DYSLEXIA: FROM MYTHS TO SCIENTIFIC KNOWLEDGE, FOR INCLUSIVE EDUCATION

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Abstract

Dyslexia is a specific learning difficulty in reading that has a neurobiological origin and is characterized by difficulties in the correct and/or fluent recognition of words and poor spelling and decoding skills, with consequences for reading comprehension. These consequences extend beyond reading and the study of a language, and can compromise cross-curricular learning and a child or young person's entire school career. Nowadays, some myths and misconceptions about dyslexia still seem to persist, a concern that led to this work. This paper aims to clarify myths/wrong or less clear ideas about specific learning difficulties in reading - dyslexia and is the result of bibliographical research (used as a data collection technique) carried out as part of the Assessment and Intervention in Specific Learning Difficulties Curriculum Unit of the Master's Degree in Special and Inclusive Education at the School of Education of the Polytechnic Institute of Bragança - Portugal. Establishing a clear knowledge base about the problem, shared by all educational stakeholders, is essential throughout the journey from detecting the risk of dyslexia to diagnosing it. In this sense, based on scientific evidence from bibliographic research, it is possible to debunk myths or misconceptions, among others: 1) In dyslexia, intelligence is at or above average; 2) Dyslexia has no cure; 3) Dyslexia is not related to vision problems; 4) Not all children with difficulties in learning to read have dyslexia; 5) Dyslexia can, and should, be identified early; 6) Children with dyslexia can succeed at school; 7) Boys and girls have dyslexia; 8) Not all pupils with dyslexia swap letters. Thus, based on our experience working in a school context, we conclude that there are still several misconceptions surrounding dyslexia, which it is essential to clarify. Only based on scientific knowledge, and not deep-rooted myths, can we prevent and intervene early to avoid serious consequences for the academic success of children and young people with dyslexia. We therefore believe that this work is particularly important for parents and guardians, educators, teachers, and technicians in the context of an inclusive school and education.

Keywords: Dyslexia, myths, scientific knowledge, inclusive education.

1 INTRODUCTION

Reading is one of the keys to achieving success at school and making dreams come true. Difficulties in learning to read can have consequences for development, and success at school and throughout adult life [1]. Many of these difficulties constitute a specific learning disability called dyslexia. Today, some myths and misconceptions about dyslexia still seem to persist, a concern that has led us to seek clarification. Thus, this article aims to clarify myths/wrong or less clear ideas about specific learning difficulties in reading - dyslexia - and is the result of bibliographical research (used as a data collection technique) carried out as part of the Assessment and Intervention in Specific Learning Difficulties Curriculum Unit of the Master's Degree in Special and Inclusive Education at a higher education institution in the north of Portugal. Establishing a clear base of scientific knowledge about the problem, shared by all educational stakeholders, is essential throughout the journey from detecting the risk of dyslexia to diagnosing it.

According to Lyon, Shaywitz and Shaywitz [2]:

> A specific learning difficulty that has a neurobiological origin. It is characterized by difficulties in correct and/or fluent word recognition and poor spelling and decoding skills. Generally, these difficulties reflect deficits in the phonological component of language, which are often unexpected given not only the student's cognitive abilities but also the effective practices they have been provided within the classroom. Secondary consequences can include problems with reading

comprehension and reduced reading experiences that can impede the acquisition of vocabulary and prior knowledge. (p. 2)

This definition is adopted by the International Dyslexia Association and is integrated into many laws in different US states [3].

As in so many other areas of knowledge and life, scientific ignorance has sometimes contributed to the emergence of various myths and misconceptions about dyslexia. Let's take a look at some of them, which we have selected because we believe they can jeopardize prevention and early intervention and, consequently, the school success of those with dyslexia.

2 MYTHS AND MISCONCEPTIONS ABOUT DYSLEXIA VERSUS SCIENTIFIC KNOWLEDGE

2.1 Dyslexia is synonymous with low intelligence *vs* in dyslexia, intelligence is at or above average

The definition presented [2] refers to the so-called discrepancy criterion, i.e. difficulties that are generally unexpected, especially given the student's cognitive abilities. The aptitude-performance discrepancy criterion has been present since the first definitions, namely that of Barbara Bateman [4].

