

A photograph of a classroom scene. A male teacher in a light blue shirt is standing at the front, writing on a whiteboard. He is holding a marker in his right hand and a tablet in his left. The whiteboard has some mathematical formulas written on it, including  $P_{rel} = P \cdot \frac{1}{m}$  and  $P_{no} = (1 - \frac{P}{m})^m$ . In the foreground, the backs of several students' heads and shoulders are visible, showing they are seated and facing the teacher. The background is a plain wall. The image is overlaid with a blue geometric design on the left and bottom edges.

# MULTIDISCIPLINARY INTERVENTIONS FOR PEOPLE WITH DIVERSE NEEDS A TRAINING GUIDE FOR TEACHERS, STUDENTS, AND PROFESSIONALS

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**Bentham Books**

# **Multidisciplinary Interventions for People with Diverse Needs - A Training Guide for Teachers, Students, and Professionals**

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## FOREWORD

Multidisciplinary Interventions for People with Diverse Needs is a book written from an interdisciplinary perspective that has the objective of helping to understand the problems from people with special needs.

It is an entertaining, well written, didactic book that will be useful for students and professionals interested in studying several and different approaches related to the meaning, evaluation and intervention of the problems related to dementia, language disorders, diabetes, alterations of consciousness, celiac disease and disability in general. The different chapters offer an updated theoretical foundation that allows contextualizing and justifying the development of these issues. For the students it will be a useful work to develop the foundation and justification of research related to the final projects of degrees, master's degrees and doctoral theses.

For teachers and professionals the work will serve as a guide for teaching, for the development of the structure of training courses, for the design of evaluation models and intervention of the topics addressed in the book. The authors of this book are experts, of recognized prestige, who come mainly from the academic world, who have achieved a balance between the rigor and depth of analysis of the different topics, and the development of an accessible text for different profiles of readers and use.

Pedagogues, psychologists, students, teachers and professionals from the Social and Health Sciences, Sports Sciences, among others, will find in this book a place to lean out to discover very interesting academic, professional and human aspects related to the world of special needs.

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## PREFACE

Human diversity faces several challenges, as there are many people in situations of vulnerability due to personal and environmental factors. Vulnerable populations can experience physical, psychological, and social problems. Those include people who face great precariousness in their life and find themselves in a situation of effective vulnerability. These people need a prompt, effective and a scientific evidence-based response to overcome barriers thrown at them.

This book compiles a set of focused evidence chapters to raise awareness on the particular conditions of special populations, invoking assessment and intervention to promote better life conditions.

In the first chapter we can find an issue that affects contemporary society, the ageing population. Although living longer is an unquestionable gain, the truth is that increasing average life expectancy inevitably entails the onset of dementia, urging the need to slow its progression and minimize its impact. It presents scientifically based physical activity to combat the cognitive decline and extend the years of life with quality.

Chapter 2 raises awareness on people with brain damage with altered consciousness. The uncertainty on the patient's state of conscience leads to doubts in the course of action to follow in terms of treatment or prolongation of life. Correct assessment plays a vital role to foster best decisions and directed interventions on the patient's best interest. Situations of misdiagnosis and consequently unachieved interventions are frequent and must be improved through extended and evidence-based approaches.

People with special needs are addressed in the third chapter. We are in a global world where borders fade and anyone can pursue employment and better life outside his/her country. It may seem simple, but there are persons with constraints that cannot fulfil their needs. Not using a common language can prevent social and employment relations. Exclusion is aggravated when learning a language hampered by a functional limitation. Sensory, motor and cognitive disabilities can hinder a truthful inclusion in modern society. EN-ABILITIES is a European project that aims to enable English autonomous learning by people with diverse needs, sustained on a universal design for learning approach.

The fourth chapter focuses on the performance of activities of daily living of children with disabilities. What for many is considered acquired, for others it seems to be a difficult task. Those inattentive, may not realize the impact of having great difficulties, or not being able, to perform everyday tasks can have in the life of a child with functional limitations. Depending on others for several tasks, having reduced options for activities and encountering mobility barriers is a crucial factor for those who experience great difficulties. Knowing this and other issues can structure routines that facilitate their inclusion in the different contexts in which these children are inserted.

Autism Spectrum Disorders are discussed on the fifth chapter. It has been found that children with ASD experience difficulties processing, integrating and responding to sensory stimuli. Consequently, behaviours associated with difficulty processing and integrating sensory information create social isolation for children and their families, restrict participation in daily living activities and impact social engagement. What for some can be misbehaviour is in fact a maladaptive response to the environment and must be carefully addressed to minimize and overcome sensory processing dysfunctions. Specialized interventions such as occupational

therapy using sensory integration are in order to help children with ASD respond more adequately to environmental stimuli.

Diabetes, referred in chapter six, is a modern world disease. Although it may be congenital, it also emerges from modern life style and eating habits. Aetiology aside, it can be seen that it can lead to serious problems with loss of independence and drastic reduction of quality of life. The adoption of a strategy to prevent the onset and progression of the disease are imperative. However, when it is already installed, its effects must be minimized. The combination of the intervention of different professionals seems like the procedure to adopt for an optimized approach.

Chapter seven goes through Celiac disease an increasingly visible condition, with frequent identification of more cases. The ordinary citizen is not aware of the difficulties that people suffering from this disease suffer. In catering and collective food services, mistakes that can harm a vulnerable person are frequent. It is important to raise awareness of the effects of the disease, in particular those that can make a difference in the lives of these people, avoiding things as simple as cross-contamination in food distribution, storage and handling, without ever forgetting the need for research and innovation for normalizing the diet of these people.

Animal Assisted Therapy and Developmental Disorders come to us in chapter eight. In it we can read how therapy with animals can assist in the promotion of skills, health-related issues and well-being of persons with developmental disorder. The overview presented shows the array of conditions that can benefit of this type of interventions. The basis of the intervention is the arise of a relationship that liberates the person with developmental disabilities, promoting positive emotional responses that influence neurobiological components and enhances performance in diverse areas, independent functioning, social participation and quality of life of those which are confronted with limitations due to disorders in their development.

Early in this book, physical activity was mentioned as a preventive and therapeutic intervention for people with diverse conditions. Chapter nine addresses again physical activity, but this time in people with disabilities. Due to their functional constraints, people with disabilities tend to perform less, or not to perform, physical activity that would greatly benefit them in a multidimensional way.

It reveals the need to identify the physical activity determinants in order to contribute to conceptual changes, new interventions and policies that increase the levels of physical activity on this population and, consequently, further advance in their full social inclusion.

The final chapter, chapter 10, deepens the theme of physical activity in children with disabilities. It's well known regular physical activity has a positive impact in health and lifestyle, contributing for functionality and quality of life. It is important to create opportunities for physical activity. In this context, school sports appear as a first line of intervention. Inclusion is a trend that must be completely fulfilled. Legislation protects the rights of functional diverse students and obliges to their inclusion in school activities, of which school sports cannot be an exception. Although it may seem less compelling to mandatorily engage in physical exercise, the truth is that if it is not enforced, it will probably never be performed by those who need it.

For the foregoing, this book assumes as essential when the theme are populations in situations of vulnerability. Academics, technicians, and the general population here have a source for drinking knowledge shed by scientists and based on rigorous scientific evidence.

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## CHAPTER 1

# Exercise and Physical Activity - Contributions to Intervention in People with Dementia

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**Abstract:** In the last few decades, the world has undergone profound demographic changes, reflected in life expectancy. We live for much longer, but we cannot say that these growing years are directly proportional to the quality of life. Dementia, in its different aetiologies, is more and more frequent with a consequent decline in the quality of life. However, cognitive decline and the onset of dementia may be delayed with the adoption of healthy lifestyle habits and therapeutic combinations that use non-pharmacological approaches such as activity and physical exercise. This chapter integrates a thorough review of the literature that characterizes ageing, cognitive decline and dementia, and it summarizes scientific evidence on the effects of physical activity on cognitive functions. Finally, recommendations are presented on the prescription of exercise for older people and elderly people with dementia. It is known that there are direct benefits (action on neurotrophic factors and neurotransmitters, among others), as well as indirect ones such as those resulting from a better vascularization of the brain. However, physical exercise requires precautions related to the conditions inherent to normal and pedagogical ageing. It is possible to perform adapted physical activity resulting from the coordination of sports and health professionals, knowledgeable of the needs and idiosyncrasies of the elderly, with cognitive decline or dementia.

