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Review

# Supporting Bilingualism in Vulnerable Populations

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**Abstract:** Although bilingualism is generally appraised and supported by society, many more doubts arise when it comes to children suffering from neurodevelopmental disorders. The concern that the exposure to two languages might deteriorate the linguistic development of children, together with the advice to simplify the linguistic environment and to adopt a monolingual approach, leads many families to abandon their home language and sacrifice bilingualism. Scientific research, however, has shown that this fear is ungrounded and that children with developmental disorders can become successful bilingual speakers, if they are provided with appropriate linguistic exposure. The aim of this paper is that of providing a state-of-the-art of the literature on this topic, by reviewing studies conducted on the interaction between bilingualism and neurodevelopmental disorders, focusing in particular on the interaction between bilingualism and developmental language disorder (DLD), developmental dyslexia and autism spectrum disorder. We discuss issues related to the early identification of DLD and dyslexia among bilinguals and we report the results of studies showing that bilingualism does not exacerbate the difficulties of children with developmental disorders, but on the contrary it can be beneficial for them, at the cognitive, linguistic and socio-cultural level. Finally, we provide some recommendations for parents, educators and practitioners, focusing on the importance of supporting the family language in all of its components, including literacy, for a complete and harmonic bilingual growth.

**Keywords:** bilingualism; developmental language disorder; developmental dyslexia; autism spectrum disorder; benefits of bilingualism; bilingualism in developmental disorders



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## 1. Introduction: Advantages of Bilingualism in Typical Populations

Bilingualism nowadays tends to be appraised and considered as a valuable opportunity for the many advantages that it can bring with it at the socio-cultural, professional and even cognitive level. There is more public awareness that having access to more than one language not only permits to communicate with people of different countries and to appreciate more in depth their culture and customs, but also to enjoy better professional and academic opportunities improving the competitiveness in the job market, to live more authentic and profound experiences while travelling abroad, and to develop higher cognitive flexibility and metalinguistic awareness.

A positive attitude toward bilingualism can drive the desire of an increasingly great number of families to raise bilingual children and to give them a bilingual education. Crucially, however, this attitude radically changes if individuals with language or learning impairments are considered. In that case, positive feelings seem to vanish, giving way to the fear that bilingualism might worsen the situation, to the point that families are not infrequently advised to simplify the language environment and to abandon one of their languages. This is, however, a prejudice which is not supported by scientific results and that is not so different from the concerns that bilingualism could cause intellectual problems which were widespread some decades ago.

In this paper, we will deal precisely with this delicate topic, providing a state-of-the-art of the studies conducted to assess the effects of the exposure to two languages on children suffering from neurodevelopmental disorders, and more particularly on developmental language disorder, developmental dyslexia and autism spectrum disorder. We will capitalize on the results of several studies reported in the literature, showing that these worries have no ground and that bilingualism does not aggravate the problems related to a language impairment, but on the contrary it can, in some cases, provide even important benefits.

Before delving into these issues, it is important to define bilingualism and bilingual development. We will adopt here a broad definition of bilingualism, considering bilinguals all individuals that regularly use two or more languages, independently of the degree of competence that they display in each of them. More particularly, we will focus on early bilingual children, exposed to their second language in their infancy. We will see that to evaluate bilinguals' language skills it is important to take into consideration their age of first exposure to the two languages, distinguishing simultaneous bilinguals—those children who have been exposed to both language from birth or within three years of age—from sequential bilinguals, who are exposed to the second language after the first one is already in place, typically after age three. We will notice that difficulties in the second language are more frequently observed in sequential bilinguals whose linguistic competence is still developing and who are also called early-L2 learners. This situation is typical of many migrant children, who are generally exposed to the majority language at the beginning of their pre-school or school years.

Another important issue is that of language dominance: the dominant language is that for which children have received the greatest amount of exposure, which is typically the language in which children are more proficient [1]. However, a shift in dominance can frequently be observed for sequential bilingual children, especially those from migrant families, who might become dominant in their second language when this coincides with the majority language. In this case, it often happens that the development of the minority first language—often referred to as heritage language—stops or gives rise to attrition phenomena. Heritage languages, which are spoken at home and readily available to the children, in many cases tend to be never fully developed due to insufficient input from the social environment and to differences in literacy and formal education [2]. This pattern of acquisition notably differs from that of bilingual children whose languages are both majority languages (i.e., English and French in Canada) and thus both widely spoken, valued and supported by the society and the education system. In this case, a more harmonic and successful bilingual development is likely to occur. This is also related to the difference between additive and subtractive bilingualism: if in a situation of additive bilingualism, the first language continues to develop without being threatened by the learning of the second language, in subtractive bilingualism the second language tends instead to replace the functions of the first one, whose development is thus hindered. This is a particularly delicate topic, especially for families of children with a migrant background who are not always aware of the importance of maintaining their home language, since the advantages typically associated to bilingualism are more easily detected in the case of additive bilingualism, where both languages are equally developed and appraised by society. The sociolinguistic minority vs. majority status of the languages at play is thus another factor to be carefully considered when evaluating the language competence and experience of bilingualism.

