

## THE ROLE OF EXERCISE IN THE TREATMENT OF DYSLEXIA IN CHILDREN IN CALABAR METROPOLIS, CALABAR, CROSS RIVER STATE, NIGERIA.

By

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### Abstract

*Dyslexia is a learning disorder that involves difficulty reading due to problems identifying speech sounds and learning how they relate to letters and words (decoding). Also called reading disability, dyslexia affects areas of the brain that process language. Children with dyslexia have normal intelligence and usually have normal vision. Most children with dyslexia can succeed in school with tutoring or a specialized education program. Emotional support also plays an important role. Dyslexia, also known as reading disorder, is characterized by trouble with reading despite normal intelligence. As well as poorer health and lower life expectancy, children with learning disabilities or dyslexia have lower levels of physical activity than their typically developing peers. Taking part in physical activity has been shown to have a number of benefits for both their physical health and psychological wellbeing. The present work aim to review on the role of exercise in correction or the treatment of dyslexia children.*

**Key words:** *Dyslexia Children, Physical exercise, Treatment.*

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### Introduction

Physical exercise is an activity presenting systematic repetitions of oriented and organized movements feature with consequent increase in the oxygen intake due to muscular demand thus generating work (WHO, 2013).

The exercise represents a subgroup of physical activity designed with the objective of maintaining the physical conditioning (Zang, 2017). Physical exercise is any bodily activity that improves or maintains physical fitness and overall health and wellness. Regular exercise

makes the heart stronger and the lungs fitter, enabling the cardiovascular system to deliver more oxygen to the body with every heartbeat and the pulmonary system to increase the maximum amount of oxygen that the lungs can take in. It may also be defined as any muscular activity that generates strength and interrupts homeostasis. The physical exercise causes a series of physiological responses in the body systems, particularly in the cardiovascular system. With the objective of maintaining the cellular homeostasis in the face of increase on the metabolic demands, some mechanisms are set into action. These mechanisms function under the form of reflex actions composed of receptors, afferent pathways, integrator centers, efferent pathways and effectors and many stages of these mechanisms have not yet been fully elucidated. One may say that during an exercise period, the human body undergoes cardiovascular and respiratory adaptations in order to attain the increased demands of the active muscles and, as these adaptations are repeated, modifications in these muscles are verified, allowing the organism to improve its performance. Physiological and metabolic processes optimize the oxygen distribution throughout tissues in activity (Gravestock, 2016). Therefore; the mechanisms that guide the post-physical training, blood pressure drop are related to hemodynamic, humonal and neural factors (Peniston, 2018). A meaningful and well planned daily physical exercise is key to holistic and optimal health of every individual. Physical exercise in previous studies has shown and supported the existence of association between physical exercise and the physiological well-being, physical exercise showed significant correlation with physiological well-being, positive effect and mood among both healthy and the clinical population (Paul & Padma, 2016). Physical exercise has many benefits in terms of fitness and health. There is also good evidence that regular aerobic exercise is associated with improved executive functioning (Tafari, Peluso & Cassese, 2018). Executive functioning includes self-regulation, planning, switching attention from one thing to another, and

maintaining attention on relevant stimuli while ignoring competing stimuli. Sorenson and Zarrett (2014) found evidence that regular physical exercise positively affects executive functioning in children, as well, although more research is needed to verify this. There is less evidence that regular physical exercise results in higher academic performance. Children who participate in regular physical exercise programs over an extended period of time tend to have higher score on achievement test, but this does not necessarily mean that the exercise was responsible for the higher scores. It is possible that highly motivated children are more committed to exercising and are also more likely to have strong study habits that more directly result in higher achievement. Research has shown that physical exercise can do a great deal to improve the life style of children with special needs. They can increase competency in gross motor skills, help to control obesity, and maintain motivation in various areas of life. Physical exercise leads to cognitive improvements in children with special needs, allowing them to access skills that they couldn't challenge within a traditional classroom setting. The structure of sports, which comes with a set of rules and organization, can be a learning tool that helps children to practice self-regulation and enhance their decision-making skills. Children with special needs also, learn to focus on specific goals, and work on their verbal communication by interacting with peers through sports. Physical exercise and training are widely considered as promoters of several positive outcomes.