**Keywords:** Cognitive decline, Dementia, Elderly, Physical exercise.

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## **INTRODUCTION**

This chapter summarizes the effects of physiological and pathological ageing and their cognitive implications. In the most exacerbated cases, we can observe the onset of dementia, which, despite the different aetiologies and possible evolutions, inevitably leads to deterioration of cognitive skills and, consequently, to lesser autonomy, greater dependence on caregivers and loss of quality of life.

In this way, in a multidisciplinary approach that combines Occupational Therapy and Physical Education professionals, it is important to list a set of scientific evidence that describes the benefits of exercise and physical activity in minimizing cognitive deterioration due to ageing. It also aims to submit a proposal for an exercise and physical activity program that helps seniors and their formal and informal caregivers.

Research in the area of exercise and ageing has a relatively short but very active history. There has been a major development in the research of ageing in the last two decades. Among other findings, the researchers provided evidence of potential low-cost alternative therapies for the treatment and prevention of disease and the potential to improve the quality of life, health, and overall vitality of the elderly.

The discussion about ageing-associated cognitive impairment and especially dementia is justified. In this context, we highlight Stone (2011), who stated that it is extremely rare to find an elderly person who does not have cognitive impairment. In this sense, this chapter discusses the benefits of physical activity in the ageing of the individual, in particular on one of the most frequent associated disorders - cognitive compromise.

Sustained by the scientific evidence, we want to contextualize and propose a program of exercise and physical activity as a non-pharmacological intervention for the prevention and reduction of progression of cognitive decline in individuals of advanced age.

Population ageing is a worldwide reality and in particular, in the European context where there is already an ageing index of 123.9, meaning that for every 100 young people, there are 123.9 elderly people (PORDATA, 2016).

The increase in human longevity has been a constant trend worldwide in recent decades. Improved socioeconomic conditions and nutritional resources, together with the prevention and treatment of important pathologies such as infectious, metabolic, vascular and cardiac diseases, have contributed to an increase in longevity from 60 to 80 years old during the 20th century in Western countries

(Démonet & Celsis, 2012). However, this dramatic increase in life expectancy was not accompanied by a proportional increase in quality of life for the elderly. On the contrary, generally, the increase of the life expectancy intensifies the risk of disease, deficiency, dementia and advanced ageing before the death. In the particular aspect of dementia, Santana, Farinha, Freitas, Rodrigues and Carvalho (2015) mentioned that the incidence and prevalence of dementia increase with age, doubling every five years after the sixth decade of life. They added that the estimated number of Portuguese over 60 years old and with dementia was 160287, which corresponds to 5.91% of this population. Knowing that Alzheimer's Disease represents 50-70% of the cases, there will be between 80144 and 112201 patients (Santana, Farinha, Freitas, Rodrigues & Carvalho, 2015). Kravitz, E., Schmeidler, J., & Beerli, M. S. (1990) disclosed that in the 85-year age group, more than half will have dementia and that the annual incidence rate doubles every 5 years. In 2010, Corrada, Brookmeyer, Paganini-Hill, Berlau, and Kawas already argued that the incidence of all causes of dementia is very high in people aged 90 years and older and continues to increase exponentially with age in both men and women. In this context arises the need to fight the effects of cognitive impairment and, in its more severe variant, dementia, trying to minimize its effects and delay its setting in so that individuals can live longer, but also with greater autonomy and quality of life. One of the most widely used therapies, along with vitamin supplements, used as the first line of defence against the detection of mild cognitive impairment and against the onset of dementia, is the practice of physical exercise.

However, the elderly population, because of ageing, needs special attention when delineating a program of exercise and physical activity.

## **AGEING - BRIEF CONTEXTUALIZATION**

The current section provides a brief context for the reader to contact with the conjuncture of ageing, observing the demography and the main physiological changes, in particular, the repercussions on the brain, and the care to be taken when exercising and performing physical activity. It seeks to justify the need for the exploration of the present subject-matter in the context of contemporary society.

### **Sociodemography**

Population ageing is a worldwide concern. There is a growing increase in the elderly population due to two main aspects: the increase in life span and the decrease in the birth rate. Human life expectancy has been increasing rapidly. Due to better health and hygiene, healthier lifestyles, enough food and better medical care, as well as the reduction of infant mortality, we can now expect to live much

## Disorders of Consciousness

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**Abstract:** A disorder of consciousness (DoC) is a state where consciousness has been affected by damage to the brain. DoC range in the form of a hierarchy, including coma, vegetative state and minimally conscious state. The most common way to assess consciousness is to observe their responses to stimulation. However, observing these responses and detecting purposeful behaviours is extremely challenging. Several studies have shown that misdiagnosis is common. It is crucial to optimise the way consciousness assessments are performed. Clinical management of DoC patients, from treatment of pain to end-of-life decisions, depends on behavioural observations. In the present chapter, we review the challenges posed by the assessment of consciousness and the importance of combining clinical assessment with complementary methods of assessment, such as positron emission tomography, functional magnetic resonance imaging and electroencephalography. According to the diagnosis established, the patient will follow different care pathways. Although therapeutic options of DoC are still limited, basic therapies include artificial nutrition and hydration, physical and occupational therapies as well as sensory stimulation. Pharmacologic trials, deep brain stimulation and multisensory stimulations are some of the therapeutic options for DoCs. Recently, it was removed the requirement to obtain legal sanction for every decision to withdraw clinically assisted nutrition and hydration from people in DoCs. This has led to an entire paradigm shift, from a focus on the diagnosis to a focus on the patient's best interest. Although these decisions will spare the courts' involvement, one should never disregard reaching a correct diagnosis for this vulnerable population.

**Keywords:** Anoxia, Assessment, Brain injury, Coma, Consciousness, Diagnosis, Disorders of consciousness, Emergence, Minimally conscious state, Misdiagnosis, Prognosis, Treatment, Vegetative state.

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## INTRODUCTION

A brain injury can be classified as traumatic (*i.e.* a car accident or a fall); nontraumatic (*i.e.* drowning, drug overdose, heart attack); and spontaneous (*i.e.* a bleed or virus). The most severe type of acquired brain injury can be classified under the term ‘disorders of consciousness’ (DoC). DoC can be used to describe a spectrum of disorders, in which consciousness is altered in a transient or permanent way (Monti, 2015). DoC range in the form of a hierarchy, including coma, vegetative state (VS) or a minimally conscious state (MCS).

A DoC, or impaired consciousness, is a state where consciousness has been affected by damage to the brain. Consciousness has two fundamental elements: arousal and awareness. Arousal refers to the level of alertness, determined by eye opening and basic reflexes such as coughing. Awareness is associated with more complex thought processes and the content of consciousness, which is determined by the ability to follow commands or purposeful motor behaviours such as localising and eye-tracking (Laureys *et al.*, 2000).

After extensive brain damage, the surviving patients may only regain limited levels of consciousness. The most common way to assess consciousness is to observe their responses to stimulation. However, observing these responses and detecting purposeful behaviours is extremely challenging. The extensive range of impairments (verbal, motor and cognitive), low arousal levels, medication and lack of assessor experience, contribute to the difficulty in reaching a correct diagnosis (Heine, Laureys, & Schnakers, 2016; Gill-Thwaites, 2006).

## DEFINITIONS

### Coma

People in a coma are completely unresponsive. They do not move, and their eyes remain closed. The person does not react to external stimuli such as light, sound or pain. It is almost as though the person is under a general anaesthetic. Some patients with very severe brain injuries who do not enter a coma naturally are placed in a medically-induced coma to allow the brain time to heal. A coma usually lasts for less than 2 to 4 weeks, during which time a person may ‘wake up’ and regain consciousness, or progress into a VS or MCS.