Before we proceed by discussing the consequences of bilingualism on children with a neurodevelopmental disorder, we will briefly mention the scientific debate about the cognitive effects of bilingualism. Although it may seem hard to believe it, positive attitudes towards bilingualism are a quite recent phenomenon. In the first decades of the last century, bilingualism had indeed a rather negative connotation and it was believed to cause cognitive impairments, to the point that bilingual acquisition was conceived as a “problem” resulting in mental confusion and intellectual disadvantages for children educated in two languages [3,4]. It was only after the seminal work by [5] that negative prejudices

started to be countered, with many studies over the last two decades demonstrating that bilingual children, far from being penalized, can actually even outperform their monolingual peers especially in tasks assessing their mental flexibility. Additionally, it was observed that the previous studies supporting a negative attitude towards bilingualism suffered from flaws that could mislead the conclusion of a bilingual disadvantage. For instance, in these studies, little attention was paid to carefully match monolinguals and bilinguals, controlling possible confounding effects such as age and socio-economic status or even ability to understand (English) instructions. Additionally, some studies ignored the bilinguals' refugee status and the fact that they could be penalized for not having attended school during war time [6].

Recent research, based on a firmer ground, suggests that bilingualism does not negatively affect the children's cognitive development and indicates that exposure to two languages can lead to an enhancement of the individuals' cognitive functions across their lifespan. More particularly, bilinguals have been found to perform better than monolinguals in executive function tasks requiring controlled attention, conflict resolution and inhibition of misleading and irrelevant stimuli [7–9], and also in tasks assessing metalinguistic awareness in children [10,11], theory of mind [12,13] and reversing ambiguous figures [14]. These benefits have been found to be more robust in children and older adults, whereas they seem more elusive in young adults, an age where executive functions are at the peak and less variation can arguably be detected [15]. Bilingualism has also been reported to delay the onset of neuropathological disorders such as dementia [16,17]. These advantages have been attributed to the constant involvement of executive functions in managing the competing language systems in bilinguals, selecting the target language and inhibiting the non-target one, although no consensus has been reached yet about the real underlying mechanisms. Several studies have shown that bilingualism can result in brain changes as well, affecting those regions that are related to cognitive control and executive functions [18,19].

Nevertheless, it must be recognized that the presence of a bilingual advantage has been questioned by other studies, which failed to find evidence for differences between monolinguals and bilinguals [20,21]. It should be however observed that studies reporting null findings are not immune from methodological flaws either and that, as has been repeatedly noted, they do not invalidate studies showing bilingual advantages [6]: what is now generally recognized is that the bilingual experience over the lifespan is shaped by many different factors—including exposure, attitudes, typological linguistic distance, among others—which can affect both linguistic outcomes and cognitive effects, and which are still not properly understood. In any case, while it would be difficult nowadays to maintain that bilingualism can be harmful for an individuals' language and cognitive development, the approach towards bilingualism is still critical when it comes to children with a neurodevelopmental disorder. In the following section we will discuss this issue with respect to bilingual children showing a developmental language disorder.

## 2. Bilingualism and Developmental Language Disorder

Developmental language disorder (DLD, henceforth) is defined as a neurodevelopmental condition including a set of different clinical features characterized by a delay or a disorder in one or more areas of language development, occurring in absence of cognitive, sensory, motor, affective and important socio-environmental deficiencies [22]. The presence of language disorders or delays is highly frequent in childhood: it is estimated that 11–18% of the infants between 18 and 36 months present a delay in the appearance of expressive language accompanied, in the most severe cases, by comprehension difficulties [23].

The majority of these children, who are typically referred to as late talker or late bloomers, catch up with their peers by age three. DLD is instead diagnosed in about 5–7% of the population, whose language difficulties persist even after age three and who are unlikely to recover before school age [24]. In this paper, we will stick to the term DLD, which is currently preferred to the more traditional label specific language impairment (SLI) and to the term primary language impairment (PLI) [25].

