Erschienen in: BABATSOULI, Elena, Hrsg.. Multilingual acquisition and learning : an ecosystemic view to diversity. Amsterdam: John Benjamins Publishing Company, 2024, S. 90-115. Studies in bilingualism. 67. ISBN 978-90-272-1469-0
https://doi.org/10.1075/sibil.67.03ven

How does dyslexia impact second language acquisition?

Insights from a questionnaire study with Italian and German learners of L2 English

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This study compares the self-perception of first (L1) and second (L2) language competence and dyslexia awareness in two groups of dyslexic students, one German and one Italian, learning English as a second language. Based on a survey, we investigate the relationship between students' self-perception of their L1 and L2 competence, and how perceived L1 competence, L2 learning motivation, time of dyslexia diagnosis, and typological similarity between L1 and L2 modulate their perceived L2 competence. The findings indicate that L1 and L2 self-perception are interdependent, and that high motivation for language learning predicts better self-perception of L2 competence. Differences emerged between the two groups' perceived L2 competence and motivation for language learning. Moreover, while students themselves are aware of the implications associated with dyslexia, they perceive a lack thereof amongst their teachers and peers, leading to negative emotions, such as shame, lack of self-esteem, and motivation to engage in foreign language learning.

Keywords: dyslexia, second language acquisition, affective factors, self-perception of language competence

1. Introduction

Dyslexia is a genetic neurodevelopmental disorder that affects an individual's ability to read and write, despite adequate educational opportunities and average or above-average intelligence (Lyon et al., 2003, p. 2). The symptoms of dyslexia range on a continuum from mild to severe (Wagner et al., 2020, p. 356), and dyslexia is often diagnosed along with comorbidities such as dyscalculia, anorthography, or more severe language-related disorders that may affect language comprehension

and production (Vender et al., 2021). Dyslexia is chronic, but its symptoms may vary over the lifespan depending on the time of diagnosis, intervention activities, education opportunities, and compensation strategies (Nijakowska, 2010).

It is beyond the scope of this paper to review models that aim at explaining the causes of developmental dyslexia. Yet we wish to point out that there is currently no generally accepted model that explains this impairment (Cappelli, 2021). This is likely due to a combination of factors, including variation in reading outcomes across different languages and the potential presence of diverse cognitive impairments within the same individual (e.g., phonological impairment, visuospatial impairment, impaired visual attention skills, and rapid automatic naming abilities). A great number of studies across different languages have demonstrated that developmental dyslexia is primarily caused by phonological deficits, giving rise to the Phonological Deficit Hypothesis (Ramus et al., 2003, 2013; Snowling, 1987; Szenkovits & Ramus, 2005; Vellutino, 2004). Individuals with dyslexia are particularly challenged by tasks that require the manipulation of phonological units at different levels of phonological representation (i.e., phonemes, syllables, and rhymes), such as removing a single sound of a given word (phoneme deletion task) or switching the first sounds of two words (spoonerism task). This shows that dyslexic individuals have weaker phonological representations and impaired storage and retrieval of speech sounds. The relationship between phonological skills and reading outcomes may, however, vary depending on the specific orthographic features of a language, i.e., whether the language is alphabetic or logographic, and on its level of orthographic depth (Cappelli, 2021; Chung et al., 2010; Ho & Fong, 2005; Katz & Frost, 1992; Ziegler & Goswami, 2005). According to recent proposals, multiple cognitive deficits may contribute jointly to the reading and spelling difficulties experienced by individuals with dyslexia (e.g., Perry et al., 2019; Ziegler et al., 2020), although the importance of phonological processing continues to be a crucial component of any model.

The orthographic depth of a language explains cross-linguistic differences in the rate at which children learn how to read (Katz & Frost, 1992; Ziegler & Goswami, 2005). Languages with transparent orthographies (e.g., Italian, Finnish, Spanish) have consistent grapheme-to-phoneme (GP) conversion rules, where one grapheme often corresponds to one specific phoneme, with a few exceptions. Languages like English or French have more inconsistent GP conversion rules and the correspondences between graphemes and phonemes are not 1:1. For example, the graphemes <ea> are read differently in *hear* /hɪə(ɹ)/ and *bear* /bɛə(ɹ)/. Children learning to read languages with opaque orthographies generally struggle more with reading accuracy compared to those learning languages with transparent orthographies (Vender et al., 2021, p. 7). This difference is even more pronounced in dyslexic children, as the complexities of opaque orthographies may