### Vegetative State (VS)

The term VS was first coined by Jennett and Plum in 1972. They described it as a paradoxical state of wakefulness without awareness, in which a person has no awareness of themselves, others or their environment. The main difference

between ‘coma’ and VS is that the person in VS has a sleep/wake cycle. They are able to open their eyes and there will be times when they appear to be ‘awake’. A person in VS is unable to show meaningful responses to any stimuli. They may move, but this movement is reflexive or spontaneous (non-purposeful). Movements can include grinding their teeth and facial movements such as grimacing. They might jerk as a reflex response to loud noises or move away from a source of pain. They may produce sounds such as grunting. There will be no reproducible, purposeful, or voluntary behavioural responses to visual, auditory, tactile or noxious stimuli and no evidence of language comprehension or expression (Bernat, 2009).

### **Minimally Conscious State (MCS)**

The term MCS was first introduced in 2002, by Giacino *et al.*, (2002) and unlike the VS, MCS is a state of consciousness. This designation enriched the clinical scene, by giving a name to a cohort of patients, who were previously grouped within the VS and whose diagnosis remains confused with it (Fins & Bernat, 2018). A person who is ‘minimally conscious’ shows some evidence of awareness of themselves or their environment. An example might be the ability to follow simple commands, even if inconsistently. Giacino *et al.*, (2002) quantified MCS as limited and inconsistent but clear evidence of awareness. Some people with brain damage are blind, or deaf, or unable to move certain parts of their bodies, therefore, what a minimally conscious person can do to demonstrate that they are aware of themselves and their environment will vary. There will be times when they can follow simple commands and times when they cannot – their consciousness is likely to fluctuate.

MCS was later subcategorised by Bruno, Vanhaudenhuyse, and Thibaut (2011), based on the complexity of the patients’ behaviours. The term MCS+ was used to describe patients with high-level behavioural responses (*i.e.*, patients who can follow commands, have intelligible verbalisations or non-functional communication) and MCS- to describe patients with low-level behavioural responses (*i.e.*, patients who can visual pursuit, localise noxious stimulation or contingent behaviours such as appropriate smiling or crying to emotional stimuli).

### **Emergence from MCS**

Although both VS and MCS are often transitional states between coma and higher levels of consciousness, some patients may fail to fully recover awareness and remain in DoC for the rest of their lives (Estraneo & Trojano, 2018). The Royal College of Physicians (RCP) guidelines for prolonged disorders of consciousness propose that emergence from MCS can be assessed and measured through demonstration of functional communication and functional object use (RCP,

## **Promoting Autonomous Language Learning in People with Special Needs: Universal Design for Learning in the Project En-Abilities**

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**Abstract:** The international society is involved in an active commercial and labour activity. This activity is based on the elimination of barriers and the dissipation of borders. Everyone wants their part of the European dream, but not everyone has equal opportunities and fair access. People with disabilities or other needs often encounter obstacles, including difficulty or inability to communicate in a non-native language, English. This chapter presents the EN-ABILITIES Project that seeks the inclusion of human diversity through communication in English. Here, we present a survey of English learning needs by people with special needs, as well as a structure for an online accessible learning model. A review of European legislation and the different concepts of universal design applied to learning contexts is presented, as well as the results of a placement test conducted with people with disabilities and the perspectives of English teachers about the teaching of this language to people with disabilities. It also addresses the particularities to be taken into account when providing online training for people with diverse skills.

**Keywords:** Autonomous language learning, EN-ABILITIES, People with special needs, Universal design for learning.

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## **INTRODUCTION**

More often than what should be desired in our society, buildings, software or information systems - to name just a few - are usually developed for prototypical users, leading to the neglect of users with disabilities and/or Special Educational Needs (SEN) (Sanchez, Diez & Martin, 2015). Fortunately, throughout the twentieth century, changes that have taken place in society have led to the adoption of new paradigms that have improved the situation of people with disabilities (Preiser & Ostroff, 2001). It is in this context that what is known as the paradigm of Universal Design was born, although it was not until the beginning of the new century, specifically in 2001, when its first handbook was published (Preiser & Ostroff, 2001). The publication of this reference showed that, in the realm of design, a significant number of changes had taken place and that it was necessary to have documents and resources which could act as guidelines for professionals in this field. Since then, the technological, economic, social, and even legal spheres have modified the discourse of the practice of universal design in society (Preiser & Smith, 2011). In addition, the rights of people with disabilities have been acknowledged by most people and governments over the last decade in relation to what accessibility and universal design refers to. Therefore, the need and obligation of teaching that complies with the social mandates to address diversity is becoming increasingly necessary.

Since its formulation, universal design and other similar concepts have described the complexity, dynamism and reciprocity of the relationship between the environment and the person (Webb & Hoover, 2015). In addition, universal design has become significant in the formation of legislation. The European base in terms of accessibility – pre-dating the concept of universal design - took place in 1988 with the launch of the HELIOS program. As a continuation of this first program, in the year 1996, subsequent studies within HELIOS II were complemented. The objectives of both projects were to promote the social and economic integration of people with disabilities, as well as to promote the possibility of achieving the basis for living an independent life (Zolkowska, Kasior-Szerszen & Blaszkiewicz, 2002).

More recently, the field of universal design has acquired a wide presence in Spanish legislation. The laws enacted throughout the last decade have greatly favoured the promotion and dissemination of the philosophy derived from these concepts. The fundamental law by which people with disabilities are guaranteed their rights in the Spanish state already refers to the need for accessibility and design for everyone in its own title. While it is true that, at present, the law that encompasses these rights is the General Law on the Rights of Persons with Disabilities and their Social Inclusion, it is the previous legislation that includes

all the normative development of this idea. Therefore, it was Law 51/2003, of December 2<sup>nd</sup>, 2003, on equal opportunities, non-discrimination and universal accessibility for people with disabilities which changed the view which society and its members had on how to address diversity.

Throughout this legal text-specific references are made to accessibility and design for all as basic tools. Thus, in Article 2, Principles, the concepts of universal accessibility and design for all are well detailed. These terms will be constantly used later throughout the norm. These definitions are as follows:

“c) universal accessibility: the condition that environments, processes, goods, products and services must meet, as well as objects or instruments, tools and devices, to be understandable, usable and practicable by all people in conditions of safety and comfort and in the most autonomous and natural way possible. It presupposes the strategy of “design for all” and is understood without prejudice to the reasonable adjustments that must be adopted.

d) design for all: the activity by which it is conceived or projected, from its inception, and whenever possible, environments, processes, goods, products, services, objects, instruments, devices or tools, in such a way that they can be used by all people, to the greatest extent possible. “

Both terms constitute the basis of all the normative principles used later in the rest of Spanish legislation. These are the same terms used in the international declaration of the rights of persons with disabilities, in the objectives of sustainable development and the 2030 agenda, as well as in the European 2010-2020 and Spanish 2012-2020 disability strategies.

Regarding the educational context, the concept and idea of the design for all is also clearly validated. The Organic Law 8/2013, of December 9, 2013, for the improvement of the quality of education in Spain describes the need to serve everyone with a model based on inclusion and with principles of universality, design for all and accessibility. The Organic Law 4/2007, of April 12, 2007, which modifies the Organic Law 6/2001, of December 21, 2001, referring to tertiary or university level studies, mentions in its twenty-fourth additional provision that there is an obligation to consider universal design criteria in higher education. In addition, and to conclude this review of the legislative context related to universal design, we must highlight the provisions of the Royal Decree 1393/2007, of October 29, 2007, which established the organization of the official university education in Spain. In its preamble, this law states that training in any professional activity should contribute to the knowledge and development of Human Rights, democratic principles, the principles of equality between women and men, solidarity, environmental protection, universal accessibility and design



## The Daily Life's Routines of Children with Disabilities

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**Abstract:** The objective of this research is to know the activities, the routes, the places visited and the obstacles identified in daily life routines of children/youth with disabilities, living in urban environments, during the time in which they are off the school period. In methodological terms, we used as instruments of study an anamnesis fact sheet and a routine diary that was completed by the parents together with the child/youth, an Individual Educational Plans (IEP) and a semi-structured narrative interview. Eight subjects between the ages of 9 and 15, all with different pathologies, were part of the study. The study was exploratory, descriptive and analytical. The results demonstrated that the subjects are supported in their routines by their parents and other relatives. Weekly out-of-school routines are primarily focused in the home (meaningful and important place) with activities classified mostly as sedentary ones in which they use little materials and, in the places, where they perform specific activities (Therapies, Tutoring, Music Conservatory and Catechism). The age and pathologies associated with each subject are factors that influence autonomy and independence of mobility. They visited few places and did so mainly in the company of family members. The main obstacles encountered in the routes performed are closely related to their pathology, showing difficulties in interacting with their peers. We conclude that the children/young people who participated in the study engaged in few activities and these were mostly in the home and sedentary. They visit few places, have poor independence of mobility, and interact poorly with others.