DLD has a genetic basis and is inheritable [26]. Children with DLD can show impairments in language processing at different levels; weaknesses in morphosyntax are generally considered a core component of the disorder, with some variation depending on the peculiarities of the languages considered. The domain of tense morphology, for instance, is particularly compromised in English [27], whereas the production of clitic pronouns is impaired in languages such as Italian and French [28,29]. Another area which is typically impaired in DLD across different languages is nonword repetition, a task in which individuals are asked to repeat meaningless but pronounceable strings of sounds modeled after the phonotactic structure of their language [30]. Vocabulary deficits are also frequently reported [31], together with poor narrative skills [32]. Pragmatic competence has been found to be impaired as well [33]. These linguistic difficulties can co-occur with other cognitive problems affecting procedural memory, motor control and executive functions [34–36]; deficits in working memory and processing speed have also been found to be associated with the children's language outcomes [37].

When it comes to the relationship between DLD and bilingualism, there are two different issues that should be addressed, respectively concerning the need to properly identify language disorders in bilinguals and the concern, often felt by parents, educators and health professionals, that bilingualism can hinder the language development of the impaired children. The two aspects will be discussed separately below.

### *2.1. Identification of DLD in Bilinguals*

The first issue is related to the fact that the linguistic domains in which children with DLD display major difficulties are typically weak in typically developing bilingual children too. Indeed, in both populations a delay in the onset of first words and first word combinations can be observed, together with difficulties in morphosyntax and vocabulary. L2 children typically score lower than age-matched monolingual peers in language tests [38], performing similarly to monolinguals with DLD in the areas which are typically reported to be compromised in this disorder, such as tense-marking morphology [39], nominal morphology [40] and clitic pronouns [41,42]. Moreover, both populations show poorer vocabulary with respect to unimpaired monolinguals, although it must be acknowledged that bilinguals specialize their lexicon in the two languages based on their effective needs and language uses, and that their total vocabulary would probably equal that of monolinguals if the two languages were considered together [43].

It is worth observing that grammar deficits are typically found in comprehension and especially in production of structures that require sophisticated morphosyntactic processing and are particularly costly in terms of memory resources. Additionally, these deficits are more common in sequential than in simultaneous bilinguals and are significantly related to the amount of exposure that the children have received in the second language, as well as to their proficiency level. Normally, if the exposure to the second language is sufficient, these difficulties spontaneously disappear, and also sequential bilinguals can catch up with their monolingual peers [44].

Nevertheless, the presence of similarities between bilinguals and children with DLD poses a great challenge to the identification of language disorders in bilinguals. The difficulties shown by L2 children, which could simply reflect still incomplete acquisition, could indeed be misinterpreted as symptoms of an underlying disorder. This can lead to problems in the diagnosis of DLD in bilinguals, which can lead to both overdiagnosis (i.e., mistaken identification), when children are incorrectly identified as suffering from a DLD, and underdiagnosis (i.e., missed identification) when they do have a language disorder, which is however unrecognized since their language difficulties are wrongly attributed to their being bilingual. The proportion of both over- and underdiagnosis has indeed been found particularly high in bilinguals [45], especially if they are tested in the majority language and if they are still not proficient in that language.

There is no simple solution for this problem: although assessing both languages is recommended, this is often not possible for practical reasons, including the lack of standardized tools in many languages (especially those spoken by migrant children) and the fact that it would in any case be inappropriate to assess bilinguals based on monolingual norms, as it is unfortunately commonly conducted in the clinical practice in many countries. It must indeed always be remembered that bilinguals are not just the sum of two monolinguals, and that it would not be fair to compare their performance to monolingual standards. Adjusting the norms of standardized tests is also not feasible, due to the high heterogeneity of the bilingual population in terms of linguistic background, age of onset, amount of language use and language status [42]. Although some attempts in this direction have been made, proposing new clinical practices based on different diagnostic tools for the identification of language disorders in bilinguals or providing norms based on bilingual students (see [46] for a proposal for Italian), they are not yet included in the clinical practice and further research is still needed. A promising strategy is that of analyzing more in depth the linguistic performance of bilinguals, especially in the so-called clinical markers of DLD, i.e., in those areas in which monolingual children with language disorders are particularly weak, to verify whether possible differences between the two populations could permit to discriminate them. It has indeed been observed that bilinguals, besides showing different acquisitional steps with respect to monolinguals, can show specific type of errors that are different from those typically found in children with DLD. Specifically, bilinguals display higher percentages of commission errors and overgeneralizations, which are interpreted as a sign of creativity in L2 children's use, and which are not found in children with DLD, who tend to commit more omission errors [29]. For what concerns clitic production, a clinical marker for DLD in Italian, for instance, typically developing sequential bilinguals have been found to perform qualitatively and quantitatively differently from monolinguals with DLD, who tend to omit the pronoun in the preschool ages: unimpaired bilinguals, instead, show commission instead of omission errors, producing a wrong pronoun instead of the target one [42]. Interestingly, bilinguals with DLD omit the pronoun much more often, similarly to monolinguals with DLD [47]. Analyzing the type of error committed by the children should thus make it possible to discriminate typical from atypical bilinguals.