The idea of below-average intelligence or intellectual and developmental difficulties being a criterion for exclusion also runs through the definitions with the greatest international consensus. Examples include Samuel Kirk's first definition of specific learning difficulties [5]and others that followed, namely Barbara Bateman's [4] NACHC [6] the USOE [7], Hammill, Leigh, McNutt and Larsen [8] USOE presented in 2005 [9]and Luís Miranda Correia [10]. If we look at the diagnostic criteria in the DSM-V, we can also see that it cannot be explained, for example, by intellectual and developmental difficulties.

Definitions such as Citoler's [11] specifically refer to the presence of normal intelligence/absence of intellectual deficit. Also, Gavin Reid in 2016, referred to by Reid in 2017 [12] explicitly states in his definition that these people have average intelligence, which in some cases can be much higher.

2.2 Dyslexia has a cure *vs* Dyslexia has no cure

Second [13, p. 76] "there is a consensus among authors that children with dyslexia do not have brain damage, but have a variety of deficits resulting from brain or neurological dysfunctions". The origin of specific learning difficulties is therefore neurological, with consequences for specific brain functions [14] which may have implications for the functioning of one or more of the processes involved in learning [15].

Imaging studies have shown that there are different patterns of brain activation in individuals with dyslexia and proficient readers. In individuals with dyslexia, the activation of neural pathways in the posterior region of the brain is not sufficient, which translates into difficulty in analyzing words and transforming letters into sounds and, consequently, slow reading. Thus, more dependent on Broca's area, these individuals resort to an alternative reading system, located in the anterior area of the right side of the brain, which, although it works, is not automatic [1].

Since it is an intrinsic neurological problem of a permanent nature, it cannot be cured [1, 15]. It continues throughout life and is not a transitory maturational delay. It is a neurological disorder that requires early and specialized intervention, which will produce results [16].

2.3 Dyslexia is a visual problem *vs* Dyslexia is not related to vision problems

Dyslexia stems, among other things, from the combined role of genetic factors that result in structural and functional changes in the brain. Thus, dyslexia is not associated with a visual deficit [1, 17].

The American Associations of Pediatrics and Ophthalmology reaffirms that dyslexia is not caused by a vision problem [18]. Eye exercises or visual training have not been shown to have any positive effect on children with dyslexia, and are even a way of delaying appropriate intervention for these children and unnecessary expense for their parents/carers [19]. Since this is not a vision problem, but a cortical problem, the American Academy of Ophthalmology itself has published recommendations discouraging the prescription of prismatic lenses for children with dyslexia [18].

As mentioned in [1]:

> The explanations for the origin of dyslexia that were put forward in the 1920s, and which continued to be considered until recently, argued that deficits in visual perception were responsible for the reversal of letters and words that were thought to typify dyslexia. Eye training was often prescribed to overcome these alleged visual deficits. However, subsequent research has proved that contrary to popular myth, children with dyslexia do not have an unusual tendency to see the order of letters or words inverted and that the deficit responsible for the perturbation lies in the system responsible for language. (p. 50)

However, these children should have their eyes checked by an ophthalmologist, in order to rule out the possibility that they have difficulty seeing up close (hyperopia) or seeing far away (myopia), which can of course aggravate their difficulties. Although these problems can cause a child not to see letters well, they are not responsible for dyslexia. As we have already seen, dyslexia does not originate in the eyes but in the brain [19].

2.4 All children who have trouble learning to read have dyslexia *vs* Not all children who have trouble learning to read have dyslexia

Over the years, the term dyslexia has often been misused, giving the false idea that all children with difficulties in learning to read have dyslexia [13].

Second [13]:

> ... the typology of children who may have difficulties in acquiring reading is so diverse that it can lead to confusion, which is why the first task is to distinguish the different situations of difficulties in learning to read. (p. 69)

It can therefore be said that dyslexia is a difficulty in learning to read, but not all difficulties in learning to read are situations of dyslexia [13]. The term dyslexia should only be used when reading deficits are based on a neurological dysfunction that arises during the child's development and continues throughout their life [14, 15].