**Keywords:** Activities, Autonomy, Children, Disability, Mobility, Movement, Objects and subjects, Obstacles, Physical activity, Places frequented, Routes,

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Routines of daily living, Time spent in activities, Travelling, Urban, Young people.

## **INTRODUCTION**

The contemporary world is undergoing rapid and profound socio-economic transformations (development of the economy, social mobility, new forms of employment, new qualitative and quantitative forms of unemployment ...), family and individual, as well as in the system of values and norms that are associated with it, and also at the level of science and technology. In a society that is constantly evolving and transforming, people's life routines are being influenced by these changes that have a strong impact on their quality of life.

When we talk about daily routines and the quality of life of people with disabilities, considering the current world and its social organization, we are looking at a very particular minority of the population that should not be neglected. in an inclusive society.

According to the World Health Organization (2011), it is estimated that today there are more than 650 million people with disabilities that is about 16% of the total population (ranging from 12% in the more developed countries to 18% in the developed countries). In Europe, there are around 40 million people with disabilities and in Portugal, around 634,408, which corresponds to 6.1% of the resident population (Freire, 2010).

The fact that they have some type of long-term physical, mental, intellectual or sensorial impediment (Santos, 2016) should not be an obstructive condition of rights of full participation on equal terms with the rest of society as defined in 2007 in the Convention on the Rights of Persons with Disabilities. Greguol (2017) states that in order to determine public policies that allow the promotion of the full social inclusion of people with disabilities in different activities, it is necessary to know the reality in different countries. At present there is still an acute shortage of information on the needs of these populations, be it on part of the family, the school and society, which translates into the lack of adequate incentives for the development of their potentialities (Greguol, Gobbi & Carraro, 2013). There is also a shortage of studies on life routines, lifestyles and quality of life of people with some type of disability (Interdonato & Greguol, 2011). In order to contribute to the development in this area of study, it was our objective to know the activities, the routes, the places attended and the obstacles identified in the routines of daily life of the children/young people with a deficiency condition, living in urban areas, during the time they are off school.

### **Routines and Activities of People with Disabilities**

When we speak of routine, it is important to clarify the concept. Santos (2016, p.3) tells us that the word “routine” is defined in the Priberam Portuguese Dictionary as “a constant practice, habit of always doing something in the same way or sequence of instructions or steps in the realization of a task or activity”.

A “daily routine” according to Pereira (2014) refers to the framing of various daily tasks or events contextualized in learning, it is related to a daily succession of flexible events, in space and time. Pinto (1995) states that routines are fundamental dimensions of everyday life because they intervene significantly in the temporal and spatial structure of everyday life. In the same way, it is said that “both the common meaning of the concept of routine and its etymology pervades the idea of repetition, habit, wheel, vicious circle” (Brandão, Gonçalves & Medeiros, 2006: 25).

The experience of a differentiated routine with respect to the contexts can be a facilitating element of this construction process. However, if the multiple and differentiated routines are not integrated into the life-style of each adolescent and in a safe and responsive family environment, these may constitute a risk factor. The family, as a context of development and socialization with an educational role, can establish the borderline between the risk and the development potential of the contexts frequented by adolescents in the course of their daily routines (Barbosa-Ducharne, Cruz, Marinho & Large, 2012). Craidy and Kaercher (2001) argue that it is necessary to organize routines considering biological needs (such as rest, food, hygiene and age), psychological needs (individual differences) and social and historical needs (with regards to culture and lifestyle). Mahoney, Harris, and Eccles (2006) also point out that the way children and adolescents use time, in particular, time away from school, has consequences for their development. Hohmann and Weikart (2011) and Pereira (2014) argue that organizing the routine allows children to anticipate what will happen next, giving them a great sense of control over what they do at any given moment, providing feelings of greater security and autonomy. The daily routines provide children with security and knowledge regarding the activities that surround them, allowing for their development and cognitive evolution. However, Folque (2014) says that there are situations in which these routines must be modified to allow the realization and value of other activities that might not be foreseen and defined previously.

Routines also appear in the literature with other names. Serrano (2003) states that in addition to “routines of life” or “ways of life” there are authors who call it “lifestyles” and be something individual or group, one can speak of the lifestyle of

**CHAPTER 5****Sensory Integration and the Child with Autism Spectrum Disorders****Helena S. Reis<sup>1,\*</sup> and Pedro J. Bargão<sup>2</sup>**<sup>1</sup> *School of Health Sciences & ciTechCare - Center for Innovative Care and Health Technology, Polytechnic of Leiria, Portugal*<sup>2</sup> *School of Health Sciences, Polytechnic of Leiria, Portugal*

**Abstract:** Since the disorder was first identified, difficulty in processing, integrating and responding to sensory stimuli has been described as a feature of autism spectrum disorders (ASD). Current estimates show that between 42 and 98% of children with ASD demonstrate these sensory difficulties and sensory features (*i.e.*: hyper- or hyporeactivity to sensory input or unusual interest in the sensory aspects of the environment) that are now included as one of four possible manifestations of ‘Restricted, Repetitive Patterns of Behavior, Interests, or Activities’ (American Psychiatric Association, 2013). Families report that behaviours associated with difficulties in processing and integrating sensory information create social isolation for them and their child, restrict participation in daily living activities and impact social engagement. Three types of Sensory Processing disorders are distinguished: (1) sensory modulation disorders, which affect the regulation of the level or intensity of the response that occurs in the presence of the sensory information, thus differentiating between over-responsiveness, under-responsiveness and sensory seeking, (2) sensory discrimination disorders, which affect the ability to distinguish and identify sensory inputs, and (3) sensorimotor integration disorders, which involve a difficulty in transforming sensations into motor responses, including postural disorders with a sensory basis and developmental dyspraxia, in which ideation and motor planning are compromised, producing difficulties in learning new motor tasks. Consequently, interventions to address problems associated with difficulty processing sensory information, such as occupational therapy using sensory integration are among the most often requested services by parents of children with ASD.

**Keywords:** Autism Spectrum Disorder, Sensory Integration, Sensory Processing Dysfunction.

**INTRODUCTION**

*Sensory Integration* was a theory developed by Jean Ayres around the 1960s, and

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it is defined as the neurological process through which the central nervous system receives, registers and organizes sensory input to create an adapted response of the body to the environment. The spatial and temporal aspects of the data received from different sensory modalities are interpreted, associated and unified, and then a response is produced according to the environment's demands - the adaptive response (Ayres, 1979). Ayres (1972) defines adaptive response as an appropriate action in which the individual successfully responds to any environmental stimulus. Adaptive responses require that the individual tries a type and an amount of sensory stimulation that challenges but does not overload the central nervous system, in which case, the production of an adaptive response is boosted.

Sensory integration is mostly based on three basic senses - tactile, vestibular and proprioceptive. The interconnections between these systems start to take shape before birth and continue to develop as the child matures and interacts with the environment. These three senses are not only interconnected between themselves but also to other brain systems, so this is considered a complex interconnection. They are less familiar systems compared with sight and hearing, but they are fundamental to our basic survival (Ayres, 2005). *Proprioception* is the term used to describe sensations that are received from the tendons, muscles and joints. The proprioceptive system carries information about joint position and movement (Herdman, 2007). The *vestibular system* detects position and movement of the head relative to gravity. Together, the vestibular and proprioceptive systems provide information about the body's position in space, about body parts relative to each other, and about the dynamic movement of the body through space. This information is used to support postural control; balance; and the coordinated movement of the eyes, head, neck, and body. Someone who has precise vestibular and proprioceptive perception is likely to move gracefully, keeping his or her balance while moving with skill and precision. When the vestibular or proprioceptive system is impaired, individuals have difficulty developing a good body scheme. They will have poor balance, poor postural control, difficulty in forming well-lateralized sensorimotor functions, and poorly coordinated movements of the body and limbs, both separately and together (Cullen, 2012).