A clinical marker which has proven to be particularly successful with the purpose of discriminating bilinguals with and without language disorders is nonword repetition (NWR), which is typically impaired in children with DLD: the advantage of this task is that is sensitive to the presence of language disorders without being dependent on language knowledge and vocabulary. Unimpaired bilinguals have been found to perform similarly to monolinguals in NWR and independently of their L1, especially if the target language has a simple phonotactic system as Italian, suggesting that the task allows a differentiation between children with and without DLD in several languages [47–51]. Another advantage of this task is that it provides a measure of language processing (phonological processing and short-term memory) that is not culturally biased [52].

However, it must be noticed that no single measure can optimally distinguish the two populations, and that creating composite clinical markers, possibly in both languages, could provide a more precise assessment for the identification of DLD in bilinguals [53], although more research is still needed in this respect.

Finally, in evaluating the language competence of bilinguals it is paramount to take into consideration also aspects related to language exposure and to the minority/majority status of the languages spoken. Caution is indeed recommended in drawing comparisons between monolinguals and bilinguals, especially if monolinguals have a higher socioeconomic condition, since it has been observed that catching up with monolinguals can take longer for bilinguals living in minority groups with a socioeconomic disadvantage, as it might often be the case of migrant children [29]. Collecting information on exposure factors (i.e., age of onset, quantity and quality of exposure, length of exposure) by means of detailed questionnaires or interviews to parents is thus always recommended [54].

Risk factors of DLD should also be considered, including late onset of multi-word stage and family history of language disorders, which have been found to be the best discriminators between typical and atypical development in bilinguals [45,55]. A tool that has been specifically designed for the evaluation of clinical markers of DLD in sequential bilinguals is the ALDeQ [56], which aims at gathering information from parents on their child's bilingual development in the L1 in a non-language/culture-specific way. This instrument has been found as a useful clinical tool to be used for the identification of DLD in bilinguals, in combination with other linguistic measures, such as the ones discussed above (see [57] for a study deploying an Italian version of the questionnaire and reporting good discriminant validity of the tool in a combined model, considering also NWR and morphosyntactic competence in both comprehension and production).

## 2.2. Effects of Bilingualism on DLD

One of the most frequently asked questions by families and educators of bilingual children diagnosed with DLD concerns the possible effects that the exposure to two languages can have on their linguistic development. It is indeed often erroneously believed that, due to the language difficulties characterizing this disorder, children with DLD will not be able to optimally learn two languages, and that bilingualism could even worsen their clinical picture. This is, however, just a prejudice that has not been supported by scientific evidence and that seems to be rooted in the outdated ideas that bilingualism might constitute an effort or a "problem" for language acquisition, as discussed above. It is thus paramount to debunk this misconception since it can have serious negative consequences for the bilinguals' development and their sociocultural life.

It is not rare, indeed, that families of bilingual children with DLD are advised to give up one of their languages, which in the case of migrant families typically coincides with the minority language, to guarantee a better development of the community language. However, several studies have pointed out that bilingualism does not worsen their language impairment, that they do not manifest difficulties in keeping the two languages separate and do not display confusion, as is often feared. On the contrary, bilinguals with DLD show difficulties in each of their languages that are specific to the language itself and similar to those displayed by the respective monolinguals with DLD [58,59]. Bilinguals have indeed been found to perform similarly to their monolingual peers in grammatical morphology considering both languages [60], in clitic production and nonword repetition [41], as well as in regular verb finiteness and nominative subjects elicited through a spontaneous narrative task [61]. The difficulties shown by bilinguals in these domains are thus not due to their being exposed to two languages, but rather to the fact that they suffer from DLD. Conversely, bilingualism might even provide an advantage, as shown by [62], who found that bilinguals with language disorders were even more accurate than their monolingual peers in the use of first-person clitic, in the production of unambiguous clitics in a narrative task and in a theory of mind task. Similarly, [63] reported that both monolinguals and bilinguals with DLD have similar and persistent impairments in executive function tasks, but bilinguals outperform monolinguals when their (lower) language knowledge is controlled for.