### **Meaning of Dyslexia**

Dyslexia is much more common than we think, since it affects more than 10% of the population. Dyslexia is the neurological impairment that affects the learning process, making it difficult to read, write, and easily decode language or symbols (Agrati & Fischetti, 2017). When dyslexic children read, they focus most of their attention on decoding the sounds of the different letters and pronouncing every word. This effort causes

a breakdown in their working memory, preventing the brain from allocating mental resources to other higher mental tasks such as reading comprehension (Ackermann & Hertrich, 2014). Several studies define dyslexia as a neuronal connection deficit related to language processing. This is why dyslexic children have trouble visualizing words due to a dysfunction in their neuronal network between the brain regions associated with language and phonological processing. According to American Psychiatric Association (2013), Dyslexia may be hereditary, which is why it is common for different members of the same family to be affected by the disorder. Boys and girls with normal intelligence, without any psychological, physical, or other problems, and whose reading problems don't affect their other cognitive skills can be affected by dyslexia. In fact, children with dyslexia often have sharper senses and develop a high intelligence level and creative ability (Clay, 2012). Not all types of dyslexia have the same severity, but it is essential to diagnose and treat dyslexia as early as possible to avoid developmental problems, loss of self-esteem, frustration, and problems at school (American Psychiatric Association, 2013). Dyslexia is a learning disorder that involves difficulties reading due to problems identifying speech sounds and learning how they relate to letters and words (decoding). Also called reading disability, dyslexia affect areas of the brain that process language. Children with dyslexia have normal intelligence and usually have normal vision. Most children with dyslexia can succeed in school with tutoring or a specialized education program. Emotional support also plays an important role. Dyslexia, also known as reading disorder, is characterized by trouble with reading despite normal intelligence (National Institute of Neurological Disorder and Stroke, 2018). Different children are affected to different degrees (National Institute of Health, 2016). Problems may include difficulties in spelling words, reading quickly, writing words, "sounding out" words in the head, pronouncing words when

reading aloud and understanding what one reads (Peterson, Robin, Pennington & Bruce, 2012). Often these difficulties are first noticed at school. When someone who previously could read loses their ability, it is known as "alexia". The difficulties are involuntary and people with this disorder have a normal desire to learn. People with dyslexia have higher rates of attention deficit hyperactivity disorder (ADHD), developmental language disorders, and difficulties with numbers (Mathew, 2014). Dyslexia is the most common learning disability. It is defined by the International Dyslexia Association as: a specific learning disability that is neurological in origin. Dyslexia is characterized by difficulties with accurate and/or fluent word recognition and by poor spelling and decoding abilities. It is another term for "reading disability." These difficulties typically result from a deficit in the phonologic component of language that is often unexpected in relation to other cognitive abilities and the provision of effective classroom instruction. Secondary consequences may include problems in reading comprehension and reduced reading experience that can impede the growth of vocabulary and background knowledge (Dermirci, Engin & Ozmen, 2012).

### Symptoms

According to Gapin and Etnier, (2014) Children with dyslexia may have a hard time with:

- Identifying words
- Recognizing the sounds that make up words
- Understanding and remembering what is read
- Translating printed words into spoken words
- Spelling
- Organizing or sequencing thoughts
- Rhyming words
- Learning the alphabet and numbers during preschool and kindergarten

For example, a person with dyslexia tends to reverse or misread letters or words, such as confusing the letter "b" for "d" or reading the number "6" as "9." He or she may read the word "was" as "saw" or may switch the order of words in a sentence, such as "are there" instead of "there are."

Because of these difficulties, a child with dyslexia usually reads slowly and tends to hesitate more often than expected (Gilberg, 2003).

Dyslexia is not a vision problem. The eyes do not see words incorrectly, but the brain apparently has difficulty processing the visual information.

It is important to note that many young children's reverse letters and numbers, misread words or misunderstand words as a normal part of learning to read. Children with dyslexia, however, continue to do so after their peers have stopped, usually during kindergarten. Dyslexia may not be recognized until a child starts school, when a student of normal intelligence begins to fall behind his or her classmates in academic performance.