The visual, olfactory, gustatory and auditory sensory systems - also channels through which we obtain information about the environment - are equally responsible for our adaptive responses to the environment in an adequate way (Hilton *et al.*, 2010). Children and adults with Autism Spectrum Disorder (ASD), as well as other individuals with developmental disorders, may present with a dysfunctional sensory system. Sometimes, one or more senses may be more or less reactive to stimuli. Such sensory problems can be the main reason for behavior such as shifting balance, spinning and flapping hands. Although the receptors of the senses are present in the peripheral nervous system (which

excludes the brain and the spinal cord), it is believed that the problem is caused by the neurological dysfunction of the central nervous system - brain (Kuhaneck & Watling, 2010). Reports of individuals with High-Functioning Autism Spectrum Disorder (HFASD) mention that some sensory integration techniques, such as pressure and touch, can facilitate attention and awareness, and reduce the state of general excitement (Murray-Slutsky & Paris, 2000). Temple Grandin, in his book “*Thinking in Pictures*”, talks about the anguish and relief of some of his sensory experiences (Grandin, 1995).

Sensory processing refers to the way the brain receives, organizes and interprets sensory input. The reception, modulation, integration and organization of the sensory stimulus, including the behavioral responses to said input, are components of sensory processing (Mailloux, & Smith-Roley, 2001).

An optimal processing ability allows someone to give an adaptive response to the demands of the environment and to adequately take up his or her daily occupations. Any activity undertaken by the individual requires the processing of the sensation, or “sensory integration” (Humphry, 2002; Lane, Young, Baker, & Angley, 2010).

ASD represent a wide range of conditions that manifest themselves in a series of deficits, but sensory issues are now part of the diagnostic criteria of Autism Spectrum Disorder in the most recent description of the disorder in the *Diagnostic and Statistical Manual of Mental Disorders* (5<sup>th</sup> edition), including hyper- or hypo-reactivity to sensory input or unusual interests in sensory aspects of the environment (*e.g.* apparent indifference to pain/temperature, adverse response to specific sounds or textures, excessive smelling or touching of objects, visual fascination with light or movement) (APA, 2013). We know that the symptoms can vary with different categories, including social interaction, perseveration (repetitive and stereotyped movement), somatosensory disorder (movement or balance shifting frequency), atypical development standards, mood changes (hyper-reactivity or absence of responses to stimuli) and attention and security problems (Pfeiffer, Koenig, Kinnealey, Sheppard, & Henderson, 2011). With the growing understanding of neuropsychology in ASD, research has been focusing more on the definition of motor performance and on the sensory processing of these children. Behavioral studies have shown that behavior is not only associated with difficulties in social communication and in restricted interests but also in what concerns the sensory experiences of children with ASD, which are different when compared with typically developing peers (Kuhaneck & Watling, 2010). Children with ASD have difficulty in processing the sensory input and adequately responding to the demands of the environment (Hilton *et al.*, 2010).

## Combined Interventions on Diabetes

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**Abstract:** Eating habits and modern society have made diabetes a global concern and those who suffer from it are a vulnerable population due to adverse health consequences and functioning limitations. However, prevention and disease management help maintaining quality of life. This chapter brings together professionals from different scientific fields who have embarked on extensive bibliographical research, merging scientific evidence with professional experience. It is possible to verify that the interprofessional work benefits the patient with diabetes, articulating nursing care, nutritional education, practise of adjusted physical activity and the adaptation of environments, occupations and activities supervised by an Occupational Therapist. It is intended that the reader seizes the knowledge of different professionals, use it to their own advantage and help those who need it.

**Keywords:** Cognitive decline, Diabetes, Dementia, Dietetics and Nutrition, Nursing, Occupational Therapy, Physical exercise, Self-management.

### INTRODUCTION

Having diabetes is an increased risk of vulnerability. It is a disease that is often silent and, if not effectively controlled, has serious repercussions on the health condition and quality of life of a person. It is not uncommon to see sequelae in vision and movement (retinopathy and neuropathy) that can cause functional limitations and impair independence and autonomy. It is necessary to intervene in

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primary care for its prevention and minimization of sequelae and, when in more severe cases, intervene to rehabilitate the person, minimize functional issues and prolong quality life.

Diabetes mellitus, seen as a chronic disease, represents a serious and growing public health problem, with numerous complications, both individual and in the community. Its incidence and prevalence are increasing considerably and have reached epidemic proportions. Uncontrolled diabetes can result in devastating complications in various organs and systems of the body including Feet, Kidneys and Eyes (microvascular complications), as well as cause macrovascular complications, which can lead to acute myocardial infarction and stroke. Prevention by changing eating habits and exercise, timely treatment of diabetes complications, and self-management of diabetes tend to provide everyone with a better quality of life as well as better control of the disease.

This chapter aims to show an intervention combined with the vision of the scientific areas of Nursing, Dietetics, Sports and wellness and Occupational Therapy. In this way, in a multidisciplinary approach that combines Occupational Therapy and Physical Education professionals, it is important to list a set of scientific evidence that describes the benefits of exercise and physical activity in minimizing cognitive deterioration due to ageing. It also aims to submit a proposal for an exercise and physical activity program that helps seniors and their formal and informal caregivers.

## **HEALTH CARE IN DIABETES**

Diabetes Mellitus (DM) is a disease known to man since ancient times. It is assumed to be a public health problem and is considered as one of the “epidemics” of the 21st century by the World Health Organization, insofar as it is considered as one of the priority non-transmissible diseases due to the high morbidity and mortality related with their complications and the socioeconomic impact on public health systems in both developed and developing countries.

Diabetes can cause chronic complications in various organs of the body. Microvascular complications include complications in the foot (in diabetic foot that may progress to amputations), Kidney (chronic renal failure in an advanced stage may lead to the need for renal function replacement through dialysis or renal transplantation) and in the Eye (diabetic retinopathy is one of the main culprits of avoidable blindness in adults). Macrovascular complications can lead to acute myocardial infarction (AMI) and cerebrovascular accident (CVA), being an important cause of morbidity and mortality (Direção Geral Saúde (b), 2017).

The treatment of diabetes should have as main goal the implementation of



measures aimed at the correction of lifestyles, in order to avoid the complications associated with the disease. Thus, pharmacological treatment must always be associated with non-pharmacological treatment. The Mediterranean diet, weight control and monitoring and increase of physical activity in a way adapted to the age and the health condition, in order to avoid sedentarism, are the basis of non-pharmacological treatment (Carvalho, Silva & Coelho, 2015), as it will be later explored.

Primary Health Care is essential in the prevention of this disease, through sensitization to behavioural change and/or adoption of healthy lifestyles, screening and early detection of potential cases of diabetes. Professionals in this area are important vectors of behaviour change in individuals with risk factors and in people with diabetes, in what refers to decision-making processes that allow them to self-control their lives (Figueiredo, 2017).

The professional practice of the nurse is implicit in all levels of prevention: in the prevention of the emergence of diseases through activities of promotion and protection of health (primary prevention); disease, and to treat it effectively in order to reverse it, cure it, alleviate or treat its severity (secondary prevention), and prevent disease progression or try to maintain the highest quality of life when process is considered irreversible (tertiary prevention).

Care for people with diabetes requires articulation between different levels of care, promoting multidisciplinary and the participation of all institutions involved in this response.

## **NUTRITIONAL INTERVENTION**

Nutritional intervention is fundamental to the treatment of type 1 and type 2 diabetes and in educating individual self-management (“Standards of Medical Care in Diabetes—2014,” 2014).

The food selection and the adherence with the individualized food plan are the most challenging parts of the treatment for many diabetics (ADA, 2018b). The review by Hamdy & Barakatun-Nisak (2016), which included different studies, showed that the medical nutrition therapy improved glycemic control, weight loss promotion, and the reduction of the cardiovascular risk factors in individuals with diabetes. The reduction of carbohydrate load, selection of low glycemic index food, and balancing macronutrients revealed improved postprandial blood glucose levels. A selection of healthful dietary patterns, such as the Mediterranean diet or DASH diet, also had demonstrated to be beneficial in managing diabetes (Hamdy & Barakatun-Nisak, 2016).