Finally, it should be emphasized that simplifying the linguistic environment and depriving children of one of their languages will not eliminate or reduce their difficulties, which are related to the presence of a specific disorder and are not altered by the exposure to two languages. It is, thus, fundamental to provide families with correct information, reassuring them about the fact that bilingualism is not harmful for their children and that there is no need to abandon one of the languages in the household. Conversely, families should continue to provide rich and high-quality input, encouraging their children to interact and to practice their home language. This will permit them not only to strengthen family relationships, but also to enjoy all the positive aspects that are typically associated with bilingualism.

### 3. Bilingualism and Developmental Dyslexia

According to the *DSM-5 Diagnostic and Statistical Manual of Mental Disorders*, developmental dyslexia (dyslexia henceforth) belongs to the overarching category of specific learning disorder, namely a neurodevelopmental disorder that compromises a person's ability to learn and use specific academic skills, such as reading, writing and arithmetic, which serves as the foundation for most other academic learning [22]. Dyslexia, whose main manifestation is the severe difficulty in reading, is the most widespread and studied of these impairments, which also include dysgraphia, a disorder affecting writing skills, and dyscalculia, which is characterized by difficulties in learning number-related concepts and in performing math calculations and reasoning. Importantly, these disorders cannot be accounted for by low intelligence level, neurological or sensory problems or poor educational opportunities [64].

Beyond the reading difficulties, which can affect accuracy, fluency and comprehension, individuals with dyslexia have been found to display linguistic deficits in phonology [65], morphology [66,67] and grammar [68,69]. Their working memory and processing abilities have also been found impaired [70–72] together with their automatization of skills [73]. The incidence of dyslexia is 5–10% and it is markedly influenced by the degree of opacity of the orthographic system, with a higher prevalence in opaque orthographies such as English than in more transparent ones such as Italian [74]. The characteristics of a language writing system can also lead to different manifestations of dyslexia, with fluency being more affected in transparent orthographies and accuracy in opaque ones; it is also possible for biliterate bilinguals to experience difficulties only (or more markedly) in one language [75,76].

Due to the increasingly high number of bilingual (often migrant) children attending schools in the nowadays cosmopolitan and multicultural society, the relationship between bilingualism and dyslexia constitutes a delicate issue. Research has tried to address aspects related on the one side to the effects of bilingualism on the acquisition of reading and on the identification of dyslexia, and on the other side on the possible consequences that exposure to two languages and possibly to two writing systems can have on the difficulties of bilingual children diagnosed as dyslexic.

#### 3.1. Reading and Bilingualism: Issues for the Identification of Dyslexia

The relationship between reading and multilingualism has been extensively investigated. A number of studies have reported that bilinguals show an advantage over monolinguals in the acquisition of reading skills, due to their better metalinguistic abilities [77] and to the possibility to transfer their literacy knowledge from one language to the other, due to the universality of the processes underlying reading [78,79], for instance, reported the results of Gaelic–English bilinguals, attending schools in which Gaelic was a vehicular language, who reached an optimal performance in reading in both languages, even surpassing their English monolingual peers. It is, however, important to emphasize that the kind of bilingualism considered in these studies is representative of an ideal situation of additive bilingualism" as [79] observe, in which, both languages are appreciated and supported by society and schools through specific policies, and in which children typically acquire a good command of both languages, with the second language adding value to the first [80].

This is rather different from the condition of migrant children, who represent a consistent proportion of the bilingual children attending schools, and who generally live in a more disadvantaged socio-economic and cultural situation, where the home language is not adequately supported and appraised by the community and it is mainly relegated to the domain of orality. What typically happens is that these children are exposed to literacy for the first time in their second language, the community language, and receive only a rudimental, if any, instruction in their first, minority language. This fact, especially if combined with a still incomplete competence in the vehicular language, might significantly slow down their acquisition of literacy, with the consequence that they might lag behind their monolingual peers in both reading and writing. Consistently, in their meta-analysis

of the literature on reading comprehension and its underlying components, Ref. [81] reported that bilingual and multilingual readers tend to underperform monolinguals in text comprehension and, although to a lower extent, also in decoding. Considering that reading comprehension is crucial for most school subjects, this discrepancy might also explain why L2 learners, especially migrants, are often found to show higher dropout rates and poorer learning outcomes and to perform poorly in reading tests as the PISA.