Thus, according to [1] e [13], we should think of two distinct groups. On the one hand, a group of general difficulties in learning to read, which can result from factors extrinsic to the child, such as poor or inadequate instruction [13] environmental factors [1] socio-economic disadvantage, family instability, socio-cultural deprivation, lack of learning opportunities [13] or result from intrinsic factors, in situations where they are the result of other developmental disorders that also compromise the acquisition of the reading process. On the other hand, a specific difficulties in learning to read - dyslexia - is an intrinsic, neurological condition [13].

2.5 Dyslexia cannot be identified early *vs* Dyslexia can, and should, be identified early

Early identification and intervention are key to success in learning to read. Identifying, signalling and assessing children who show signs of future difficulties before they start school allows for the implementation of early intervention programs that will prevent or minimize failure [16].

In this sense, several risk factors emerge that can be considered even before the child enters school, namely physical and clinical conditions such as language/speech disorders [1, 20] or a set of predictors of school entry, such as phonological awareness. Articulatory difficulties, which are often seen as being due to a certain childishness, but whose existence extends beyond the age at which they are usual (at the age of five/six these difficulties, if they exist, should be scarce) may be the root of a serious reading difficulty such as dyslexia [1]. A language delay can also be an early indicator of dyslexia. Contrary to expectations, children at risk of dyslexia may begin to say their first words at around 15 months and use short utterances after the age of two (when this should happen at 12 and 18 months respectively). Often, because it doesn't seem to be a worrying delay, it is undervalued or attributed to family history. But, in fact, a delay of this kind, even if seemingly insignificant, in a family with a history of dyslexia can be a warning sign of a reading problem. However, not all children with dyslexia show this delay or it may be so slight that it goes unnoticed [1].

These are only possible predictors and, based on them, we can only be alert, but we should start intervening as soon as possible. They do not, however, allow us to make a diagnosis. We are acting preventively on your risk factors.

However, diagnosis is possible and desirable in the early years of schooling and can be made from the detection of risk in learning to read, within the context of level 1 of a preventive educational model based on a multi-level support system [21]. Thus, based on this model, it is possible, in the inclusive classroom, the regular class, to make early detection of risk in reading from a set of screening tests - universal screening - to be carried out three times a year (fall, winter, spring) followed by the identification of at-risk students through the 20th percentile [22]. [22]. These students will be subject to a level 2 intervention, systematic and intensive, lasting a few weeks, and their progress will be monitored through a set of tests, namely the curriculum-based monitoring tests (CBM) [23, 24]. Once their difficulties have been overcome, they can return to level 1 (regular classroom), otherwise, if they haven't achieved their goals, they move on to level 3 where they receive a more systematic and intensive intervention. Once their difficulties have been overcome, they can move on to a lower level; if they haven't, a range of special education services should be called in to carry out a comprehensive assessment to identify a possible specific learning difficulty in reading (dyslexia) or another special educational need. [21]. Thus, if the child is diagnosed with dyslexia, they can receive the intervention they need in the first years of school, without having to accumulate failure, not just in reading but in all areas, since reading cuts across the different curricular areas.

It's important to bear in mind that it's never too late to improve the reading skills of a child with Dyslexia. But, of course, the earlier the intervention, the more likely the child will be to succeed [1].

2.6 Children with dyslexia will always fail at school *vs* Children with dyslexia can succeed at school

As mentioned, [25, p. 37] "Dyslexia is not an all-or-nothing phenomenon; it can be more or less severe and, consequently, more or less compromising of reading ability."

In this context, it's important to bring up the issue of grade retention as a strategy to help children with dyslexia develop their reading skills. Repeating years of schooling does not help to overcome this difficulty; on the contrary, it can create additional difficulties on an emotional level: feelings of frustration, anxiety, devaluation of self-concept, and self-esteem [16].

If a student is helped early on with intensive intervention tailored to their needs, to overcome the difficulties caused by dyslexia, if there is support from educational agents (parents, teachers, technicians, among others), and if this is combined with motivation and effort, then the conditions are in place for them to succeed, both academically and professionally [1].