## Celiac Disease and Modern Society

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**Abstract:** Celiac Disease is a serious autoimmune disorder that can emerge in genetically predisposed persons where the ingestion of gluten could damage the small intestine. It can develop at any age and if left untreated, it can lead to severe health problems. Celiac disease has a hereditary component and when a celiac person eats gluten (a protein found in wheat, barley and rye), the body begins an immune response that leads to damage the small fingerlike projections (villous) of the small intestine, avoiding the proper absorption of nutrients into the body. In this chapter, we intend to present a brief review of the literature that has been produced, following the new perspectives on celiac disease approach. We present a brief description of recent advances in the celiac disease diagnosis, treatment and gluten-free diet.

**Keywords:** Barriers, Celiac Disease, Future Perspectives, Literacy.

### INTRODUCTION

Celiac Disease (CD) is a systemic life-long gluten-sensitive autoimmune disorder induced by dietary gluten peptides found in rye, wheat and barley and is classified as one of the most common diseases (Gujral, Freeman, & Thomson, 2012; Kang, Kang, Green, Gwee, & Ho, 2013). It occurs in people who are genetically susceptible to ingestion of gluten which leads to mucosal damage of small intestine, with these patients potentially presenting gastrointestinal symptoms, extraintestinal symptoms or even no signs of any symptom. Classical symptoms could include diarrhea, steatorrhea and weight loss due to malabsorption, but an expressive part of the CD patients could present anemia osteoporosis, dermatitis herpetiformis, neurological and dental problems (extraintestinal or atypical symptoms).

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Most patients with CD carry one of two major histocompatibility complex class II molecules (HLA-DQ2 or –DQ8) required to present gluten peptides in a manner that activates an antigen-specific T cell response. Although DQ2 or DQ8 is a major factor in the genetic predisposition to celiac disease most of the positive people never develop CD despite daily exposure to a gluten diet (Therrien & Kelly, 2018). Environmental factors and genetic factors required for the loss of immune tolerance to gluten diets are still unknown, but we know that the timing of initial gluten intake plays an important role, as well as the coexisting gastrointestinal infections or direct damage to the intestinal-epithelial barrier.

Ka *et al.* (2014) and Therrien & Kelly (2018), proposed that the loss of immune tolerance to the peptide antigens (from de gluten dietary) derived from prolamins in wheat (gliadin), rye (secalin) and barley (hordein) is the central abnormality of CD. As reported by Therrien and Kelly (2018), the human proteases could not decompose those peptides and persist intact in the small intestinal lumen stimulating interleukin-15 production by dendritic cells, macrophages and intestinal epithelial cells, which then stimulate intraepithelial lymphocytes, leading to epithelial damage. Cytotoxic T lymphocytes induced cell death, tissue remodeling with villous atrophy and subsequent antigliadin and anti-transglutaminase antibody production.

CD has been kept in the dark for a decade as a known child disease and only now has received a greater understanding of its prevalence, diagnosis and pathogenesis. The variability of the clinical picture of CD creates a spectrum with different forms as a result of the villous atrophy and hypertrophy of the intestinal crypts. There is no formal classification but Gujral *et al.* (2012), Kang *et al.* (2013), and Therrien & Kelly (2018) divided it into common subgroups: i) classic; ii) atypical; iii) silent; iv) nonresponsive; and v) refractory. The classic form emerges with typical symptoms as well as diarrhea, weight loss, abdominal pain and discomfort, and weakness. The atypical form presents with deficiency states (*e.g.* iron deficiency) or extraintestinal manifestations (*e.g.* fatigue, liver enzymes growing, infertility) and this form is likely to account for the largest number of patients with a CD diagnosis. Silent forms evidence serologic and histologic without any evident symptoms or signs. The nonresponsive form appears when clinical symptoms and laboratory abnormalities recur after gluten withdrawal or while the patient is on a gluten-free diet. The refractory form of CD defines the persistence of clinical symptoms and histological abnormalities after 6 months on a strict gluten-free diet and in the exclusion of other evident causes (Gujral *et al.*, 2012; Kang *et al.*, 2013; Therrien & Kelly, 2018).

CD is a life-long disorder, and if left untreated, it is associated with increased morbidity and mortality, and since 1970, the European Society of Paediatric

Gastroenterology highlights the criteria for the CD diagnosis in children based on three biopsies before and after a gluten-free diet.

Today's approach has been modified by the introduction of highly sensitive and specific serologic tests. The initial evaluation of CD is based on a combination of positive CD-specific serological tests, histological findings from intestinal biopsy, CD-predisposing gene encoding HLA DQ2 or DQ8, medical and family history of CD, and clinical and histological response to a gluten-free diet (Gujral *et al.*, 2012).

## **EPIDEMIOLOGY**

Generally, the CD diagnosis is based on the presence of a predisposing genetic factor, human leukocyte antigen (HLA) DQ2/8, with positive biopsy and serological antibodies upon gluten contained diet. For several years, CD was considered a childhood disease mainly among white Europeans. Today, we know that CD is a common genetic disorder in many countries, with a uniform prevalence, slightly more likely in women, and maybe diagnosed at any age, with a first large peak period of presentation around the age of 6 to 7 years and a second large peak in the fourth and fifth lifetime decades (Therrien & Kelly, 2018). Geographic and temporal variation in the incidence of CD is a direct result of the effects of nutritional practices on the risk and severity of CD (Rewers, 2005), and be of great public health significance.

The available data suggest that CD incidence is increasing and is more common in some areas than earlier identified. The changes in diet habits, particularly in gluten consumption as well as in infant feeding patterns are probably the main factors that can account for these new trends in CD epidemiology (Ka *et al.*, 2014). The rapid increase in wheat intake in recent decades in countries that commonly produced gluten-free cereals like rice, maize, sorghum, and millet, is one of the main causes associated with the changes in the CD geographical variation.

Gujral *et al.* (2012) stated that the world distribution of CD seems to have followed the wheat consumption and the migratory flows with its prevalence being underestimated in the past. Following the same reasoning, the specialty literature suggests that many people may have a genetic predisposition to CD but the clinical presentation only occurs in the presence of gluten dietary.

Around the world, in most countries the CD prevalence is unknown and, when it exists, it is based on different reference sources (*e.g.* serology, biopsy, the two combined and with a response to gluten challenge). Among the factors that denote a higher risk for CD, researchers point out that the most important is family

## Animal-Assisted Therapy and Developmental Disorders

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**Abstract:** For the last few years, neurosciences has been focusing its research on analysing the structures and processes behind Animal-Assisted Therapies (AAT) and their effects on persons with neurodevelopmental disorders. The aim of this study is to present an overview of the main evidence-based effects of AAT in the promotion of skills, health-related issues, and well-being of persons with neurodevelopmental disorders. For this matter, the main theories of AAT effects will be approached. In conclusion, animal-human interaction characteristics and how this relationship may compensate deficits and promote functional competences will be described.

**Keywords:** Animal-assisted therapy, Attention deficit and hyperactivity disorder, Autism, Developmental disorders, Health, Learning disability, Well-being.

### INTRODUCTION

Animal-Assisted Therapy (AAT) conceptualization is due to Boris Levinson, in the sixties, within his experience in assessing the effects of using animals in therapeutic processes (Bachi & Parish-Plass, 2016). Levinson called his dog Jingles a “pet partner” (Levinson, 1964). The use of animals as promoters of human development has been consistently reported through time (Fine, 2015), although not all interventions are therapeutic and the animal could not be considered as the therapist although may assume the role of mediator or facilitator (Bachi & Parish-Plass, 2016). The integration of an animal in therapy seems to facilitate a therapeutic alliance, as one of the key aspects in this dynamic (Wesley, Minatrea & Watson, 2009), intensifying the interaction between physiological and psychological (Odendaal, 2000).

The interest in AAT application with persons with developmental disorders has

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been increasing for last two decades (Hart & Yamamoto, 2015), due to its relevance and it is being used with different subgroups across lifespan, from children and adolescents (Balchi, 2013; Balluerka, Muela, Amiano, & Caldente, 2015) to older people (Filan & Llewellyn-Jones, 2006), with and without developmental (O'Haire, 2012), or psychiatric disorders (Nathans-Barel, Feldman, Berger, Modai, & Silver, 2005), war Veterans (Yount, Ritchie, St. Laurent, Chumley, & Olmert, 2013) and prisoners (Bachi, 2013), and within distinct settings such as classrooms (Gee, Church, & Altobelli, 2015; Smith & Dale, 2016), hospitals (Braun, Stangler, Narveson, & Pettingell, 2009; Giuliana & Jacquemetta, 2017; Johnson, Meadows, Haubner, & Sevedge, 2003; Marcus, *et al.*, 2012), home (Heade, Fu, & Zheng, 2008), or rehabilitative context (Muñoz, *et al.*, 2015).

