul – Brazil.

**Nelson Thiago Andrade Ferreira**

Graduate Program of Movement Sciences, Federal University of Mato Grosso do Sul  
Campo Grande, Mato Grosso do Sul – Brazil.

**Juliana Vicente de Souza**

Graduate Program of Movement Sciences, Federal University of Mato Grosso do Sul  
Campo Grande, Mato Grosso do Sul – Brazil.

**Aline Ortega Soloaga**

Graduate Program of Movement Sciences, Federal University of Mato Grosso do Sul  
Campo Grande, Mato Grosso do Sul – Brazil.

**Raquel Borges de Barros Primo**

PhD in the Health Sciences Graduate Program, Federal University of Grande Dourados  
Dourados, Mato Grosso do Sul – Brazil.

**Geanlucas Mendes Monteiro**

Health and Development in West Central Region Graduate Program, Federal University of Mato Grosso  
do Sul  
Campo Grande, Mato Grosso do Sul – Brazil.

**Ygor Thiago Cerqueira de Paula**

Graduate Program of Movement Sciences, Federal University of Mato Grosso do Sul  
Campo Grande, Mato Grosso do Sul – Brazil.

**Vanessa de Souza Ferraz**

Graduate Program of Movement Sciences, Federal University of Mato Grosso do Sul  
Campo Grande, Mato Grosso do Sul – Brazil.

**Júlia Arruda de Fonseca Palmiere**

Master's Program in Health Psychology, Don Bosco Catholic University  
Campo Grande, Mato Grosso do Sul – Brazil.

**Cristiane Martins Viegas de Oliveira**

Local Development Graduate Program, Dom Bosco Catholic University  
Campo Grande, Mato Grosso do Sul – Brazil.

**Abstract**

*Several social spaces have been attended by people with disabilities. The universities include some of them, in this context we point out the Don Bosco Catholic University, in which through the University Extension Project Vida Nova, mainly serves people with spinal cord injuries with physical activities and resistance exercises. At the head of the project are coordinating teachers and students, with participation from the Physical Education and Nutrition courses. After the anamnesis, the training routines are elaborated, attending the requirements and limitations of each person. The objective is to present the work of adapted exercises carried out in the project with the members with physical disabilities. Seven individuals participate in the project in the morning, two of them female and five male, with ages between 24 and 61, an average of 44.85 years. Currently, the project serves around 15 people with physical disabilities, having the thera band as the most used means of adaptation. Future studies on the implementation of adapted gyms can be carried out, considering the interdisciplinary relevance of the theme, which in addition to involving courses in the health area, can cover other areas such as engineering and exacting for floor plan making and budgeting.*

**Keywords:** Human Rights; Muscle Strength; Paraplegia; People with Disabilities; Resistance Training.

**1. Introduction**

According to the World Health Organization(2012), more than one billion people live with some form of disability, and about 200 million have considerable functional difficulties. Data from IBGE (2010) show that 23.9% of the population in Brazil have some form of disability, 25.73% of these classified as people with motor disabilities. A more alarming number is that, even without official data, it is estimated that only 10% of this population practices some type of regular physical activity (SOLERapudSERON, ARRUDA and GREGUOL, 2015).

Contrary to other historical moments, an increase in the number of people with disabilities attending social spaces can be observed at the present time. This achievement was acquired through struggles that guaranteed their democratic rights as citizens. In this scenario, the National Congress approved through

Legislative Decree 186 of 2008, the text of the Convention on the Rights of Persons with Disabilities and its optional protocol, signed in New York City on March 30, 2007. It points out (REQUIÃO, 2016) that the Statute brings numerous guarantees for people with disabilities of all types.

In sequence, Brazil besides the Convention with weight of constitutional norm, approved the Brazilian Law of Inclusion of the Person with Disability, better known as the Statute of the Person with Disability (Law 13.146/2015). It declares Manica (2017), that the Convention favored the basis of the Statute, and deals with the person with disability covering countless places of coexistence, attesting the acquired rights, which results in new opportunities for better quality of life, health, independence, and promotion of affirmation of people with disabilities. In this regard, it is important to observe some precepts established in the Statute, among them, Art. 105, § 2, in which it recognizes the person with disability when interacting with one or more barriers, which may prevent his/her full participation in equal conditions with other people.

