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LEXICAL SKILLS IN CHILDREN WITH DEVELOPMENTAL DYSLEXIA AND DEVELOPMENTAL LANGUAGE DISORDER: AN OVERVIEW

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Abstract: Children with developmental dyslexia (hereafter DD) and developmental language disorder (hereafter DLD) have deficient lexical skills compared to their typically developing (TD) peers. Verbal fluency tasks are often used to investigate one's lexical skills by asking them to access and retrieve words from the mental lexicon, in addition to executive function skills. In the Greek language, recent research findings showed that part of the variance of poor performance on verbal fluency tasks was accounted for by poorer oral and written language skills in children with DD and/or DLD compared to their TD peers. This study discusses these findings and the variables involved in the processes and presents directions for interventions considering word learning and executive function skills in children with DD and DLD. It also points out that a single verbal fluency task cannot be a comprehensive assessment of one's lexical skills, but instead if one performs poorly on a verbal fluency task should undergo a comprehensive language assessment to receive a proper diagnosis in preschool and early school years.

Key words: Developmental language disorder, Dyslexia, Interventions, Lexical skills, Verbal fluency

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INTRODUCTION

Conceptualization of developmental dyslexia and developmental language disorder

In the latest edition of the International Classification of Diseases (ICD)-11 (World Health Organization, 2018), *developmental dyslexia* (hereafter DD) is characterized by "significant and persistent difficulties in learning academic skills related to reading, such as word reading accuracy, reading fluency, and reading comprehension. The individual's performance in reading is markedly below what would be expected for chronological age and level of intellectual functioning and results in significant impairment in the individual's academic or occupational functioning". Using as a cut-off point a score of more than two standard deviations below the mean on a measure of reading accuracy, plus normal IQ, Rutter et al. (2004) found that between 3-6% of children in the UK could be classified as having DD. Epidemiological data originating from Greek adults with specific learning disabilities is estimated to be consistent with international data reported (Bampalou et al., 2020). Regarding the subtypes of DD, evidence is mixed. Torppa et al. (2007), for example, in their longitudinal study, presented five subtypes (1) poor readers, (2) slow decoders, (3) poor comprehenders, (4) average readers, and (5) good readers. Children with familial risk for dyslexia performed on average at a poorer level in all reading tasks than both their classmates and the controls, and they were overrepresented in slow decoders subtype. Differences between the subtypes were found in the early language and literacy skill development, as well as in the reading experiences of the reading subtypes. Recently, Grigorakis et al. (2022) investigated whether early oral language skills of Greek-speaking children assessed in Grade 1 can predict the type of reading difficulties in Grade 2. Children who were reading disabled were assigned to two subgroups: the first group included children with predominantly reading fluency difficulties and the second group included children with single reading comprehension difficulties. The results showed that vocabulary, phonological, and morphological awareness skills predicted children's classification in the reading comprehension difficulties subgroup more than in the typically developing (TD) group. Further, poorer phonological awareness skills and rapid automatic naming skills predicted the classification of children in the reading fluency difficulties group than in the other reading disabled group or in the group of TD children. These findings therefore highlight the contribution of early oral language assessment to the identification of children with reading difficulties and their specific types in the Greek orthography (Grigorakis et al., 2022).

Turning now to another neurodevelopmental disorder, Bishop et al. (2016) gathered an international group of experts, the CATALISE consortium, who agreed on the term "Developmental Language Disorder" (hereafter DLD) to replace the term "Specific Language Impairment" (SLI) when the child has receptive or expressive language problems that affect every day functioning and when language disorder is not part of a broader developmental disorder, such as autism spectrum disorder, or a known condition, such as brain injury and sensori-neural hearing loss (Bishop & Norbury, 2008; Botting, 2014; Williams & Lind, 2013). The term DLD has been embraced by some researchers (Joye et al., 2019; Mengisidou, 2019; Mengisidou & Marshall,

2019; Mengisidou et al., 2020; Ralli et al., 2021a) since it was first proposed by Bishop et al. (2016). The term DLD is also used by the World Health Organization (2018) in the latest ICD-11. Thanks to the increasing unification of speech-language pathologists around the term DLD, the time is ripe to directly address clinical practices in delivering a diagnosis to caregivers in ways they can understand, retain, and use to build connection and drive advocacy efforts (Tighe & Namazi, 2022). Norbury et al. (2016) reported that in the UK, DLD affects an estimated 7.58% in children aged 4 years 9 months to 5 years 10 months. Further, Calder et al.'s (2022) study reported an estimated 6.4% as children having DLD at 10 years of age originating from a large-scale Australian prospective birth sample. DLD therefore is as prevalent in middle childhood as it is in early childhood (Calder et al., 2022). Regarding the subgroups of DLD, Tomblin and Zhang's (2006) epidemiological study found no evidence for the potential dimensionality of language ability into two modalities, receptive and expressive. However, Calder et al.'s (2022) study reported that their sub-cohort of children with DLD comprised 33.7% with expressive language deficits, 20.2% with receptive language deficits, and 46.2% with receptive-expressive deficits.

Comorbidity between developmental dyslexia and developmental language disorder

In terms with comorbidities, DD co-occurs with DLD with an overlap of approximately 50%, and accordingly, the probability of showing DD is much higher in children diagnosed with DLD than in those without DLD (Bishop & Snowling, 2004; Eisenmajer et al., 2005; McArthur et al., 2000; Messaoud-Galusi & Marshall, 2010; Nash et al., 2013; Pennington & Bishop, 2009; van der Lely & Marshall, 2010). According to many of the proposed models attempting to account for the relationship between DD and DLD, the phonological deficit underlies the overlap between the two disorders. Indeed, it has been reported that children with DLD have similar phonological difficulties as those with DD (Bishop et al., 2009; Brooks & Kempe, 2012; Hulme & Snowling, 2009; Kamhi & Catts, 1986).

Nevertheless, even though there is a lot of overlap between the two disorders, there are children who have either DD or DLD, but not both, as proposed by Bishop et al.'s (2009) study in which children with DLD-only and children with DLD plus DD seem not to have exactly the same deficits in phonological processing skills but that they can be differentiated in a task assessing speeded lexical access. Similarly, in another study by Ramus et al. (2013) designed to investigate why the overlap between DD and DLD is not complete showed that DLD was related to deficits in both phonological representations and phonological processing skills, whereas DD was related to deficits in the skills that operate on phonological representations and not the representations themselves.