This animal incorporation in therapeutic processes seems to be beneficial for persons with supports needs and positive evidences are reported in literature especially in cases of anxiety, stress, depression, challenging behaviors, attention deficits, ability to be involved in tasks, motivation, learning disabilities, motor coordination, social, and communications disorders (Beetz, Julius, Turner, & Kotrschal, 2012; Hart & Yamamoto, 2015; Herzog, 2017; Julius, Beetz, Kotrschal, Turner, & Uvnäs-Moberg, 2013; Odendaal & Meintjes, 2003; Seal, Robinson, Kelly, & Williams, 2013).

As this article is focused on the relation between AAT and groups with developmental disorders, its definitions should be clear. Developmental disorders involve a set of changes that occur during the central nervous system's development that usually are expressed in early years and characterized by limitations on critical developmental acquisitions at several levels: sensorimotor, cognitive, socioemotional, adaptive, behaviour, and communication, which affect human functioning (American Association Psychiatric [APA], 2013). Examples of developmental disorders include intellectual and developmental disability, communication disorders, autism spectrum disorder, attention-deficit/hyperactivity disorder (ADHD), specific learning disabilities, motor disability, among others (APA, 2013).

### **Animal-Assisted Therapies**

Terminology in AAT has varied tremendously across times, and terms are often used interchangeably, according to each therapeutic process aim (recreational, therapeutic, *etc.* - Kruger & Serpell, 2010). Therefore, some of the most used terms will be briefly defined.

Animal-Assisted Activities (AAA) are informal/casual interactions between person-animal, with rigid criteria or goals, used for motivational, educational, and

recreational purposes (Pet Partners, 2012). The same references add that there are no therapeutic aim or previous established goals, as well as no planning or evaluation, and are traditionally facilitated by individuals without training in health, education, or social services. Kruger & Serpell (2010) reported that AAA are directed towards the improvement of quality of life by motivational, recreational, and educational components, through the recruitment of an animal with specific characteristics.

Human-Animal Interaction (HAI) can be defined as a dynamic and mutual interchange between human beings and animals, influenced by components, essential for both health and well-being, within environmental demands (American Veterinary Medical Association [AVMA], 2018). According to this association, this bond includes and is influenced by physical, emotional, and psychological interactions between humans, animals, and the environment.

AAT or Animal-Assisted Interventions (AAI), which is the most used term, encompasses pedagogical and psychological interventions with therapeutic aims and goals, adapted to each person or groups of individuals that include the active participation of an animal within structures activities performed by habilitated health professionals (Pet Partners, 2012). This is a controlled and documented process, with results and progress monitoring. The main goal of AAT/AAI is to improve motor, cognitive, socioemotional, and behavioral functions and animals play an essential role in all therapeutic processes (Pet Partners, 2012).

The *European Society for Animal-Assisted Therapy* (ESAAT, 2011), based on International Classification of Functioning, Health, and Disability (ICF, World Health Organization [WHO], 2001), defines AAT as pedagogical and psychological interventions that aim to promote health, prevent, and rehabilitate symptoms, using trained animals, trying to match support needs with supports provision, according to high ethical standards. It bases its approach in the interaction of three elements: client(s), animal, and therapist.

The main goals of AAT (ESAAT, 2011) are the promotion of well-being and quality of life through personal competences stimulation for real and active social participation, across the lifespan. AAT seeks the cognitive, motor, and socioemotional rehabilitation and its maintenance through activities and treatment interventions led by trained professionals in the health field: psychotherapist, psychology, education, *etc.* The specific goals are bases on the support's needs, strengths, and weaknesses identification, as well in resources available (ESAAT, 2011). In all these processes of AAT, some legal requisites that support interventions should be considered: animals' protection and physical and psychological well-being should be ensured, hygiene standards to prevent

## Physical Activity Practice Determinants for People with Motor Disabilities: Inequities in Access and Physical Activity Engagement

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**Abstract:** Even with extensive documentation on the health benefits of physical activity (PA), a part of the population does not practice enough PA to have these benefits, especially people with disabilities. People with motor disabilities tend to be less engaged in PA than their peers, even with the positive outcomes on bodily, social, functional and emotional changes promoted by PA. Therefore, the identification and knowledge of PA's determinants, either as facilitators or barriers, for people with motor disabilities seems logical and essential. The goal of this chapter is to review the literature about these determinants and examine possible future paths. This information can contribute to conceptual changes and new interventions and policies that increase the levels of PA practice in this population subgroup and, consequently, further advance their social inclusion.

**Keywords:** Barriers, Determinants, Facilitators, Motor disabilities, Physical activity.

### INTRODUCTION

The benefits of physical activity (PA) are well documented (Hardman & Stensel, 2009), namely in the maintenance of health and physical fitness (World Health Organization, 2016) for people with or without disabilities (Murphy, Carbone & Council on Children with Disabilities, 2008). In general, PA regular practice contributes to the reduction of musculoskeletal and cardiovascular diseases, obesity (Marques, Sarmiento, Martins & Nunes, 2015b), increased personal and

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social autonomy, community integration, self-esteem (Biddle & Asare, 2011), stress and anxiety reduction (Hogan, Catalino, Mata & Fredrickson, 2015; Murphy ., 2008), *etc.* PA is a predictor of better health, regardless of other factors such as age, sex, socioeconomic status, body mass index, smoking, and educational level (WHO, 2007).

Despite its health benefits, a considerable part of the population does not practice PA as recommended (European Commission, 2018; Marques *et al.*, 2015b; Marques, Martins, Peralta, Catunda & Nunes, 2016) and in recent decades, there have been major changes in lifestyle, characterized by increased levels of sedentarism (Ng & Popkin, 2012). Physical inactivity and sedentary behaviors represent a health problem, with particular emphasis on subgroups with low socioeconomic status and people with some type of limitation or disability (Bauman *et al.*, 2012).

PA is a behavior that varies in form and context and can be considered a biocultural process, therefore, its approach requires the understanding of its determinants (Rimmer, Riley, Wang, Rauworth, & Jurkowski, 2004). Habits and lifestyles are not always the result of entirely free, conscious and autonomous choices, being influenced by external, environmental, social, cultural, and economic pressures and constraints (*e.g.*: gender, age, physical fitness, environmental, social, cultural and psychological factors), and thereby needing a multidisciplinary approach (Seabra, Mendonça, Thomis, Anjos & Maia, 2008).

The lack of involvement of people with disabilities in PA and/or their physical inactivity is a current fact (Badia, Orgaz, Verdugo & Ullan, 2013; Solish, Perry & Minnes, 2010), with a tendency towards sedentarism. Factors that may influence or discourage PA practice in this population subgroup are diverse. People with intellectual disabilities identify determinants linked to support and the scarcity of information about PA programs, with proper follow-up; people with visual impairment tend to refer to determinants linked to family support and to the professionals skills (Rimmer & Rowland, 2008); and people with motor disabilities tend to identify more environmental determinants such as accessibility of facilities or means of transportation and travel, as well as factors associated with bodily functionality (Rimmer *et al.*, 2004).

Physical limitations, associated with increased therapeutic needs, poor economic status, psychological impairment or lack of accessibility, contribute to a less healthy lifestyle (Bedell *et al.*, 2013). Therefore, PA engagement has a positive impact on the life of a person with motor disabilities. Motor disability is characterized as any physical alteration in the human body, resulting from some orthopaedic, neurological or congenital malformation problems (Mauerberg de

Castro, 2005), with developmental impairments and repercussions on performing varied motor tasks. In addition, there is a greater tendency for the development of chronic diseases, such as diabetes, hypertension and obesity (Anderson & Heyne, 2010; Riley, Rimmer, Wang & Schiller, 2008).