Moving forward in the Statute, Art. 18 presents the guarantee of total care to the health of the person with disability guaranteeing full access to all, which is corroborated by Art. 6 and Art. 196 of the Federal Constitution of 1988, which elucidates health as a right of all and a duty of the State. Subsequently, Art. 43 brings the promotion and participation of the person with disability in cultural, sportive and recreational activities by the public power, affirming the accessibility to event venues and the participation of people with disabilities in games and leisure sports activities, even in school environment, in total equality with other people. Farias, Cunha and Pinto (2017), concludes that the objective of the law, therefore, is to provide access to culture, sports and leisure for people with disabilities in order to eliminate any type of discrimination. Although this project is structured in a bias towards the practice of physical activities for a better quality of life, we emphasize the issue of sports practice and the opportunity of access for people with disabilities, in which several infra-constitutional laws describe it. As an example, Law 10.891/2004 that establishes the Institution of the Athlete's Scholarship, for athletes with high performance in the Olympic and Paralympic modalities.

It is important to point out here the Art. 217 of the Constitutional Charter, which indicates as the duty of the State to favor sports practices as a form of law for each one, noting also in its paragraph 3 that the Public Power should stimulate leisure, as a form of social promotion. Besides, it presents the Convention on the Right of Disabled People in its Art. 30, in item one that attests to the States parties, the right of disabled people to participate in cultural life in equality to other people. In item five, letter "a", which establishes the duty of the States parties to encourage and promote participation in sports activities for people with disabilities. Consecutively in the following items, allow access to sports and recreational events; and allow access to services provided by people or companies involved in the organization of recreational and sports activities.

Among these spaces are the universities, which as a social and training space, have participated in the construction, preparation and dissemination of knowledge about disabilities and in the work that can be developed with people who are born with some kind of disability, or acquire it throughout life. It is within this context of care for people with disabilities that we highlight the Don Bosco Catholic University (UCDB), which through the New Life University Extension Project (PEUVN), offers among other activities to this population, also a work directed to exercises with weight, which attends in its majority individuals with spinal cord injury, who present paraplegia and tetraplegia in the members.

Based on these considerations, the present study aims to present the work of adapted exercises carried out in the PEUVN with members who have physical disabilities. We use the term adapted in this study from the concept given by Winnick (2004, p.04) that uses it in the “sense of adjusting, modifying, shaping”, and that in the project in which the study was carried out, refers to the modification of teaching methods, the adaptation of the apparatuses in the performance of exercises, bringing them closer to weight training in order to work on the same muscle groups, but performed with other materials, among other adaptations that will be used during the work.

## **2. People with physical disabilities and adapted physical activity**

The adapted Physical Education is a subject of the UCDB graduation course in Physical Education, where the study was developed. This discipline was inserted in higher education based on the proposal of the United Nations (UN) World Organization when it instituted 1981 as the International Year for People with Disabilities in order to promote changes in attitudes towards people with disabilities (SILVA, 1986). The discipline was inserted with the purpose of working on issues related to physical activities and sports for people with disabilities.

To work with these people it was necessary to know the types of disabilities and their origins. As in this study we will deal only with physical disability, at this moment we bring Gorgatti eCosta (2005, p. 218) who conceptualizes the physical (or motor) disability as that which refers “to osteomuscular problems or the function of the body, interfering in motricity. It is characterized by a disturbance in the structure or function of the body, which interferes with the movement and/or locomotion of the individual”.

From ancient times, there is information that people with disabilities practice physical activity, however, going deeper into the subject, as for competitive activities, these are still recent. Data from the last 20 years, athletes with physical disabilities have presented important results compared to the levels of people without disabilities. Besides being a therapy, the sport for the person with disability goes towards high performance in search of a better training technique for each athlete, becoming of great importance to obtain good results (GORGATTI and BOHME, 2017).

According to Miarka (2017) when athletes with disabilities are accepted and considered at competition levels, inclusion becomes a final stage in the approach of athletes when they are able to approach without fear or preconceptions of being judged, which promotes inclusion, with greater possibility of it occurring, when the sport is adequate, when there is motivation and interest of members.

As for the assessment instruments in the area of sports and physical activity adapted for people with disabilities, few are the instruments to be used that take into account the specificity of each disability. What usually occurs is an adaptation of the available resources used, which is often without the necessary care for people with disabilities (GORGATTI and BOHME, 2017).