Recently, in the Greek language, Mengisidou and Marshall (2019) also showed that children with DD and/or DLD had deficient phonological access to otherwise intact phonological representations as measured with two different variables, the one measuring access to representations and the other measuring the quality of phonological representations themselves.

Further, previous research in the Greek language reported that DD and DLD show common deficits on tasks measuring reading skills and reading-related phonological skills, namely, phonological deficits on tasks measuring phonological awareness, phonological short-term memory, and rapid automatic naming skills (Diamanti et al., 2018; Spanoudis et al., 2018; Talli et al., 2016), even though they do not completely overlap. Recently, Giannopoulou et al. (2022), in a retrospective Greek study, assessed a group of Greek-speaking pre-schoolers with a history of DLD, and reported that 92.5% of the participating children showed a significant reading difficulty in their primary school years (mean age of the group was 10.5 years). Children with severe reading difficulties also showed a significantly poorer score on a vocabulary task. The above-mentioned group of children showed poorer scores on a verbal IQ subtask. A poorer score on a verbal IQ subtask, in addition to a history of DLD in preschool years of age were two independent predictors of the severity of DLD children's reading disorder in the Greek language.

Aim of the present study

The aim of this study is discussing about how lexical skills are being evaluated, through verbal fluency tasks, that is, semantic and phonological fluency tasks. Additionally, how these results are used to investigate lexical organization and lexical retrieval processes. Indeed, a direct relationship between Full Scale Intelligence Quotient and performance on verbal fluency tasks is evident, with the latter performance being a brief and effective neuropsychological task that can reveal a deficit not only in executive functions and verbal abilities in children with dyslexia (Brandeker & Thordardottir, 2022; Takács et al., 2014; Vaucheret Paz et al., 2020), but also detect children with low intellectual performance (Vaucheret Paz et al., 2020). Children with DLD experience lexical problems (see Marshall, 2014, for a review) revealing themselves as word-finding difficulties. They might also have poorer vocabulary knowledge, as measured, for example, by a task assessing receptive vocabulary, such as the Peabody Picture Vocabulary Test (Dunn & Dunn, 2007), or the British Picture Vocabulary Scale (Dunn et al., 2009). Phonological fluency tasks are also used to assess one's lexical skills. Specifically, phonological fluency tasks measure the quality of children's phonological representations and explicit and implicit access to them, with the children with impairments in language learning showing inferior phonological fluency performance (Mengisidou, 2019). Recent research findings showing the contribution of oral and written language skills on verbal fluency performance in children with DD and/or DLD will be presented, in addition to future directions for appropriate interventions considering word learning in children with DD and DLD.

Verbal fluency performance

Semantic fluency tasks

Semantic fluency tasks require children to produce as many words as they can belonging to certain categories, such as "animals", in a 60-second period. The task therefore requires the search of the mental lexicon for words based on their meaning, offering an important window into lexical organization, namely, how words are stored in the mental lexicon, and lexical retrieval processes, namely, how words are accessed from the mental lexicon. While the most common performance measures in verbal fluency categories are the total number of correct responses, other analyses such as the number and size of clusters (namely, the number of words belonging to a subcategory) and the number of switches between clusters can be carried out to investigate what drives verbal fluency performance (Marshall et al., 2013; Marshall et al., 2018; Summaka et al., 2022; Troyer et al., 1997). Troyer et al. (1997) introduced clustering and switching as two components of verbal fluency performance. Words are often produced in clusters of semantically related words (Dell, 1986). For example, "cat-dog" is a cluster of "pets". Semantic clusters provide a measure of how words are stored in the mental lexicon (lexical organization) on the basis that semantic similarity (or overlap) in successively produced responses might aid word retrieval. In the example given above, the retrieval of "cat" might facilitate the retrieval of "dog" because their semantic representations partly overlap both animals are pets, for example. Individuals also tend to switch to another subcategory (for example, from "pets" to "fish"). As such, good performers search mentally for subcategories, and then produce words within an identified subcategory as described above, namely, clustering process. Once in a subcategory they are not able to find other words, it is most efficient to quickly move to another subcategory or cluster. This process is referred to as semantic switching. It has been reported that both clustering and switching are an outcome of strategic searching and cognitive flexibility (Troyer et al., 1997).

Phonological fluency tasks

Phonological fluency tasks are explicit word-retrieval tasks requiring children to produce as many words as they can beginning with some letters in a 60-second period (Nash & Snowling, 2008). Importantly, the phonological fluency task measures two different aspects of access to phonological representations, namely, explicit access to phonological representations, as evidenced by the number of correct responses retrieved, and implicit access to phonological representations, as evidenced by the size of clusters produced. Namely, producing words starting with certain letters would suggest that one has representations of those words in which an initial phoneme is distinct, or segmented, from the rest of the word form (Nash & Snowling, 2008). Words are often produced in clusters of phonologically related words. For example, "flag-flower" is a phonological cluster since the two words share the initial two phonemes ("*fl*"). In the example given above, the retrieval of "flag" might facilitate the retrieval of "flower" because their phonological representations partly overlap. Theoretically, phonological clustering at the word

onset can be explained by the Cohort Model (Marslen-Wilson, 1984). According to the Cohort Model, an initial phoneme of a word (for example, 'f") is used to activate the set of all words in the lexicon that have the same initial phoneme (for example, "fun", "flag", "flower"). This set of words is called a "cohort" in the model. As more words are retrieved over the task period, words can be eliminated from the cohort due to new phonological information added. In phonological fluency tasks thereby, this results in phonological clustering (Luo et al., 2010). Further, given the limited time of the task period, once lexical retrieval within a cluster slows down, individuals tend to switch to another cluster (for example, from "flag-flower" to "free-friend"). Switching allows them a more rapid retrieval of lexical items from the mental lexicon. Both clustering and switching strategies show a strong positive correlation with the number of correct items retrieved in phonological fluency tasks (Kosmidis et al., 2004; Summaka et al., 2022).

Semantic and phonological fluency tasks: Same or different?

Do semantic and phonological fluency tasks measure the same or different cognitive processes? It is evident that word productivity in semantic categories is reliably greater than word productivity in phonological categories (Arán-Filippetti & Allegri, 2011; Hazin et al., 2016; Hurks et al., 2006, 2010; Kosmidis et al., 2004). Nevertheless, word productivity in both tasks is moderately or strongly correlated (in Ardila et al., 2006; Matute et al., 2004). Unsworth et al. (2011), for example, found that productivity in semantic and phonological fluency tasks was accounted for by a single factor, suggesting that the two tasks measure to a great extent the same cognitive processes, namely, lexical organization and lexical retrieval skills. Similarly, Vonberg et al. (2014) argued that even in a condition where individuals were asked to search words in the lexicon by using a phonological strategy, content and sound-related information interacted with each other, and therefore that the different aspects of lexical information cannot be retrieved independently from each other. The argument is that a semantic search is the default search strategy given how the lexicon is organized and that individuals cannot scan the mental lexicon only under the premise of phonological word features, leaving semantic information aside.