It should also be noted that the measures implemented for students with dyslexia are not an injustice to other students. Inclusive education presupposes that the teacher provides each student with the measures and adaptations they need to succeed in school. Therefore, the adaptations that teachers make are an attempt to create a level playing field, whether in a test situation or for homework and not a way of giving advantages to students with dyslexia. A student with dyslexia will have to work as hard or harder than another student, even with individual adaptations [1].

2.7 Only boys have dyslexia *vs* Boys and girls have dyslexia

Dyslexia can appear in both boys and girls [17]. Although over the years various studies have pointed to a higher prevalence in boys than in girls, in a longitudinal study conducted by Sally Shaywitz [1]no statistically significant differences were found between the two sexes. The same author explains that over the years many studies have been based on children already diagnosed by schools, which should make us think about their identification processes, which may have been influenced by certain prejudices with consequences for identifying certain groups and not others. It is also important to reflect on the way teachers assess children's behavior in the classroom, a privileged context for the expression of dyslexia, as explained by Sally Shaywitz [1]:

> Analysis of teachers' assessment of children's behavior revealed why girls are less readily identified compared to boys. There are significant differences in the way teachers assess typical boys and girls. Teachers consider classroom behavior norms that reflect the behavior of girls to be normal. As a result, boys who are a bit boisterous - although still within the parameters of behavior considered normal for boys - may be seen as having a behavior problem and may be referred for assessment. Meanwhile, well-behaved girls who sit quietly in their seats but still can't learn to read often go unnoticed. Their school systems may identify them as having reading difficulties much later, or perhaps never at all (p. 44).

It is also important to clarify another misconception that persists, namely that dyslexia only occurs in certain languages, which is not true. Dyslexia has a universal neurocognitive basis [16] and manifests itself in different cultures and languages [1].

According to Shaywitz [1] in America, one in five children has Dyslexia. In Portugal, the prevalence is approximately 5.4 to 8.6%. It varies between 5 and 10% internationally [18].

Around 80% of pupils with specific learning difficulties have reading difficulties and 3.5% or around 2 million are monitored by special education services because they have these difficulties [1].

In a nationwide study carried out in Portugal by Vale, Sucena and Viana [26] in which a sample of 1460 children from the second to the fourth year of schooling was assessed, a prevalence rate of 5.4% of children with dyslexia was observed, a percentage which, according to the authors, is equivalent to that of other countries similar to Portugal.

2.8 All students with dyslexia swap letters and/or syllables *vs* Not all students with dyslexia swap letters

One of the misconceptions that has arisen is that children with dyslexia see letters and words upside down [17]. They indeed have difficulty associating the right names with letters and words, but there is no evidence that they see them inverted. "A related error is the belief that mirror writing invariably accompanies dyslexia. Reversals are common situations in the early stages of writing development, among both dyslexic and non-dyslexic children." [1, p. 113]. This misconception can even lead to children with dyslexia who don't make inversions not even being diagnosed [1]with the tragic consequences that can result.

These children read more slowly, and their reading is characterized by hesitations, jerks and interruptions, which means that they often get lost in the text and make mistakes, which "in the end", also as a result of the phonological decoding effort, compromises the comprehension of the text [25].

3 CONCLUSIONS

Our experience working in a school context has allowed us to see that there are still a number of myths and misconceptions surrounding dyslexia, which it is essential to clarify.

In this sense, based on scientific evidence and bibliographical research, we were able to debunk myths and misconceptions: 1) In dyslexia, intelligence is at or above average; 2) Dyslexia has no cure; 3) Dyslexia is not related to vision problems; 4) Not all children with difficulties in learning to read have dyslexia; 5) Dyslexia can, and should, be identified early; 6) Children with dyslexia can succeed at school; 7) Boys and girls have dyslexia; 8) Not all pupils with dyslexia swap letters.

It's important to emphasize that it's only on the basis of scientific knowledge, and not deep-rooted myths, that we can prevent and intervene early in order to avoid serious consequences for the academic success of children and young people with dyslexia. We therefore believe that this work is particularly important for parents and guardians, educators, teachers, technicians and people with dyslexia, in the context of an inclusive school and education.

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