The project participants, subjects of this study, have a physical deficiency resulting from injuries that occurred in the marrow, which we call spinal cord injury. Spinal cord injuries can be categorized into non-traumatic (hemorrhages, tumors, virus infections, among others) and traumatic (events related to traffic accidents, assault with a firearm, work, daily life and leisure), although they can still be qualified as complete when there is no voluntary movement below the level of the spinal cord injury, and incomplete

when there is voluntary movement or sensitivity below the level of the spinal cord injury (WINNICK,2004). These circumstances are increasingly evident in everyday life, given the increase in the number of cars and motorcycles circulating in cities today, and the change in the pace of people's lives, which leads them to move from place to place in a reduced time. It is in this way that the incidence of these types of trauma has increased in the population that configures the most recurrent causes of spinal cord injuries (SOUZA 1994; NASCIMENTO and SILVA, 2007; BORTOLLOTTI and TSUKAMOTO, 2011, BAHIA, 2015).

According to Souza (1994); Nascimento e Silva (2007); Muttiet al2010); Bortolotti and Tsukamoto (2011) and Bahia (2015), traumatic spinal cord injuries with irreversible damage to the spinal cord and nerve roots affect the individual's sensory-motor functions, causing social and economic consequences to the patient and his family. Still regarding the denomination within spinal cord injuries, tetraplegia and paraplegia are considered the most common types of spinal cord injuries, in which in tetraplegia all limbs and trunk are affected and in paraplegia there is a reduction or loss of motor function and/or sensory function of the thoracic, lumbar or sacral segments of the spinal cord. In this case, the upper limbs remain intact, but depending on the level of the injury, it may affect the function of the trunk and pelvic organs - urinary system, intestinal – as well as the respiratory, circulatory, sexual and reproductive systems.

From the point of view of Souza (1994); Nascimento e Silva (2007); Muttiet al2010); Bortolotti and Tsukamoto (2011) and Bahia (2015) there is also an incidence of other sequelae besides physical and sensory dysfunction, the person with spinal cord injury may present atrophy of the musculoskeletal system, metabolic, hormonal and neuromuscular alterations, such as spasticity, hyperreflexia or hyporreflexia of the autonomic nervous system. As for the respiratory capacity, there can be, reduction, as well as the blood circulation and the dimensions of the cardiac structures. All these aspects associated with sedentariness can stimulate cardiovascular and respiratory diseases, which limits physiological responses to motor activity, leading to rapid fatigue.

In addition, homeostatic and adaptation mechanisms that are responsible for people's natural health can occur. Physical fitness and functional independence – relevant aspects in the life of the person with spinal cord injury – end up being impaired as the degree of afferent and efferent spinal cord injury extends, consequently there will be less muscle mass available for physical activity (SOUZA 1994; NASCIMENTO e SILVA, 2007; MUTTIet al, 2010; BORTOLLOTTI e TSUKAMOTO, 2011; BAHIA, 2015).

Faced with the changes resulting from the spinal cord injury, the knowledge about this before the practice of any physical activity becomes essential due to the risk that practitioners may expose themselves to both fractures and cardiovascular overloads. This knowledge can guide the elaboration of a program of physical activities, the quantification of the loads and also the elaboration of a program of health education.

### **3. Resisted exercises for people with disabilities**

Individuals with spinal cord injury, temporarily or not, need extrinsic assistance to perform certain movements, such as displacement, since most of them are wheelchair users or even individuals who have some walking pattern, which requires the use of objects to support themselves as canes or walkers. With this, a progressive overload in their upper limbs may occur, and consequently joint wear and muscle injuries, which may limit and damage their independence and rehabilitation (BAHIA, 2015).

According to Bortolotti and Tsukamoto (2011) in the last decades there has been a significant expansion in the survival of spinal cord injury patients due to advances in medicine. Thus, rehabilitation treatments are aimed at maximizing the individual's functional independence and reintegration into society, working on the inclusion of factors such as prevention of deformities and complications, increase in remaining muscle function, respiratory function, transference and replacement of postures, wheelchair handling, balance, acquisition of orthostatism and possible return of walking with orthotic apparatus. These factors are inherent to the paraplegic spinal cord injury, associated with the several activities he performs in his routine, such as lying down and getting out of bed, getting in and out of the car, going to the bathroom, changing clothes, among others.