It has been suggested that the phonological condition predominantly taps grapho-phonemic processes, even though semantic processes are involved also in TD children aged 5-15 years old (John et al., 2016). The argument is based on the finding that in phonemic fluency tasks, task-discrepant clustering (defined as semantic clusters produced in the phonological condition, that is, words which shared phonological characteristics, but which were also related in meaning) was evident in less than 5% of the children in higher grades, namely, in those children who have been exposed to the orthographic system of their language and therefore developed their written language skills more compared to the children in their first grades. This suggests therefore that the findings from Vonberg et al.'s study (2014) might be better interpreted as evidence showing that even if semantics is involved in retrieving items in phonological conditions, this does not imply that phonological skills are not involved (see also Woods et al., 2016).

Evidence originating from deaf signers using the British Sign Language offered another important insight into whether semantic and phonological fluency tasks measure the same or

different cognitive processes. Marshall et al. (2014) reported that phonological fluency is particularly hard in deaf signers using the British Sign Language (see also Marshall et al., 2013). The researchers argued that since there is no orthography for sign languages, signers show reduced phonological awareness and fewer opportunities to engage in meta-phonological activities. Likewise, do Nascimento Marques et al. (2022) reported that phonological awareness was a predictor of performance in phonemic verbal fluency tasks, and lexical access speed was the best predictor of performance in semantic verbal fluency tasks. Among the executive function components, working memory was a predictor of performance in phonological fluency tasks and most categories in semantic fluency tasks. These results highlight the importance of phonological processing skills in children's performance on verbal fluency tasks and show similarities and differences in the contributions of various linguistic and executive skills to phonological and semantic verbal fluency tasks (do Nascimento Marques et al., 2022).

Effects of switching and clustering behaviour on semantic and phonological fluency performance

Both switching and clustering behaviour strongly associate with word productivity in semantic and phonological categories (Arán-Filippetti & Allegri, 2011; Kosmidis et al., 2004). Regarding to the semantic condition, Kosmidis et al. (2004), in a study with TD Greek adults, showed that the total number of responses correlated weakly with cluster size and strongly with the number of switches. This indicates that as the size of clusters and the number of switches increased, so did the total number of responses. Arán-Filippetti and Allegri's (2011) child study in a group of 8-11 years old children reported that the number of clusters explained 52% of the variance, the number of switches explained an additional 18%, and cluster size explained an additional 16%. In another child study, Resch et al. (2014) tested Dutch 4-6-year-old children using the semantic category of "animals". The researchers found that semantic fluency correlated with the number of switches, the number of clusters, and cluster size.

In terms of the phonological condition, Kosmidis et al.'s (2004) study with Greek adults showed that the total number of responses correlated moderately with cluster size and strongly with the number of switches. Arán-Filippetti and Allegri's (2011) child study reported that the number of switches explained 84% of the variance, the number of clusters explained an additional 10%, and cluster size explained an additional 6%. Hence, in adult and child studies alike, productivity in semantic and phonological fluency tasks is driven mainly by switching and the number of clusters retrieved, and to a lesser extent by the size of clusters.

Effects of age, gender, and level of intelligence on semantic and phonological fluency performance

In studies including the effect of age on semantic and phonological conditions, it has been found that the number of correct items increases significantly as older children are evaluated (Chami et al., 2018; Cohen et al., 1999; Hurks et al., 2010; Klenberg et al., 2001; Korkman et al., 2001; Nieto et al., 2008; Resch et al., 2014; Sauzéon et al., 2004). Further, Regard et al. (1982) showed that

the level of one's intelligence had a moderate effect on verbal fluency performance in TD children from Grades 5 to 7. Weak correlations have been reported between semantic fluency and verbal IQ and full-scale IQ (in Ardila et al., 2006). Resch et al. (2014) also reported a moderate association between a measure of non-verbal IQ and semantic fluency in 4-6-year-old children. Mixed effects of gender on verbal fluency performance have been reported: many studies have failed to find significant gender differences (Arán-Filippetti & Allegri, 2011; Barry et al., 2008; Hazin et al., 2016; Hurks et al., 2006, 2010), while others have reported a main effect of gender, with girls outperforming boys (Klenberg et al., 2001), or with boys outperforming girls using, for example, the category of "brands of cars" (Zarino et al., 2014). Gender differences might be related to the fact that males and females are more familiar with certain semantic categories. It appears that males produce more responses using the categories of "cars" and "tools" and females produce more responses using the category of "fruits", while no gender differences have been found for the category of "animals" used in another study (in Woods et al., 2016). Females also found to generate more words in the "clothes" and "household items" categories (Summaka et al., 2022).

Effects of oral and written language skills on semantic and phonological fluency performance

It has been reported that greater productivity in verbal fluency categories is associated with better performance on measures of vocabulary (Ardila et al., 2006; Henry et al., 2015; Marshall et al., 2018), and that semantic fluency is related to language measures, namely, naming, repetition, comprehension, and phonological fluency (in Ardila et al., 2006). Studies have also showed that greater productivity in semantic and phonological fluency tasks is also associated with better performance on language measures assessing a child's ability to define words and identify similarities across sets of words, as reported by Henry et al. (2015) who assessed English children with DLD and their TD peers. Henry et al. (2015) found that better oral language supports performance in earlier parts in the semantic fluency task (the first 15 seconds of the task), when items are more readily available, but ceases to be important during the more effortful searching required in later parts of the task (the rest 45 seconds of the task); however, better oral language supports performance both in earlier and later parts in the phonological fluency task.

The finding in which oral language was a stronger predictor of phonological than semantic fluency in Henry et al.'s (2015) study is not consistent with Luo et al.'s (2010) study, however, which revealed that oral language is a more important predictor of semantic than phonological fluency performance. The authors hold that more integrated semantic knowledge was needed for the semantic task and because oral language was relevant throughout the semantic fluency task. Whiteside et al. (2016) found that both semantic and phonological fluency tasks loaded onto a language factor, with the researchers arguing that language processing is of critical importance for both verbal fluency conditions.