Although it should be remarked that problems in decoding are generally detected only at the beginning of the literacy instruction process and tend to disappear after a couple of years [82,83], the risk is that of misinterpreting these reading difficulties as symptoms of dyslexia, leading, as in the case of DLD, to an inflation of inappropriate diagnoses. The risk of overdiagnosis has indeed been reported to occur, especially if the same tests and cutoff points used for monolinguals are employed, without taking into consideration the language biography of the children [84]. On the other hand, underdiagnoses are also frequent, if teachers assume that their problems are related to incomplete language competence and do not refer them to health professionals for a precise assessment [85], with the unfortunate consequence that children will not be given access to proper interventions that can improve their literacy skills.

Since it has been shown that scores can be significantly lower if tasks are administered in the second language instead of the first [86], it is often recommended to assess performance also in the first language. This is, however, hardly feasible in migrant contexts, as many children are literate only in the majority language and cannot be tested for reading and spelling in the first language.

Research has shown that it is possible to come up with a more accurate diagnosis. The first indispensable step is that of taking into consideration the child's full background and experience, gathering information about the exposure and development of the two languages by means of specific questionnaires that could help to build a complete and clearer picture of their language and literacy competence [87]. Furthermore, it has been shown that some reading measures are more reliable than others: more particularly, it is advisable to rely more on performance in nonword reading than in real-word reading, as in this task bilinguals are not penalized from their lower lexical competence and perform similarly to their monolingual peers, especially for languages with a transparent orthographic system [88]. Since dyslexia is characterized by reading difficulties in both word and nonword reading, if a bilingual child shows impaired reading only with words, performing similar to monolinguals with nonwords, it is more likely that their difficulties are related to their poorer vocabulary in the vehicular language than to the presence of a real disorder. Moreover, it would be important to integrate the diagnostic procedure with other linguistic tasks that have proven to be successful in discriminating bilingual children with and without dyslexia. A promising candidate is nonword repetition, which has been found effective as an integrative tool for the identification of dyslexia in both monolinguals and bilinguals (see [89] for a study on Italian L2 bilinguals with and without dyslexia), together with rapid naming, which is a task assessing lexical access, in which participants are asked to rapidly name sequences of symbols (e.g., letters, digits, colors and objects), and which is considered as one of the best and perhaps universal predictor of reading fluency [90].

Finally, an important recommendation for children that have been diagnosed as dyslexics is to start intervention as soon as possible, to give them the possibility to improve their literacy skills and their reading comprehension, which are both fundamental to fully enjoy educational, professional and cultural opportunities.

### *3.2. Effects of Bilingualism in Dyslexia*

One of the major concerns of parents and educators of bilingual children that have received a diagnosis of dyslexia is that bilingualism can worsen their difficulties and hinder their schooling progress. This fear is fueled by the wrong misconception that their reading problems are caused by their being exposed to two languages and that by giving

up one of them it will be possible to eliminate the source of their difficulties. Studies on bilingual dyslexics, however, on the contrary show that they perform similarly to monolingual dyslexics in both reading and language tasks, thus disconfirming the belief that bilingualism has negative effects on dyslexia.

As for reading, we have already observed above that the manifestations of dyslexia can differ based on the characteristics of the orthographic systems of both languages. Interestingly, it has been reported that bilinguals with dyslexia who are literate in both languages develop different reading strategies in the two writing systems, showing the same mechanisms for processing written materials that are used by monolinguals in each of their languages [91], with no signs of confusion or of negative effects of bilingualism on reading in dyslexia. Conversely, cross-linguistic transfer effects from one language to the other can be beneficial for both normal and poor readers. More particularly, it has been found that biliterate bilinguals who learned to read in a transparent orthography, such as Spanish or Welsh, in which mappings between letters and sounds are simple and regular, showed an enhanced development of sublexical decoding strategies and of phonemic awareness, which was transferred to the less consistent language, such as English. This, in turn, provided an advantage in literacy tasks that strongly rely on phonological processing, such as pseudoword reading, also in the opaquer language, thereby reducing the difficulties related to dyslexia in bilinguals with respect to monolinguals [92–94]. These results are in line with those reporting that bilingualism can boost reading skills, but of course they are limited to those bilinguals that are also biliterate, which unfortunately is rarely the case for migrant children.

The effects of bilingualism on the linguistic competence of dyslexics have been also investigated: importantly, results have shown that bilingual dyslexics perform similarly to monolingual dyslexics in those linguistic areas that are typically reported as compromised in dyslexia, such as phonological awareness ([95] for data on nonword repetition, rhyme detection and spoonerism,) and morphosyntactic skills (e.g., clitic production [96]). In particular, results revealed that bilingual dyslexics were impaired at the same level of their monolingual dyslexic peers, indicating that the exposure to two languages does not hamper their skills.