Thus, it is important to add to these advances and knowledge, that the individual performs sections of muscle strength training that allows the evolution of improvement in his physical fitness. Among the several trainings, the practice of exercises with weights or weight training (most commonly used term) stands out in this work, allowing the improvement of the individual's daily activities, activities that can be called functional independence, which is directly linked to the preparation of all preserved muscles in the spinal cord injury, as well as the improvement in the predisposition to the risk of cardiovascular diseases, improvements in social living, psychological well-being and quality of life (BORTOLLOTTI and TSUKAMOTO, 2011), (MEDINA, BOTARO and OLIVEIRA, 2012).

#### **4. Resisted exercises and their benefits**

As for the benefits of physical activity for people with disabilities, we can present not only the promotion for a better quality of life and functional independence, but also an essential component when it comes to reducing public health expenditures ( RIMMER et al., apud SERON, ARRUDA e GREGUOL, 2015)

In this sense, Soares and Blascovi-Assis (2018), there are several benefits brought by the practice of sports activity that aim to overcome negative situations, so that everyone can effectively participate in society, which aims at identification in the social environment, and which enables the development of self-esteem, of how the person with disability affirms himself/herself, how he/she determines his/her independence and social interaction.

Studies by Bortolotti and Tsukamoto (2011) have shown that paraplegic people performing exercises with weights have obtained a significant improvement in muscle strength. In them, the test of 1 RM (maximum repetition) was used as a training protocol to obtain the results. With this, they concluded that after 7 weeks of regular training, the individuals showed strength gain in the upper limbs, and that muscle strengthening produces a better response in trainings carried out 2 to 4 times a week in healthy individuals, being necessary to work an intensity of resistance that allows the execution of 8 to 12 repetitions, and now have an increase in the rate of muscle gain if the intensity of exercise and/or training increases (more weight and fewer repetitions). Through the 1 MRI test it is possible to obtain the result of factors such as muscular strength behavior in different muscle groups, effectiveness or not of regular physical activity programs to increase muscular strength, prescribing the intensity to be applied in exercises with weight, among others. In a literature survey conducted by Mutti et al. (2010), aspects such as muscle strength and endurance, functional capacity, independence and quality of life incorporated some of the benefits granted by resistance

exercises, as well as increased capacity to perform activities of daily life and correction of muscle imbalances that occur with chronic wheelchair propulsion. Studies were also found informing an improvement in the psychological and social issues of paraplegics, where after 1 year of conducting a resistance exercise program in 4 men who use wheelchairs, the results of the analysis of the interviews pointed out positive changes in self-confidence and body image and that resistance exercises promoted opportunities for socialization.

Another study conducted by Nascimento Silva (2007) shows that after spinal cord injury there is a decrease in muscle mass instead of inactivity, and the practice of physical activity promotes improved muscle strength, coordination and endurance, decreased negative psychological reactions such as depression, mental inactivity and social isolation, infectious complications of the urinary tract, bedsores and hospitalizations, improved functional independence and mood.

A study with 2 paraplegics and 1 tetraplegic through an upper limbs cycloergometer tried to evaluate the cardiovascular and respiratory conditioning of patients before and after the 6-week training period, twice a week. The results showed that there was an increase in inspiratory pressure of 40% for the cervical spinal cord injury, 53.4% for the thoracic spinal cord injury and 20% for the lumbar spinal cord injury. There was also an increase in forced vital capacity and forced expiratory volume in the first second in quadriplegic and paraplegic patients at thoracic level. Moreover, physical exercise generates an improvement in cardiorespiratory parameters, promoting an increase in work capacity of 40% and maximum oxygen volume of 20%. Regarding the functional independence and quality of life of the patients, there were no changes, and despite this, the exercises of this specificity become relevant in the life of the spinal cord injured, since the inactivity compromises the cardiorespiratory system (JUVENAL and SAVORDELLI, 2016).

From the presentation of some studies carried out with the population we work with and with whom we direct these studies, we will present the extension project that represents all the work, place, participants and activities of this study.

## **5. Materials and methods**

This research has a methodological case study bias, reporting experiences in the PEUVN and their contributions to the community served and the academic participants through teaching and research. The authors of this research developed the activities in the morning period. Seven individuals with physical disabilities participated in the project during this period, two of them female and five male, living in the city of Campo Grande - MS. Three of them present tetraplegia, two paraplegia, one hemiplegia and one with neuromotor deficiency performing walking at short distances. The age of the participants is between 24 and 61 years, with an average of 44.85 years.