Written language skills have also been found to play a role in verbal fluency performance. Indirect evidence for the effect of written skills on verbal fluency performance originates from the study of Riva et al. (2000) who tested children aged 5-11 years. An important finding of their study was that verbal fluency performance increased linearly from first to fifth grade, with the most

significant increase observed between first and second graders. The authors argued that this is because at that time formal teaching begins, and children begin to know the components of language. Riva et al. (2000) therefore proposed an association between the development of the ability to organize and retrieve words according to phonological categories and reading skills. To the best of the authors' knowledge, only one published study directly showed that in phonological conditions, the effect of reading ability was significant (Landerl et al., 2009).

In terms of the proposed theories, Nation (2017) suggests that there is a close relationship between reading and semantics in that semantic representations also affect word reading skills as any word has a phonological form, an orthographic form, but also a meaning. According to the *Lexical Legacy Hypothesis* (Nation, 2017), the development of word reading is achieved via the experience of words in diverse and meaningful language environments: because reading experience allows a reader to read words in different semantic contexts, it leads to a rich and nuanced database about a word and its connections to other words. This hypothesis therefore states that word knowledge is based on lexical co-occurrence in the sense that a word is known as it is related in meaning with other words.

Perfetti (2007) proposed the *Lexical Quality Hypothesis* claiming that variations in the quality of word representations have consequences for reading ability. High lexical quality includes well-specified and partly redundant representations of form (orthography and phonology) and flexible representations of meaning, allowing for rapid and reliable meaning retrieval. The *Lexical Quality Hypothesis* states that "a lexical representation has high quality to the extent that it has a fully specified orthographic representation (a spelling) and redundant phonological representations (one from spoken language and one recoverable from orthographic-to-phonological mappings)" (Perfetti & Hart, 2001, p. 68). Lexical quality therefore concerns the knowledge of the form and the meaning of the word and leads to rapid processing (Perfetti & Hart, 2001). The origin of high-quality representations may therefore be sought in the amount of experience with both oral and written language. Concomitantly, this suggests a relation between children's lexical-semantic representations and their oral and written language skills, and a valid index of lexical quality is performance on semantic and phonological fluency tasks. In support of the *Lexical Quality Hypothesis*, Dyson et al.'s (2017) intervention study suggested that it is through access to the meaning of the word after pronouncing the word correctly that improves children's ability to learn to read.

With respect to written skills, it has been reported that spelling draws heavily on phonological representations, and the fact that spelling predicted phonological fluency reflects the well-known association between written skills and the quality of phonological representations. However, the spelling task predicted semantic fluency which implies an association between written skills and the quality of semantic representations. This finding is consistent with Nation's (2017) argument that there is a close relationship between reading and semantics in that semantic representations (in addition to orthographic representations) affect word reading skills as any word has a phonological and an orthographic form, but also a meaning. Evidence from intervention

studies also supports the view that oral language skills, and specifically semantics, plays a significant role in reading ability. For example, Best (2005) reported that children with word-finding difficulties can improve their naming skills after an intervention focused on strengthening links from meaning to form.

Semantic and phonological fluency performance in dyslexia and developmental language disorder

Findings for children with DD are mixed. Some studies have reported that children with DD perform poorly both on semantic and phonological fluency. There is another line of evidence showing that children with DD perform poorly on semantic fluency but similarly to controls on phonological fluency. Levin's (1990) early study assessed children with DD aged 9.5 years old using the categories of "proper names", "foods", and "words beginning with the letter *F*". Significant differences were found between children with DD and TD children in all three categories. Levin also reported that in phonological fluency, children with DD showed more out-of-category responses compared to TD children. Similar findings for poorer semantic and phonological fluency performance in children with DD compared to controls have been reported by studies assessing children in languages other than English (Moura et al., 2015; Plaza et al., 2002; Reiter et al., 2005; Varvara et al., 2014).

Frith et al. (1995) measured the time it took 12-year-old children with DD and their age-matched TD peers to produce ten exemplars from the semantic category of "animals" and ten exemplars from the phonological category of the sound /S/. They found a non-significant difference between the two groups in the time in which ten exemplars from the semantic category of "animals" were produced, but a significant difference between the two groups in the phonological condition, with the children with DD requiring longer to retrieve ten words. Further, with respect to phonological fluency, the researchers showed that one can rely on orthographic representations, in addition to phonological representations, when retrieving words from the lexicon. Indeed, the spelling of the sound /S/ is S or C, and 11 out of 19 children with DD produced words beginning with C compared to 6 out of 19 controls.

According to the researchers, this finding might suggest that the two groups utilize different strategies. Frith et al. (1995) were the first researchers who explored performance in children with DD at a finer-grained level than just recording the number of responses produced in semantic and phonological conditions. The researchers asked children to produce items in three successive trials for each condition and measured the number of new words produced on these three trials. Children with DD and TD children did not differ in the number of new words produced on trials 2 to 4 of either the semantic or the phonological condition. The researchers estimated a word pool size for each condition reflecting the number of total words from which the children could retrieve words to tease apart if group differences on phonological fluency performance could be accounted for by a smaller number of words from which children could retrieve words or by lexical difficulties. Even though TD children showed a larger estimated word pool size in the phonological condition

than children with DD, this difference was not significant. Frith et al. (1995) therefore argued that children with DD had a similar sized lexicon compared to TD children, and that group differences in phonological fluency could be accounted for by a difficulty that children with DD had in accessing these words by their initial phoneme. Further, the finding that children with DD did not differ from TD children in semantic fluency but differed in phonological fluency could be interpreted as revealing that lexical difficulties in children with DD might originate from a phonological processing or phonological representational deficit rather than a semantic processing or semantic representational deficit. Other studies have also reported significant group differences between children with DD and TD controls on phonological fluency, but non-significant group differences on semantic fluency in languages other than English (Brosnan et al., 2002; Landerl et al., 2009; Marzocchi et al., 2008).

In the absence of a reading age-matched control group, however, it cannot be adjudicated whether DD children's poor performance in phonological fluency tasks is a consequence rather than a cause of poor reading. To this end, Frith et al. (1995) tested a group of highly educated and well-compensated adults with dyslexia, and they found that there was a significant group by task interaction: adults with dyslexia differed from controls only in phonological fluency but not in semantic fluency. Frith et al. (1995) argued that these results suggest that for this group of highly educated and well-compensated adults with dyslexia, group differences in phonological conditions are not consequential of their poorer reading experience but are attributable instead to an underlying impaired phonological system in dyslexia. Smith-Spark et al. (2017) tested university students with DD and TD controls in semantic and phonological fluency to investigate whether DD can account for any group differences in the two verbal fluency conditions. Consistent with the findings of Frith et al. (1995), they found that after controlling for IQ, adults with dyslexia performed significantly more poorly on phonological fluency, but non-significant group differences were found on semantic fluency. However, Hall et al. (2017) tested a group of adults with dyslexia and/or DLD and reported poorer overall semantic fluency than TD controls. Overall, it is evident that mixed findings have been reported for children and adults with DD.