### **Dyslexia in Children**

Dyslexia in children can be detected as early as preschool, and if not treated, the symptoms of dyslexia can persist beyond childhood or adolescence, and may even last throughout adulthood. Although every child is unique, children with dyslexia tend to start speaking later, have weaker listening comprehension, and have fewer words in their vocabulary compared to other children of their age. Oftentimes, they confuse letters such as "b" and "d" (or "p" and "q"), and they may also lack attention (Berwid & Halperin, 2012). This lack of concentration is not intentional. As children with dyslexia have to work twice as hard to read and write, they get tired faster, and become absent-minded. As children with dyslexia need support and encouragement from parents and educators, detecting the disorder as early as possible is critical. Understanding and helping the child is important so that they can develop and properly integrate themselves into the school environment, which allows them to

compete (Agrati & Fischetti, 2017). When dyslexia is not found and treated early on, it tends to snowball. As kids get more and more behind in school, they may become more and more frustrated, feeling like a failure. Often, self-esteem problems lead to bad behavior and emotional problems such as depression, anxiety, and even dropping out of school. Children with dyslexia have certain neurological abnormalities. The cells that make up the linguistic circuits aren't properly organized, which is what makes it more difficult for the organism to decode words and make sense of what is being read (American Psychiatric Association, 2013).

In order to read efficiently, you need the interpretation processes, as well as the comprehension and learning processes, which we call the "lexical strategy", which is how the brain addresses text in order to understand it. The difficulties for children with dyslexia are caused by the combination of:

- Deficits in language processing.
- Deficient working memory.
- Problems with processing speed (Greco, Cataldi & Fischetti, 2019).

### **Characteristics of a Dyslexic Victim**

The symptoms of dyslexia can differ from one child to another, and not all children with the condition will have the same problems reading. The symptoms are inconsistent and can even change within the same day and evolve differently as children grow. According to Cornelius, Fedewa and Ahn (2017), some characteristics of dyslexia are:

- Problems with executive functions  
Executive function includes a wide range of complex cognitive skills that are responsible for planning tasks by breaking them down into steps. These steps could start with the task analysis and requirements, then organize and determine the time necessary to complete the task, structure the workload, set goals, evaluate the implemented actions, and adjust them based on the results, etc. Difficulty in executive development is one

of the most common features of dyslexia. It means that any task that requires planning (examples: cleaning your room or finishing your homework) can pose a real challenge for children with dyslexia

- Difficulties learning and communicating  
Impaired ability to comprehend rapid instructions, or understand jokes or expressions that have a meaning not easily understood from the specific words (idioms), such as “out of the blue” which means something happens that was unexpected. Inability to learn new words and pronounce them correctly. Feeling insecurity when speaking or expressing ideas, etc.
- Trouble with reading  
Difficulties with decrypting and remembering any language codes or symbols, making reading hard. Children with dyslexia frequently misinterpret the pronunciation of words, and have problems processing and understanding what they read. Thus, they are oftentimes not very interested in books.
- Trouble with writing  
Since dyslexic children have difficulties remembering spelling words over time and applying spelling rules, they make spelling mistakes frequently. They have trouble expressing their ideas in writing. Sometimes even though they fully understand the teacher, they have difficulties taking notes. Their pencil grip is generally unusual making their handwriting irregular, barely readable, either too big or too small.
- Symptoms in motor coordination and spatial orientation  
Difficulty distinguishing left from right, up from down, front from back, inside from outside, etc. This problem may be associated with slur. They appear clumsier than other children and get lost more often. They are generally not good at sports that require coordination, such as cycling or any team sports such as football.

- Distortion of time estimation  
Difficulty to manage time and confusion regarding the date of the day.
- Difficulties with math problems  
Since they have problems recognizing symbols, it is hard to do arithmetic as it involves symbols such as addition, subtraction, multiplication, etc. Children with dyslexia also have trouble memorizing multiplication tables.
- Problems with social and emotional engagement  
Children with dyslexia can be class clown, trouble-maker, or too quiet. They are extremely disorderly or compulsively orderly. Every child is different, and we see cases of both rebellion and intolerance, but also cases of submission.

### **Types of Dyslexia**

Although some symptoms are often common in dyslexia, scientists have identified several types of dyslexia. Use of the term dyslexia primarily distinguishes between genetic and acquired forms of dyslexia.

- Acquired dyslexia  
Occurs later in life and does not usually result from genetic or hereditary causes. Often follows a traumatic brain injury, or brain damage such as dementia or stroke that affects the language areas of the brain which are responsible for processing the literacy.
- Developmental dyslexia  
This type of dyslexia is usually most apparent in an academic setting. Developmental dyslexia is not caused by any type of brain injury or accident and is present since birth. There are multiple different types of dyslexia within this single classification, but this article will focus on the types of dyslexia that affect processing and brain function: Superficial dyslexia, phonological dyslexia, and mixed or dysphonic dyslexia.
- Surface dyslexia

Most often, an acquired form of dyslexia but can be developmental as well. Children with surface dyslexia do not show significant reading difficulties. This type of dyslexia is associated with poor processing information in the visual, lexical or direct nerve pathways, meaning that children can sound words out well, even nonsense words, but have to split words into fragments or syllables to read the words. It becomes more troublesome when the words are not in line with the pronunciation.