These are people with physical disabilities resulting from automobile accidents, firearms, diving and head trauma due to confrontation with another individual. That is why we think about actions in the project that, through physical activities, can contribute to the independence and autonomy of the participants, promoting conditions so that they can return to participate and enjoy with quality and safety their social coexistence. The service starts with the filling out of a form as soon as they enter the project. One of the academics

receives the participant and after a brief dialogue and interview, writes down the information on the anamnesis form. This procedure consists of identifying the participant's profile, information regarding his/her functional independence, how his/her physical disability occurred, and the data that subsidizes the preparation of the training form. After the preparation of the training form, the practice begins with the execution of the exercises.

Bodybuilding exercises are worked in adduction, abduction and adduction, horizontal shoulder abduction, bending and extension of shoulders and elbows, isometric exercises with breathing to activate muscles in the region of the core and stretching, made both with common devices of the gym as with alternative devices, and adapted materials such as shin guards, thera band, dumbbells, among others. The participant, with walking ability, works exercises of lower limbs for the quadriceps and ischiotibial muscles, in the extension chair and flexor chair

In the case of those with tetraplegia, there is a type of adaptation in the hands with a type of leather glove, possessing a ring that is attached to the karabiner of the devices, and the use of the thera band is one of the adaptations that allows the execution of exercises of upper limbs and back. With only one band of the thera band it is possible to work large muscle groups and adapt the band on the hands or arms to perform strength exercises. For those who present paraplegia there is no need to use the gloves, but the thera band is also used, mainly in exercises for joint movements.

Some classes are recorded with footage and photographs for monitoring the training program, for example, in the case of one of the participants, quadriplegic, whose physical exercise program aims to minimize the postural problem, installed in the cervical and thoracic spine due to his condition as a wheelchair user and loss of waist movements down.

## **6. Results and discussion**

The Vida Nova extension project has among its objectives to offer physical activities, among them resistance exercises, to people with disabilities, taking academic knowledge to the service of the community and expanding the process of inclusion of these people in society. There are other objectives in the project, such as contributing to the academic formation in the area of adapted physical activity and contributing to the social inclusion of people with disabilities, providing greater autonomy and physical independence to the people with disabilities served in it.

For a better quality of care for the people with disabilities in the project, often with several kinds of limitations, one or more academics are responsible for each one of them. The participating academics can assist in the Project since the first semester, and for that they receive adequate training from the coordinating professor, because not all of them still have theoretical and practical knowledge of the proposed activities for people with disabilities.

Currently, the project offers sports initiation and psychomotricity classes for young people and adults with intellectual disabilities, weight training for a diverse public, among them blind people, people with physical disabilities (congenital malformation, brain trauma and spinal cord injury) and intellectual. Classes are held on Tuesdays and Thursdays, lasting 40 to 60 minutes per student, with morning and afternoon hours.

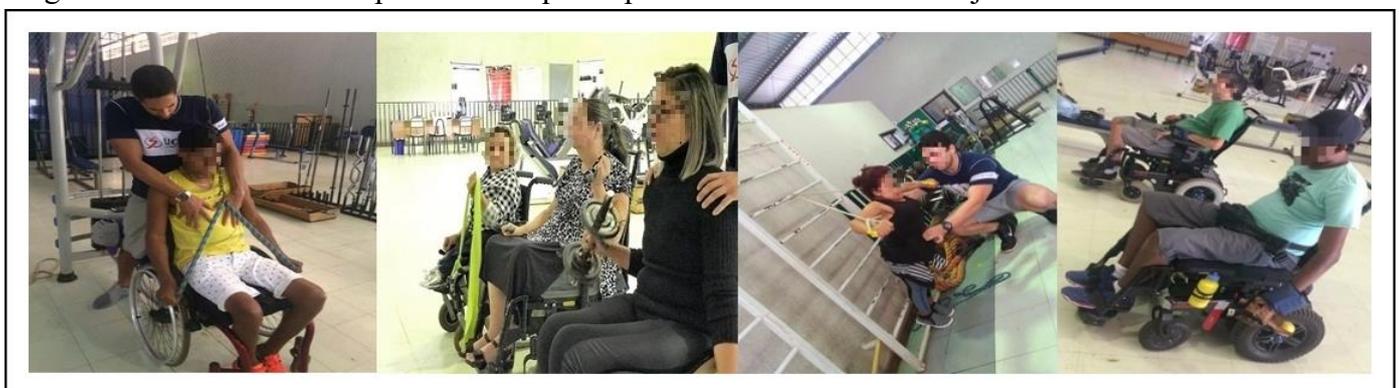
The coordinators of the New Life Project were teacher Joslei Viana de Souza who created it, teacher