Studies which have assessed English-speaking children with DLD on semantic and phonological fluency tasks are consistent in terms of finding group differences, which contrasts with the previous section on DD, where the findings are much more mixed. Children with DLD show significantly poorer semantic and phonological fluency performance than TD children. Recently, Ralli et al. (2021a) assessed Greek-speaking children with DLD aged 8-9 years on verbal fluency. The results showed that children with DLD were outperformed by their TD peers in the verbal fluency measures. Weckerly et al. (2001) also found that children with DLD produced significantly fewer correct responses in semantic categories compared to TD children. Henry et al. (2012) assessed children with DLD aged 8 years 1 month-14 years 1 month of low language functioning and controls aged 6 years 0 months-14 years 8 months. They reported that after controlling for age, non-verbal and verbal IQ, 39% of the variance in semantic and phonological

fluency scores was significantly accounted for by the dummy-coded group variable of "DLD vs typical group" (see also Henry et al., 2015 for similar findings).

Design fluency performance in children and adults with dyslexia and developmental language disorder

Tests of design (non-verbal) fluency assess an individual's ability to generate geometric patterns and are argued to measure visuospatial executive functions under time constraints and restricted design conditions. Another issue is the specificity of the fluency deficit to verbal material in DD and DLD. For example, Protopapas (2014) argues that to establish the viability of any phonological hypothesis, one has to ensure that statistically poorer performance on tasks requiring phonological processing is accompanied by normal performance on similarly structured tasks that do not involve phonological processing. It is therefore a similarly structured task to semantic and phonological fluency tasks without requiring, however, phonological, or semantic representations, and phonological or semantic processing skills.

In terms of phonological hypotheses, this is because hypotheses advocate a 'modular' deficit within the language system which affects the phonological domain, whilst the non-verbal domain is unaffected. However, given that empirical evidence shows that children with DD and DLD demonstrate deficits not related only to the effective functioning of the phonological system (Gooch et al., 2014; Henry et al., 2012; Henry & Botting, 2017; Varvara et al., 2014). Moreover, as Messer and Dockrell (2006) have argued, in the context of children with word-finding difficulties, lexical-retrieval difficulties can be potentially caused by impairments in processing speed, amongst other proposed causes. The hypothesis is that if there is a slower processing speed in children with DD and/or DLD accounting for poorer semantic and phonological fluency performance, poorer design fluency performance would be also found in the DD and/or DLD group; however, if only verbal processing difficulties were to underlie poorer semantic and phonological fluency performance in children with DD and/or DLD, the two groups would show similar design fluency performance.

Existing literature on design fluency in children with DD is limited, and inconsistent findings have been reported, with one study reporting that the DD group generated significantly fewer correct designs than the TD group (Griffiths, 1991), and another study reporting no group difference (Reiter et al., 2005). To our knowledge, only one published study used design fluency in children with DLD and showed that the DLD group generated significantly fewer correct designs compared to the TD group (Henry et al., 2012). Recently, Smith-Spark et al. (2017) tested university students with dyslexia using a design switching task, in which participants were asked to switch alternately between empty and filled dots in each design. They reported that, after controlling for IQ, adults with dyslexia did not differ from controls on design fluency. The researchers argued that given that the two groups of participants did not differ on executive functions, as measured with the design fluency task, phonological fluency deficits found in adults with dyslexia could not be attributed to difficulties with executive functions but rather to

phonological processing problems in dyslexia. There are no design fluency data originating from Greek children with DD and DLD. From the review so far, it is evident that inconsistent findings have been reported in relation to design fluency performance in children and adults with dyslexia or DLD compared to controls.

Orthographic features of the Greek orthography and current research findings

Reading acquisition is easier in consistent than in less consistent orthographies (Borleffs et al., 2019). The Greek language has a shallow orthography characterized by consistent grapheme-to-phoneme mappings (Seymour et al., 2003), estimated to be 95% consistent for reading and 80% consistent for spelling (Protopapas & Vlahou, 2009). Considering this high level of orthographic consistency, it is not surprising that reading difficulties are evident primarily in poor reading fluency rather than poor reading accuracy (Nikolopoulos et al., 2003). Poor reading fluency in turn is associated with poor performance on phonological awareness and rapid automatic naming tasks (Nikolopoulos et al., 2006; Protopapas et al., 2013a, b). Having said that, reading accuracy difficulties are evident in children with DD even in Grade 7 (Protopapas & Skaloumbakas, 2007; Protopapas et al., 2008; Protopapas et al., 2012).

Although there are only limited studies investigating children with DD and DLD learning to read and spell in the Greek orthographic system, Greek-speaking children with DLD have been reported to show a similar profile to English-speaking children with DLD. For example, Greek-speaking children with DLD show a difficulty acquiring subject-verb agreement and grammatical morphemes (Stavrakaki, 2005), a difficulty with relative clauses and *wh*-questions (Stavrakaki, 2001; Stavrakaki et al., 2011), and perform poorly relative to children with DD and their TD peers on tasks measuring listening and reading comprehension skills (Talli et al., 2015). With respect to phonological skills in DLD, children with DLD aged 8-12 years are reported to show poorer phonological short-term, working, and long-term memory skills relative to their TD peers (Spanoudis & Natsopoulos, 2011). However, there is also evidence that relatively easy tasks for assessing phonological awareness, such as phoneme segmentation and phoneme deletion tasks, show ceiling effects by the end of Grade 1, and are not therefore able to reveal children's phonological difficulties (Papadopoulos et al., 2009; Papadopoulos et al., 2012). More demanding phoneme deletion tasks, when stimuli comprise polysyllabic nonwords with consonant clusters, can reveal group differences in 3rd and 4th graders (Protopapas et al., 2008), and in children with DD through secondary education (Anastasiou & Protopapas, 2015; Protopapas & Skaloumbakas, 2007).