Even more intriguingly, it has been found that the advantages that typically are provided by bilingualism also extend to people with dyslexia, as in metalinguistic/morphological awareness (see [97] for a task on nonword pluralization in L2 Italian based on the Wug Test by [98]) and executive functions and implicit learning [99]. In both studies, bilinguals with dyslexia have been found to outperform their monolingual peers, reaching the performance levels of the groups of typically developing children.

Although research in this domain is still rather limited, it should be emphasized that no study reports possible negative consequences of bilingualism on reading disorders, indicating that the fear that exposure to two languages might worsen the difficulties of people with dyslexia is unfounded and even dangerous. Abandoning one of the two languages will indeed not reduce the deficits associated to the disorder, but it will deny bilinguals the opportunity to enjoy the benefits typically provided by the practice of using two (or more) languages. As argued above, research on the contrary indicates that biliteracy should be encouraged and supported, since dual-language literacy instruction might boost the development of reading and spelling skills in both languages through positive mechanisms of cross-linguistic transfer.

#### **4. Bilingualism and Autism Spectrum Disorder**

Autism spectrum disorder (ASD) is a developmental condition which is characterized by persistent difficulties in social communication and social interaction across multiple contexts and repetitive patterns of behavior, interests, or activities [22]. The reference of a “spectrum” relates to the presence of considerable inter-individual heterogeneity in the manifestations of the disorder, which might range from mild to severe, also depending on the individual’s intellectual functioning and adaptive behavior. Communication problems

often involve delayed speech, echolalia and use of deictic pronouns [100,101], and pragmatic skills, as in command of conversational rules, comprehension of irony and metaphors and use of referential expressions [102,103]. Absence of verbalization can even be observed in some cases into adolescence and beyond [101]. A core feature of ASD is the impairment in theory of mind (ToM), which refers to the individual's ability to attribute cognitive states and emotions to oneself and to others. Deficits in ToM are believed to explain the problems in social interaction frequently reported by individuals with ASD [104,105].

Due to the increasing number of bilingual families and bilingual children with ASD and to the extensive negative effects on conversational skills in this disorder, the interaction between bilingualism and ASD has been explored by several studies. A consistent body of research focuses on the language policies adopted by families, who are frequently discouraged by practitioners to maintain their home language and are advised to adopt a monolingual approach [106,107]. As in the case of DLD and dyslexia, this recommendation lies on the misconception that bilingualism can deteriorate the development of the children and that a simplification of the linguistic environment can mitigate their language problems.

Such advice is actually in deep contrast with a growing body of evidence that not only children with ASD can become successful bilingual speakers but they can even benefit from the exposure to two languages [108]. No study indeed supports the concern that bilingualism can be detrimental for the linguistic, social and cognitive development of these children, who conversely have been found to perform similarly to monolinguals with ASD in different domains (see [109] for a systematic review of the literature). Stages of early language development and vocabulary growth have been found to be similar in monolingual and bilingual toddlers and preschool children [110,111]; bilinguals with ASD are reported to have a larger lexicon than respective monolinguals, if both languages are considered together [112]. A crucial role in both vocabulary and language tasks is played by the amount of language exposure, which is the strongest predictor of language skills: this offers an important practical indication, as it suggests that children with ASD can successfully grow bilingual on condition that adequate exposure to the two languages is provided.

Furthermore, it has been shown that exposure to two languages does not inhibit the social development of children with ASD, who instead show similar characteristics to their monolingual peers [113], nor does it aggravate their difficulties in terms of pragmatic competence [114] or cognitive functioning [111].

On the contrary, bilingualism could mitigate the difficulties in executive functions and cognitive flexibility of children with ASD, resulting in enhanced performance in tasks tapping on their executive functions and selective attention [115,116]. Advantages of bilingualism in the verbal domain have also been reported, as in narrative production: more particularly, bilinguals have been found to outperform monolinguals in narrative tasks, considering both structure complexity and use of adverbial clauses, and also to produce a lower number of ambiguous referential expressions with respect to children exposed to only one language [117]. Moreover, it has been reported that bilinguals with ASD made use of more communicative gestures, were engaged in more imaginative play [111] and showed better ToM skills than monolinguals with ASD [115].