- **Phonological dyslexia**  
Most common type of dyslexia, synonymous with dyslexia itself. Mainly a developmental type of dyslexia but in some cases can be an acquired type of dyslexia after a stroke or Alzheimer's disease. Children with phonological dyslexia experience extreme difficulty reading long, unfamiliar or, infrequent words. However, they are able to read correctly familiar words. This type of dyslexia is associated with poor brain areas associated with processing the sounds of language, meaning that children with this disorder often read through lexical or visual pathways but have trouble with the auditory processing.
- **Deep Dyslexia**  
Is an acquired form of dyslexia. One of the most severe forms of dyslexia as the individual loses the existing capacity to read. Deep dyslexics have trouble with both sounding out words and recognizing whole words because phonological and visual neuronal pathways are both damaged (Emerson & Baines, 2010).

### **Causes of Dyslexia**

Researchers have been trying to find the neurobiological basis of dyslexia since the condition was first identified in 1881. For example, some have tried to associate the common problem among people with dyslexia of not being able to see letters clearly to abnormal development of their visual nerve cells (Stein, 2014).

### **Neuroanatomy**

Neuroimaging techniques, such as functional magnetic resonance imaging (fMRI) and positron emission tomography (PET), have shown a correlation between both functional and structural differences in the brains of children with reading difficulties (Whitaker, 2010). Some children with dyslexia show less electrical activation in parts of the left hemisphere of the brain involved with reading, such as the inferior frontal gyrus, inferior parietal lobule, and the middle and ventral temporal cortex (Pammer, 2014). Over the past decade, brain activation studies using PET to study language have produced a breakthrough in the understanding of the neural basis of language. Neural bases for the visual lexicon and for auditory verbal short-term memory components have been proposed with some implication that the observed neural manifestation of developmental dyslexia is task-specific (i.e., functional rather than structural). fMRIs of people with dyslexia indicate an interactive role of the cerebellum and cerebral cortex as well as other brain structures in reading (Sharifi, 2014). The cerebellar theory of dyslexia proposes that impairment of cerebellum-controlled muscle movement affects the formation of words by the tongue and facial muscles, resulting in the fluency problems that some people with dyslexia experience. The cerebellum is also involved in the automatization of some tasks, such as reading (Cain, 2010). The fact that some children with dyslexia have motor task and balance impairments could be consistent with a cerebellar role in their reading difficulties. However, the cerebellar theory has not been supported by controlled research studies (Levav, 2015).

### **Genetics**

Research into potential genetic causes of dyslexia has its roots in post-autopsy examination of the brains of people with dyslexia (Stein, 2014). Observed anatomical differences in the language centers of such brains include

microscopic cortical malformations known as ectopias, and more rarely, vascular micro-malformations, and microgyrus—a smaller than usual size for the gyrus (Faust, 2012). The previously cited studies and others suggest that abnormal cortical development, presumed to occur before or during the sixth month of fetal brain development, may have caused the abnormalities. Abnormal cell formations in children with dyslexia have also been reported in non-language cerebral and subcortical brain structures (Kere, 2014). Several genes have been associated with dyslexia, including DCDC2 and KIAA0319 on chromosome 15 and DYX1C1 on chromosome 15 (Marshall, 2017).

### **Gene–environment interaction**

The contribution of gene–environment interaction to reading disability has been intensely studied using twin studies, which estimate the proportion of variance associated with a person's environment and the proportion associated with their genes. Both environmental and genetic factors appear to contribute to reading development. Studies examining the influence of environmental factors such as parental education and teaching quality have determined that genetics have greater influence in supportive, rather than less optimal, environments (Rosen, 2013). However, more optimal conditions may just allow those genetic risk factors to account for more of the variance in outcome because the environmental risk factors have been minimized (Rosen, 2013). As environment plays a large role in learning and memory, it is likely that epigenetic modifications play an important role in reading ability. Measures of gene expression, histone modifications, and methylation in the human periphery are used to study epigenetic processes; however, all of these have limitations in the extrapolation of results for application to the human brain (Law, 2014).