Evidence from Greek-speaking children with dyslexia and developmental language disorder and limitations of studies

In the Greek language, the recent studies of Mengisidou et al. (2019, 2020) showed that children with DD and/or DLD showed poorer semantic and phonological fluency performance relative to their TD peers even after design fluency performance was controlled, demonstrating the specificity

of their verbal fluency deficit. The studies also showed that children's oral and written language skills predicted semantic and phonological fluency performance suggesting that poorer semantic and phonological fluency performance in children with DD and/or DLD is partly related to their inferior oral and written language skills (Mengisidou & Marshall, 2019; Mengisidou et al., 2020). Participants were 66 Greek-speaking children with DD and/or DLD, and 83 TD children, all monolingual Greek speakers. The DD and/or DLD group had a mean age of 9.51 years, and the TD group had a mean age of 8.37 years. Specifically, findings showed that in the overall sample, after controlling for age in months and non-verbal IQ, 6 and 8.8%, respectively, of the variance in semantic and phonological fluency was accounted for by the Written and Language variable. Further, as expected, clustering and switching were correlated with word productivity both in children with TD and children with DD and/or DLD, showing that the semantic lexicon is organized in a similar way in the three groups of children. The finding that the semantic lexicon was organized in a similar way in the three groups of children was also evident by the fact that a similar size of clusters of words was found among all three groups of children.

Recent results in the Greek language showed that the lack of verbal fluency in children with DD and/or DLD, is limited to semantics and phonology of language, as no differences were seen between children with TD and children with DD and/or DLD in the design fluency task. Together, the results demonstrate that after the effects of age and design fluency performance were controlled, children with DD and/or DLD still show lexical retrieval difficulties in semantic and phonological fluency tasks, arguing for the specificity of the verbal fluency deficit in children with DD and/or DLD. As such, verbal fluency difficulties and not general speed processing difficulties which might have resulted in poorer semantic and phonological fluency performance account for DD and/or DLD children's poorer verbal fluency performance. The pattern was different when analyses by subgroup were carried out, however. Analyses by subgroup revealed that children's oral and written language skills uniquely and significantly predicted semantic and phonological fluency performance in the DD and/or DLD group, but not in the TD group.

As Lenio et al. (2016) argued, poorer verbal fluency performance is not deterministic to its cause but rather multifactorial. Therefore, for both verbal fluency categories, slower retrieval processes originating from deficient access to (intact) semantic and phonological representations, in addition to difficulties with executive functions and inferior language and written skills, influence verbal fluency performance in Greek-speaking children with DD and/or DLD (Mengisidou & Marshall, 2019; Mengisidou et al., 2020). In the study of Mengisidou and Marshall (2019), the two groups of Greek-speaking children (TD children and DD and/or DLD children) showed a similar design fluency performance, and since the design fluency task was used as a measure of children's executive functions, this finding might be interpreted as evidence that poorer semantic and phonological fluency performance cannot be attributed to difficulties with executive functions in the DD and/or DLD group. However, another measure of executive functions, namely, switching, suggested difficulties with executive functions in the phonological condition in the DD and/or DLD group compared to the TD group as the former group switched significantly fewer times in this task than the latter group.

Smith-Spark et al. (2017) argued that executive function demands should be equal in semantic, phonological and design fluency tasks for one to reach firm conclusions about any possible effects of executive functions on fluency tasks. Following Smith-Spark et al.'s (2017) argument, this can be acknowledged as a limitation of the study of Mengisidou and Marshall (2019), since the effect of executive functions cannot be separated from the effect of difficulties with phonological processing skills. Further, in the study of Mengisidou et al. (2020), lexical-semantic representations were found to be intact in children with DD and/or DLD using semantic fluency tasks.

Further investigation is, however, needed to shed light on the underlying causes of slow retrieval processes in children with DD and DLD, by using other tasks too (see, for example, the study of Sheng and McGregor, 2010 in which an association task was used in children with DLD and TD). As such, even though in the study of Mengisidou et al. (2020) the two groups did not differ on the organization of the semantic network using semantic fluency tasks, group differences might have been evident if another task assessing semantic organization of the lexicon had been used. Indeed, Smith-Spark et al. (2017) interpreted poorer phonological than semantic fluency performance in adults with dyslexia as follows. They argued that worse phonological than semantic fluency performance could be related to the fact that phonological fluency tasks place higher demands upon executive functions than semantic fluency tasks. As such, not difficulties with phonological processing skills but increased executive function demands might result in poorer phonological than semantic fluency performance. Their claim that phonological fluency placed higher demands upon executive functions than semantic fluency was supported, according to the researchers, by the finding that individuals' IQ score was a stronger predictor of phonological than semantic fluency performance. This finding was consistent with the view that phonological fluency tasks reflect cognitive complexity to a greater extent than semantic fluency tasks, as was previously reported by Ardila et al. (2006). Shao et al. (2014) also argue that phonological fluency is affected by one's executive function skills, whereas semantic fluency is affected by one's verbal skills.

Directions for interventions

This section discusses future directions for intervention studies for children with DD and/or DLD based on current research findings concerning deficient lexical skills. In their language intervention, McGregor et al. (2021) examined a small sample of children with DLD during their preschool years, from four to six years of age. The language intervention focused on strengthening their poor vocabulary and grammar skills in courses at school with scientific terms. Teaching some very useful words used in the classroom for the science course to children with DLD is potentially of high importance, as well as to apply this in different contexts. As such, the children can access the daily school programme, with this being important because children with DLD in their school

years have difficulty even with monosyllabic words used in teaching science (McGregor et al., 2021).

McGregor et al. (2021) reported that some of the children responded very well, and some had poor results regarding the intervention they received. They mentioned that as all the preschool children examined had DLD, those who did not respond well to the intervention had other problems besides DLD. The researchers mentioned problems of poverty (i.e., the children lived in families with a low socio-economic background), and that they had additional difficulties with their executive functions (they reported, for example, inferior attention skills). Aside from strengthening children's oral language skills, intervention studies which aim to develop disordered children's lexical skills should also focus on children's executive functions. McGregor et al. (2021) reported that over time, the children become more familiar both with those language skills required by school courses using scientific courses and that their executive functions have been developed more with age too. McGregor et al. (2021) gave a positive message to clinicians as follows. Even those children who respond moderately or fail to respond to intervention, they do learn, but they learn much more slowly compared to children who respond positively to intervention. Further, they stressed the point that it is the individualized and differentiated intervention for the unique needs of each child that can produce the desired results of a language intervention (McGregor et al., 2021).