These results thus unanimously indicate that adopting a monolingual approach is not necessary or useful for children with ASD: not only it would deprive them from the possibility of growing bilingual, but it could in many cases exacerbate their isolation from the family environment and the social and cultural community life. Reducing or even abandoning the family language could indeed cause negative consequences on the family well-being, such as engendering parental guilt or preventing other siblings to grow bilingual as well [118]. Speaking the home language, instead, enables parents to connect emotionally with their children and express their feelings in a more natural way, preserving and enhancing the psychological well-being of the whole family, which is particularly important when it comes to ASD. Qualitative research on the linguistic policies adopted by families of children with ASD reveal that bilingual parents report a higher level of comfort, emotional involvement and competence when they use the native language with their

child, whereas they show more frequent interruptions and shorter utterances when they use the non-native language [117].

Finally, it is essential to emphasize that in order to guarantee a full bilingual development, children with ASD need to be given consistent and varied opportunities to hear and practice the home language, which is particularly relevant in the case of heritage languages in contexts where the majority language is the dominant one [119].

### **5. Conclusive Remarks: Best Practices and Indications for Families, Educators and Practitioners**

Families and society are increasingly aware of the importance of bilingualism and of the benefits associated with it. However, when faced with situations involving a developmental disorder, the fear of worsening an already delicate situation tends to prevail. Although these concerns are understandable, research has shown that they are unfounded: it is very unlikely that bilingualism can worsen the difficulties experienced by children suffering from language related impairments such as DLD, dyslexia or ASD.

On the contrary, the studies reviewed above reveal that bilingualism, far from having negative consequences on the linguistic development of the children, can lead to benefits both from a linguistic and a cognitive point of view. The advantages that the exposure to two languages provides in terms of cognitive flexibility and metalinguistic skills, among others, have indeed been found to extend, even at a higher degree, to individuals suffering from language and learning impairments.

There is, thus, ample evidence indicating that children with developmental disorders can become successful language users and enjoy all the opportunities offered by bilingualism, if they are provided with an extensive and varied exposure to the two languages (especially to the home language, which in general is not the dominant one for children attending school in the host country) and with an adequate support in an inclusive educational context [120]. There is then no reason why parents should sacrifice one of their languages: renouncing to bilingualism, indeed, would not only be useless for the purpose of reducing the children's difficulties, but it could rather be harmful, especially for the psychological wellbeing of the children themselves and of their families.

It is important also to take into consideration the environment in which the child lives, acknowledging that in some cases bilingualism is not only a choice but a necessity, as it happens in migrant families that are used to communicate in their home language and that might not be proficient (or literate) in the majority language. Asking these families to abandon their first language to guarantee a supposedly better development of the second, not only has no scientific basis but can create situations of great discomfort and even determine the isolation of the child within his own family, which would inevitably resort to using the minority language in the conversational exchanges in which the child is not involved. Parents could even provide poor-quality input, if they lack fluency in the second language, and their fear to pass on grammatical mistakes could create a barrier to successful communication [109,118]. Having poor proficiency in the language directed to the children can indeed hinder communication, leading to lower opportunities for parent-child interactions which certainly do not facilitate the child's language development.

Supporting the maintenance of the home language and encouraging bilingualism, also in more vulnerable contexts as in families with migrant background, is instead fundamental to safeguard the psychological well-being of the children and of their families and to avoid situations of subtractive bilingualism [121]. In this light, schools might also foster inclusion within bilingual students at risk for exclusion by promoting educational practices that adhere to the principles of additive bilingualism, i.e., by proposing dual language educational curricula addressing the needs of culturally and linguistically diverse learners [122]. It is, thus, of the utmost importance to spread correct information about the benefits of maintaining the home language, especially in migrant families, which often tend to underestimate the importance of their mother tongue [123]. The role of teachers, educators and practitioners is crucial here to raise the awareness of families and children themselves on the advantages provided by bilingualism at different levels, as well as on

the possible weaknesses, as in lexical competence, that they might display, explaining that they are just part of the natural process of becoming bilingual and should not be a cause for concern. Especially regarding children with a migrant background, it should be emphasized by schools and society that all languages are equally valuable and worth to be preserved, remarking that minority languages are crucial also for maintaining cross-generational relationships and preserving cultural heritage [124]. Sacrificing the home language could indeed result in lack of integration of the children with their community and weakening of family relations due to language barriers, while also leading to contexts of subtractive bilingualism in which the benefits of bilingualism might be reduced.

The vital role of literacy instruction in the minority language needs also to be underlined: schools, educators and practitioners should indeed emphasize that home literacy experiences are fundamental to enrich the children's language exposure and to offer them better literacy outcomes and deepen connections to the family culture.

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