### **Language**

The orthographic complexity of a language directly affects how difficult it is to learn to read it (Juel, 2013). English and French have comparatively "deep" phonemic orthographies within the Latin alphabet writing system, with complex structures employing spelling patterns on several levels: letter-sound correspondence, syllables, and morphemes (Habib, 2018). Languages such as Spanish, Italian and Finnish have mostly alphabetic orthographies, which primarily employ letter-sound correspondence—so-called "shallow" orthographies—which make them easier to learn for people with dyslexia. Logographic writing systems, such as Chinese characters, have extensive symbol use; and these also pose problems for dyslexic learners (Smith, 2011).

### **Exercise as a Treatment Protocol for Dyslexia**

The results of participating in a physical recreation activity for a learning-disabled person include an improvement in lung capacity, reduction in resting heart rates and blood pressure levels, decrease in body fat mass, increase in lean body mass, muscle strength, and structure and function of connective tissues and joints. Any moderate physical activity is known to reduce the depression and anxiety levels and improve self-image, mental health and social skills. Physical activities have positive influences in learning disabled children in terms of shortening stress, anxiety and depression, and strengthening the overall academic performance. Many researchers have opined that it is beneficial to have the children engage in regular physical activity, thereby making it a habitual daily life activity and a route to maintain good health. Learning ability and general health of a child may be improved with continuous engagement in physical activity. Each and every physical activity brings positive outcomes such as enhanced feelings of social inclusion, modeling appropriate behaviors for others with similar

disabilities, displaying of shared interests and rewarding experiences.

According to Gert (2010), Treatment of dyslexia consists initially of defining the disorder, advising parents, and possibly also advising teachers. Subsequent treatment depends on the severity of dyslexia and psychological symptoms or concurrent disorders. Drug treatment is not beneficial for dyslexia. Only if a dyslexia sufferer also has attention deficit hyperactivity disorder (ADHD) can drug treatment for ADHD also improve learning abilities inside and outside school.

Defining the disorder, its causes, and treatment options is usually a great relief to parents. Diagnosis often takes months to years, during which time parents, usually the mother, have tried to support their child via daily practice at home. Hours spent together every day on homework, regular (usually frustrating) dictation exercises, and the child's unwillingness to study, together with despair at spelling errors in so many words in samples or tests despite so much practice, lead to constant depression in the child and feelings of failure in parents. In addition, parents often receive reports from teachers to the effect that their child might benefit from more practice at home. If parents are then told in advice sessions that they have not failed, that their child finds it significantly harder than other children to learn to read and spell because of neurobiological deficits, this can come as a great relief to parents. Children themselves must also have the disorder explained to them and thereby have their stress relieved. Advice for teachers serves to explain the child's psychological stress and provides an opportunity to consider together how the child can become better integrated at school. The dyslexia diagnosis must also be reported. Dyslexia treatment has two components: treatment of core problems with reading and spelling, and treatment of any concurrent psychological disorders (Gert, 2010). Child and adolescent psychotherapy is available to treat psychological disorders. This aims primarily to reduce children's symptoms and improve their

individual development. Reading support depends on an individual child's development. On the basis of detailed analysis of developmental status in reading, reading support should be provided regularly, at least once a week for at least a year. In addition to this therapy, establishing a reading-friendly family environment with frequent reading sessions and reading together can also substantially boost reading development (Gert, 2010).

### **Conclusion**

Based on this paper, it is therefore concluded that:

1. Children with dyslexia need support and encouragement from parents and educators, detecting the disorder as early as possible is critical. Understanding and helping the child is important so that they can develop and properly integrate themselves into the school environment, which allows them to compete.
2. As children get more and more behind in school activities, they may become more and more frustrated, feeling like a failure in the society. Often, self-esteem problems lead to bad behaviour and emotional problems such as depression, anxiety which can lead to problems in the society.
3. One of the best ways to support a child with dyslexia, or any child who is struggling is to encourage those activities that he/she likes and feels good at, whether it is music, drawing, joining a sports team or anything else that helps build his/her confidence.

### **Recommendations**

On the basis of the above conclusion, the following recommendations were made:

1. Both the parents and educators to take full responsibilities of their wards to make sure they report any early signs of dyslexic characteristics from their wards for onward solutions.

2. The government should make provision for such individuals to be catered for, to avoid them being miscreants later in the society.
3. Special attention should be given to a dyslexic child to really know what he/she is good at and to encourage the child and build his/her confident.

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