Marcela Grisólia Grisoste, teacher Flávia Faissal de Souza, teacher Sarita de Mendonça Bacciotti and since 2014 is coordinated by teacher Dr. Vera Lícia Souza Baruki. The project has a Physical Education teacher as coordinator and academics of the UCDB Physical Education course, scholarship holders and volunteers of the Physical Education course (Degree and Baccalaureate) who perform the work with people with disabilities. The project team also includes a teacher and an academic scholarship holder from the Nutrition course of the same institution. There is also a social worker responsible for all the extension projects inserted in the UCDB school clinic. The work begins after the referral made by the physiotherapy sector of the UCDB's clinic school or by the physiotherapist of the SUS who attends inside the institution. Each person with disability has specific training that considers their type of disability, their limb commitments, and their possibilities of strengthening, improving their postural condition, and joint mobility.

Regarding the academics who are at the forefront of the activities, the project makes it possible to put into practice all the theoretical-practical knowledge learned in the classes of the Physical Education course. In it, the Physical Education teacher will also face different challenges not only related to disability, but also to educational, social and cultural aspects, and in order to overcome them, this teacher must have a posture not only participatory, but also critical. The extension activities allow the academic to exchange and gain experience, where it is possible to teach and learn from the people with whom one works.

Weight training for people with spinal cord injury began on May 3, 2011 after the Physical Therapy sector of the Clínica Escola at UCDB proposed that the Vida Nova Project continue the work. A partnership was established between the Physical Therapy sector and the Physical Education sector, in which the Physical Therapy sector referred patients who needed to gain strength so that in the Vida Nova Project this work could be developed. Upon entering the project, this individual is treated as a student and no longer as a patient. In the Vida Nova Project we have as a goal the gain of strength and localized muscular resistance (RML) for people with spinal cord injury. In addition to weight training equipment, we use resources such as thera band, teratubling and a lot of creativity. Figure 1 presents images of the work done with the PEUVN students. Periodic anthropometric evaluations are performed, which include perimeter and skin fold measurements, as well as nutritional orientation with a scholarship student from the Nutrition course.

Figure 1 – Activities developed with the participants of the Vida Nova Project.



Source: Own elaboration.

## **7. Final considerations**

The Brazilian Law of Inclusion to the Person with Disability, Law 13.146/2015 was a great advance in the politics of inclusion in the Country, what corroborated the Constitutional Letter that came in 1988. However, it is observed that there is a long way to go in the search for such rights to be effectively fulfilled.

The project presented in this work, meets the fulfillment of the constitutional precepts exposed and the harmonious search for human rights. Currently, this project serves around 15 people with physical disabilities, and in the morning the concentration of participants is higher. Six of them arrive in motorized wheelchairs and others in common wheelchairs. The activities are carried out at the School Academy, which when it was designed and at the time of acquisition of the equipment, did not count on the participation of people with disabilities at some time. As we have already reported in this study, people with disabilities have currently increased and attended more social spaces, one of them is the Vida Nova project within UCDB.

This situation led scholars to add to their knowledge of the subject Adapted Physical Activities, the study of the physical space of the gym and the apparatuses to explore new possibilities for wheelchair students, with paraplegia and tetraplegia, to perform muscle strength training. At the same time that they observed the gym's apparatuses, they created the exercises with the use of the theraband.

The strength training was applied individually, considering the need and characteristics of the injury of each participant positioned in his wheelchair. Only exercises for upper limbs were performed, and if there was a postural alteration during the execution, the academics made the correction verbally.

The structure of the gym does not allow the full use of the devices, but the use of the theraband with quadriplegic individuals in weight training exercises was one of the adaptive procedures that can be applied in case of lack of accessibility in the gym or for participants who do not have prosthesis or hook to perform the training.

However, future studies may be developed regarding a school gym with adapted equipment to better serve them. This possibility has already been portrayed to the responsible teachers and obtained a good acceptance, because it was observed beyond the contribution to the students, the interdisciplinary relevance that the project can provide, establishing relationships beyond the health courses, with the courses of engineering for surveying and making of floor plan, as well as courses such as accounting sciences and administration that will make the budget for the implementation of the academy and make it accessible and adapted.

## **8. Competing Interests**

The authors declare no competing interests.

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