Regarding the role of early executive function skills in children with DLD on later language performance at school, Sack et al. (2021) investigated whether early language, speech, and movement performance in preschool children with DLD can predict their language performance when the children enter school. To this end, the researchers examined children's grammatical structure skills, phonological skills (as measured with a single articulation task) and gross motor skills. The dependent variable was the standardized scores on a language assessment three years later (when the children were 6-7 years old) after the first assessment. Fourteen TD children and 12 children with DLD were examined. Researchers found that in preschool children with DLD, it was their scores on the gross motor test that predicted whether those children would still exhibit DLD two years later. In early childhood settings, neither DLD children's performance on language tests nor DLD children's performance on the phonology test used could predict their persistent language impairment two years later.

In contrast, for the TD preschool children, only the standardized scores on language tests predicted their language performance three years later, while these children were in their early school years. This, however, was a small-scale longitudinal study in that the findings of the study should be replicated. However, if motor skills do predict a child's later language performance in the early school years, then, this is an important finding because it is much easier to see a child's motor deficits than their language deficits which are more hidden.

Children will be therefore helped in the sense that they will be able to receive an early intervention. Researchers also reported and commented on the finding that DLD children's early articulation skills did not predict their language performance in the early school years. They argue that this is a somewhat surprising finding because around 80% of children with DLD also have a

speech sound disorder, as reported in the literature. The limitation of the study was that they examined a speech sound disorder by using a single task, with the researchers arguing that using a more complex task might be able to show a longitudinal relationship between early difficulties with speech sounds in children with DLD and their later language skills in their early school years (namely, around the 8 years of age).

Having separate groups of children, namely, children with DD-only and children with DLD-only, is also important. Adlof et al. (2021) argue that past research has showed that both children with DD and children with DLD have difficulties with vocabulary. For children with DD, these difficulties are less compared to children with DLD, however, word learning is another difficulty for both groups of children. Adlof et al. (2021) studied word learning in children with DLD-only, in children with DD-only, and in a third group, in children who had both DLD and DD at the same time, with this being the first published research to follow these three groups of children separately in the domain of word learning. Participating children attended the second grade of primary school. The children were categorized based on a test measuring word reading and another one measuring language comprehension. A computer-based test to teach children to learn new objects (8 new objects) and their names was used. The test showed the children the picture of the new object, in addition to their name, and some characteristics associated with these new objects. Then, the children were asked to give the definition of the word and then to find the object among a series of pictures shown to them (namely, children had to hear the name of the object and choose the correct picture among a series of pictures). This training procedure was repeated three times, with the researchers changing the order of the presentation in the repetitions. As such, the children heard the name of each object 24 times and practiced saying the name and finding it on the page with the pictures, as such, this was repeated three times for each object. The findings showed that the children with DLD were at the same level as the TD children in all tests except the one asking children to tell everything they know about this object (referred to as the Describing task). This suggests that children with DLD were able to recall significantly fewer features of the novel object compared to TD children. In contrast, children with DD-only differed significantly compared to TD children on all five tests measuring novel object learning (the teaching script included multiple exposures to the phonological form, the pictured object, a verbal semantic description of the object, spaced retrieval practice opportunities). Word learning was assessed immediately after instruction with tasks requiring recall or recognition of the phonological and semantic information). Children with DLD-only showed significant better performance compared to children with DLD and DD in three out of the five tests of word learning. Also, children with DD-only did not differ significantly compared to the other two groups of children (children with DLD-only and children with both DLD and DD) on any of the five tests of word learning. One important aspect of their research, however, is to look at whether learning new words is maintained and for how long after training (Adlof et al., 2021). Adlof et al. (2021) also mentioned that learning words in a laboratory setting is completely different from learning words in the real world.

In their recent study, Ebbels et al. (2022) assessed young adults with (D)LD aged 16 -19 years 9 months who received a nine-week tailored intervention targeting subject-specific vocabulary (nouns, verbs, and adjectives), using word maps to focus on the forms of words, definitions, morphologically related words, and syntactic knowledge such as word categories and how to use the word in a sentence. An online learning tool provided practice in retrieving the words and their definitions that had been taught. Individuals showed significant progress in learning subject-specific vocabulary from attending the lessons. However, they made significantly more progress on those words taught in the individual sessions, parallel to the vocabulary intervention, with a speech and language therapist, regardless of word category (i.e., nouns, verbs, and adjectives). Namely, researchers aimed to compare progress with explicit vocabulary intervention plus in-course teaching versus in-course teaching alone in a group of young adults with (D)LD. This progress was maintained for 14 weeks. Ebbels et al. (2022) argued that direct, individual (one-to-one) vocabulary intervention with a speech and language therapist can lead to significantly greater gains in the acquisition of targeted vocabulary for a specific lesson for young adults with (D)LD compared to teaching vocabulary available in specific lessons. Therefore, individual intervention provided by speech and language therapists should be offered to this age group of students with (D)LD to maximize their ability to access their academic curriculum and their future career. Indeed, the wider role of speech and language therapists in helping these young adults access the world of work and an independent life should be further explored and supported. A limitation of the intervention study of Ebbels et al. (2022) was that there was not a control group, namely, a group of participating young adults without (D)LD.

However, the effects of direct instruction versus indirect exposure on multiple aspects of novel word learning for children with DLD and their TD peers was also demonstrated by the intervention study of Pomper et al. (2022) in children aged 6-8 years old. Children were randomly assigned to be exposed to novel words and their unfamiliar referents via either direct instruction (each referent presented in isolation with an explicit goal of learning) or indirect exposure (multiple referents presented with the goal of answering yes/no questions). Researchers found that in alternative forced-choice measures of recognition, children with DLD were less accurate than their TD peers in linking words to referents, encoding semantic categories for words, and encoding detailed representations of word forms. These differences in word learning were accounted for by a constellation of cognitive measures, including receptive vocabulary, phonological memory, visuospatial memory, and sustained attention. Benefits from direct instruction were observed for children with DLD in link and semantic, but not word form, learning. The researchers concluded that vocabulary interventions with direct instruction can help children with DLD learn some, but not all, aspects of novel words.

In the Greek language, which uses a morphologically rich orthographic system, Tsesmeli and Kariotaki (2020) evaluated the effect of the training of morphological awareness to spelling and meaning of words by students of third grade of a primary school, who were divided into an intervention and a control group. The intervention was carried out in the school classroom via a board game and included a pre-test, an educational program, and a post-test. The experimental

material comprised compound words categorized into two conditions in terms of their meaning (concrete/abstract). The results showed that the systematic exercise of the morphological structure of words improved considerably students' spelling and meaning of compounds, with higher gains in spelling than in meaning. The intervention group had equal gains in spelling concrete and abstract words, while their gains in the meaning of concrete words were larger than that of abstract words. These findings underline the importance of morphological awareness in the acquisition of spelling and meaning of compound words by students in the school classroom.