The search for the practice of PA by the person with motor disability, as well as any other type of disability, can contribute to the rehabilitation process, as a means of testing possibilities, preventing secondary diseases and promoting the total integration of the individual in the society (Zabriskie, Lundberg & Groff, 2005). The authors emphasize the importance of participation in recreational activities, particularly highlighting the well-being and the development of the feeling of competence (King *et al.*, 2003; Safania & Mokhtari, 2012), social recognition with social networking and positive impact of interaction with typical peers (Hassan, Dowling, McConkey, & Menke, 2012; Wilhite & Shank, 2009). The prevention of functional decline (Murphy *et al.*, 2008) and the maintenance of functional independence are also worth mentioning (Rimmer *et al.*, 2004).

Therefore, it is important to understand why people with motor disabilities have lower levels of PA, when it could bring, in addition to the common benefits, increased mobility, functionality and autonomy, body strengthening in the face of physical limitation and positive emotional reinforcement, interaction and social inclusion (Barclay, MacDonald, Lentin & Bourke-Taylor, 2016; Marques, Maldonado, Peralta & Santos, 2015a). People with motor disability tend to have higher values of body mass index, lower levels of flexibility, strength, endurance and speed (Hands & Larkin, 2006), and regular practice of PA is associated with proven benefits (Rimmer & Rowland, 2008; United States Department of Health and Human Services, 2018).

The low accessibility and adherence to PA should be seen as one of the public health concerns (Eck *et al.*, 2008; WHO, 2016). A healthy lifestyle should be understood as a key point in reducing the risk factors for the health of people with disabilities thus highlighting the importance of PA in this field (WHO, 2016). The prevalence of inactivity, characteristic of people with disabilities, is related to medical, psychological, social or involvement barriers, *etc.* (Martin, 2013).

Currently, there are still few studies that address the determinants of the PA practice in people with motor deficits (Rimmer *et al.*, 2004; Seabra *et al.*, 2008) and the consequent non-participation in PA on a regular basis (Roberts, Cavill, Hancock & Rutter, 2013), in school, social or recreational context. The identification and understanding of these determinants leads to the discovery of the mechanisms through which the behavior is controlled or modified. The knowledge is used to establish, among others, intervention programs. This group

## Psychosocial Correlates of the Physical Activity of Children and Adolescents with Intellectual Disability or Motor Impairment

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**Abstract:** The positive relationship between physical activity (PA) and health, healthy lifestyle and regular PA engagement has been pointed out in the literature. However, a significant proportion of the world's population does not engage in enough PA, and in Portugal, the situation is getting worst in terms of children and adolescents with disabilities. These subgroups tend to be inactive, facing numerous health problems and limitations in their daily lives, with consequences in their functionality and quality of life. Most of the research studies within the framework of disability are based on adults and are not specific to a kind of disability. The goal of this study is to analyse and compare the psychosocial correlates of PA of 91 children and adolescents, between 10 and 17 years, in regular schools. Of all the participants, 30 had intellectual disability ( $13.43 \pm 2.28$ ), 31 ( $13.4 \pm 0.1$ ) had spina bifida and 30 had ( $12.70 \pm 1.15$ ) typical development. A questionnaire was applied to characterize the engagement in PA by these children, to determine their impact factors. There were significant differences in the formal and informal PA engagement of students and their parents and peers. Students with a disability tend to be less engaged both in formal and informal physical activity, however, the attitude towards PA and physical education was identical in all the students, as well as competence and health perception. Scholarly sports seem to be a good strategy for the participation of all the students in physical activities. There should be an emphasis on studying and finding solutions and strategies to enable children to have access to physical activity in and out of school.

**Keywords:** Competence Perception, Health Perception, Intellectual Disability, Motor Disability, Physical Activity, Psychosocial Correlates, Physical Education,

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Significant Peers, Significant Adults, Scholar Sport.

## INTRODUCTION

Regular physical activity (PA) has a positive impact on health and is a key factor of healthy lifestyles (Marques, 2010), contributing to the functionality and quality of life (Visscher, Vjuik, Hartman & Scherder, 2010). People with disabilities have more co-morbidities and require extra care from health promotion and prevention services, as compared to the general population (Yen, Lin, Loh, Shi & Shu, 2009). They also present higher levels of sedentary behaviour and physical inactivity, a greater prevalence of unhealthy lifestyles, and reduced participation in community life (Hutzler & Korsensky, 2010).

Nowadays, intellectual disability is no longer defined solely based on the low intelligence quotient, but it relies on the concomitance of significant intellectual and adaptive limitations during the developmental period (American Psychiatric Association, [APA], 2013) or until adulthood (Schalock *et al.*, 2010). Motor disability is characterized by motor impairments caused by injuries in body structures responsible for movement that affect daily functioning and social participation (World Health Organization, 2001). Spina bifida is a motor disability that results from the non-closure of the neural tube (Durstine *et al.*, 2000), with an impact on daily life. According to recent conceptual models of human functioning, disability is conceptualized as the quality of the relationship between the individual and the environmental demands, emphasizing the provision of support for effective participation, instead of individual limitations (Santos, Lebre & Pereira, 2018).

In the last decade, research was mainly focused on intellectual (Schalock *et al.*, 2010) and motor (Marques *et al.*, 2015) disabilities, paediatrics and rehabilitation (Fragala-Pinkman, O'Neill, Bjornson & Boyd, 2012), PA participation (Van der Horst, Paw, Twisk & Mechelen, 2007) and PA impact on public health (Johnson, 2009; Rimmer & Rowland, 2008). Now, the focus is on education, disease prevention and health promotion through PA participation (Fragala-Pinkman *et al.*, 2012).

Even though participation in regular PA improves health, a significant part of the population does not practice enough PA to achieve its benefits (Marques, Sarmiento, Martins, & Saboga Nunes, 2015). Additionally, people with intellectual disabilities are even less engaged in PA than the general population (Perrier, Shirazipour & Latimer-Cheung, 2015), justifying the need for adapted and personalized plans and programs. Besides the scarcity of evidence in this population (Patrick *et al.*, 2012; Rimmer, Chen, McCubbin, Drum & Peterson,

2010), PA engagement is known to be influenced by age, gender, type of diagnosis and other demographical variables.

Regarding the physical fitness of people with disabilities, although it may be difficult to establish due to the limitations imposed by the diagnosis information (Patrick, Sami & Dirk, 2012), it is usually lower than that of their peers without disabilities (Bodde & Seo, 2009). Notwithstanding, motor proficiency, PA level and community participation are important outcomes related to the functional status of people with disabilities (McDonald, 2002). Given this scenario, it is urgent to promote PA participation in youth, particularly in children and adolescents with disabilities (Fragala-Pinkman *et al.*, 2005).

### **Childhood, Adolescence & Physical Activity**

Childhood and adolescence are two critical periods in human development, as competences, knowledge, attitudes and behaviours acquired in these stages are transferred into adult life (Rimmer & Rowland, 2008). Martin & Choy (2009), highlighting the importance of the development of a healthy and active lifestyle in childhood and its benefits in adult life (Lehnhard, Manta, & Palma, 2012).

The benefits of regular participation in PA on both physiological (USDHHS, 2018) and psychological (Rimmer & Rowland, 2008) levels are well documented. Exercise has been pointed out as beneficial for improvements in strength and cardiovascular capacity (Draheim, 2006), secondary conditions' prevention (contractures, spasticity decrease, fractures decrease – Oriel, George & Blatt, 2008), self-concept, perception of competence and interpersonal relations (Specht, King, Brown & Foris, 2002). However, PA levels are decreasing (Patrick *et al.*, 2012) and participation in PA tends to decline with age (Frey, Stanish & Temple, 2008). Worryingly, among children and adolescents with a disability, who tend to be less active and have lower fitness levels than their peers, this decrease is even higher (Bodde & Seo, 2009; Patrick *et al.*, 2012).

Children and adolescents with disabilities tend to engage in more sedentary activities, which require less effort, and are focused essentially on socialization (Hands & Larkin, 2006). Additionally, most of these children and adolescents do not have positive PA experiences that could lead them to become more physically active. The lack of PA in this population may compromise short and long-term health and well-being (Ferreira *et al.*, 2006). Individuals with a motor disability, who are actively and regularly engaged in PA, have better health, as well as a higher level of community participation (Crawford, Hollingsworth, Morgan & Gray, 2008). Martin & Choy (2009) suggested that being inactive increases the negative effects of having a disability.

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