The role of language in children's psychosocial competence is fundamental, as it contributes to the emotional and behavioural self-regulation as well as to the interpersonal relationships. Recent findings in the Greek language showed statistically significant correlations between the language performance and the psychosocial skills in children with DLD (Ralli et al., 2022). The study explored for the first time in Greece, the views of 122 Greek Kindergarten Teachers (KTs) and Primary School Teachers (PSTs) about DLD. Both groups of professionals reported that children with DLD had many vocabulary and syntactic difficulties in the receptive language. In the expressive language KTs identified more articulation and phonological difficulties, while PSTs referred mainly to vocabulary and grammatical difficulties. Many professionals mentioned additional difficulties such as emotional and behavioural problems. Furthermore, the educators mentioned that it is difficult for them to identify and support a child with DLD while, at the same time, they acknowledged the need to collaborate with other professionals to meet children's needs (Ralli et al., 2022).

Davies et al. (2022) also stressed the point that despite the importance of adjectives, speech and language therapists (SLTs) and other professionals supporting language development rarely receive specific training regarding their structure and meanings, and how to teach and support their use. Davies et al. (2022) provided an accessible primer on the many subtypes of adjectives and how these behave syntactically and semantically. They also explored how adjective teaching could be enhanced for children with DLD by adapting an established metalinguistic technique that provides practical recommendations for implementing this approach.

Senter et al. (2022) reviewed the research and guidance for school-based speech-language pathologists (SLPs) who provide intervention to children with developmental executive function deficits, particularly those children with co-occurring developmental language disorder (DLD). A small body of research explored the efficacy of SLPs' intervention for children with co-occurring DLD and executive function deficits, generally finding modest but inconsistent effects of cognitive interventions and strategy training to improve language outcomes. Meanwhile, non-empirical articles (e.g., tutorials) offer guidance to SLPs to support students with executive function deficits through direct and indirect services. A growing body of literature equips SLPs with the principles and strategies of executive function intervention. Few empirical studies measure the efficacy of these interventions for children with co-occurring DLD.

General conclusions

The objective of this study was, first, to discuss variables involved while children with developmental dyslexia (DD) and developmental language disorder (DLD) are asked to access and retrieve words from the mental lexicon, in addition to executive function skills. Access and retrieval to the mental lexicon as assessed by using verbal fluency tasks, and executive function skills are assessed by using design fluency tasks. Its second objective was to present future directions for appropriate interventions considering word learning in children with DD and/or DLD.

Studies showed that clustering and switching behaviours are associated with productivity in the DD, DLD, and TD groups, revealing that the semantic lexicon is organized in a similar way in the three groups of children. Given that in most of the studies a similarly sized average cluster is found among the three groups of children, we conclude that the findings indicate that slower retrieval processes of lexical items from the mental lexicon and not a poorer semantic structure of the lexicon result in poorer semantic and phonological fluency performance in children with DD and/or DLD relative to their TD peers. In the Greek language, recent research findings showed that part of the variance of poor performance on verbal fluency tasks was accounted for by poorer oral and written language skills in children with DD and/or DLD compared to their TD peers. We also concluded that lexical retrieval difficulties experienced by children with DD and/or DLD in semantic and phonological fluency tasks are better explained by the specificity of the verbal fluency deficit as assessed with a design fluency task in children with DD and/or DLD. As such, verbal fluency difficulties, and not general speed processing difficulties which might have resulted in poorer semantic and phonological fluency performance, account for DD and/or DLD children's poorer verbal fluency performance.

Overall, even though just verbal fluency tasks are not a comprehensive assessment of a child's lexical skills, this study suggests that verbal fluency tasks can be used as they are fast, reliable, and easy in their administration to assess children with DD and/or DLD. Children with poorer verbal fluency performance compared to their TD peers should be identified to be assessed extensively for them to receive a proper diagnosis (Vaucheret Paz et al., 2020).

In the Greek language, the need for a comprehensive language assessment tool for preschool and early school years children which could form the basis for valid and reliable screening and diagnostic decisions, led to the development of a new norm-referenced digital tool called Logometro®. Logometro® evaluates an array of oral language skills across the different language domains such as phonological awareness, listening comprehension, vocabulary knowledge (receptive and expressive), narrative speech, morphological awareness, pragmatics, as well as emergent literacy skills (letter sound knowledge and invented writing) in Greek-speaking 4-7 years old children. Logometro® is characterized by good psychometric properties and can constitute a norm-referenced battery of oral language and emergent literacy skills. It could be used to inform the professionals as well as the researchers about a child's language strengths and

weaknesses and form the basis on which they can design an appropriate individualized intervention if needed (Antoniou et al., 2022).

In sum, regarding the trends in the intervention research mentioned in the previous section, first, aside from strengthening children's oral language skills, intervention studies which aim to develop disordered children's lexical skills should also focus on children's executive function skills (McGregor et al., 2021). Further, McGregor and her colleagues (2021) stressed the point that it is the individualized and differentiated intervention for the unique needs of each child that can produce the desired results of a language intervention. Ebbels and her colleagues (2022) also stressed that individual intervention provided by speech and language therapists maximized (D)LD children's ability to access their academic curriculum and their future career. The wider role of speech and language therapists in helping young adults access the world of work and an independent life should be further explored and supported (Ebbels et al., 2022). Having separate groups of children, namely, children with DD-only and children with DLD-only, is also important. Adlof et al. (2021) argue that one important aspect of their research was to look at whether learning new words is maintained and for how long after training. Adlof and her colleagues (2021) also mentioned that learning words in a laboratory setting is completely different from learning words in the real world. The role of language in children's psychosocial competence is fundamental, as it contributes to the emotional and behavioural self-regulation as well as to the interpersonal relationships. For example, recent findings in the Greek language showed statistically significant correlations between the language performance and the psychosocial skills in children with DLD (Ralli et al., 2022). Many professionals mentioned additional difficulties for the children with DLD, such as emotional and behavioural problems. The educators also mentioned that it is difficult for them to identify and support a child with DLD while, at the same time they acknowledged the need to collaborate with other professionals to meet DLD children's needs (Ralli et al., 2022).

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