exacerbate their difficulties and make their symptoms more pronounced compared to children learning transparent orthographies (Ziegler & Goswami, 2005). For example, English children with dyslexia show impaired reading accuracy and speed compared to their typically developing peers, while for Italians the impairment primarily affects reading speed (Brizzolara et al., 2006; Serrano & Defior, 2008; Tressoldi et al., 2001). Given these crosslinguistic differences, our study compares Italian and German learners of L2 English to explore the potential influence of orthographic transparency in the L1 onto L2 learning. Both Italian and German are considered transparent languages, although the degree of transparency arguably differs (Italian being more transparent). A cross-linguistic comparison is also interesting because German is typologically closer to English than Italian.[1]

Not only does dyslexia affect an individual's linguistic abilities but also various affective factors, such as motivation for language learning, self-esteem, and self-perception. Dyslexia symptoms typically become evident during formal education and social activities where proficient reading and writing skills are essential. Especially in cultures that highly value literacy skills (Cappelli, 2021) and see them as indicators of intelligence, education, and social status, the lack of such skills can influence dyslexic students' perception of their own linguistic competence, affecting their motivation. This is particularly true in the context of second language acquisition, where motivation can be key to developing high proficiency (Dörnyei, 1994). Therefore, understanding how dyslexia influences factors that modulate L2 proficiency is necessary to develop tailored support tools and increase general awareness of dyslexia to prevent students from experiencing discouragement or demotivation in foreign language learning.

In the following sections, we present a survey study on Italian and German learners of English diagnosed with dyslexia, in which we investigate whether their perceived L2 competence is related to perceived L1 competence, the timing of dyslexia diagnosis, language learning motivation, and the typological similarity between L1 and L2. The study also explores the emotional responses to a dyslexia diagnosis and the perceived awareness of dyslexia among teachers and peers. The following section compares Germany and Italy in terms of how dyslexia is diagnosed and dealt with and explains the linguistic and affective implications of dyslexia. Section 3 outlines research questions and predictions. Sections 4 and 5 present the methods, data, and analysis. We conclude with a discussion in Section 6.

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1. We compared Italian and German students as they are both part of the EU. Thus, education goals align with European policies, which allows us to control as much as possible for differences within the education system. Nonetheless, we are aware of the complexities of cross-cultural comparison.

2. Background

2.1 Dyslexia in Germany and Italy

While there is general consensus that dyslexia involves the impairment of specific cognitive functions, especially at the phonological level, the definition and assessment of dyslexia varies considerably within and across countries. The identification of dyslexia is further problematic because it relies on the definition of a cut-off point. As Wagner et al. (2020, p.356) point out, identifying a child as dyslexic or non-dyslexic requires a categorical decision, although reading impairments are best described along a continuum. This creates a challenge in accurately identifying and diagnosing dyslexia, as the categorization may not capture the complexity and variability of reading difficulties.

Italian legislature and, in particular, Law 170/2010[2] officially recognizes dyslexia, dysgraphia, anorthography, and dyscalculia as *specific learning disorders* and establishes the guidelines for their identification, official assessment, and intervention practices. According to this law, dyslexia is defined as difficulty in reading speed and accuracy. Only qualified speech therapists are authorized to diagnose specific learning disorders, and it is the school's responsibility to provide support for students with specific learning impairments, who have a right to compensatory tools and measures supporting the learning processes. The entry into force of this law has radically changed the school experience of children with specific learning disorders. The primary objectives of the 170/2010 law were to grant fundamental rights to students with specific learning disorders, to promote academic success through supportive measures, to ensure adequate education for every individual, and to facilitate the development of their full potential, thereby reducing emotional and relational distress caused by the impairment.

Despite the implementation of a dedicated law and assessment guidelines for specific learning disorders, the prevalence of dyslexia in Italy is still underestimated. Based on a large sample of almost 10,000 children, Barbiero et al. (2012, 2019) investigated whether the number of children who turn out to be dyslexic based on systematic testing coincides with the number of children who were officially diagnosed as dyslexic. They found that dyslexia was widely underestimated, with the percentage of individuals diagnosed increasing from 1.3% (those with a diagnosis) to 3.5% (those who had problems in the diagnostic tests).

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2. The 170/2010 law was specified with a document from the MIUR (Ministery of Education, University and Research, 2011), *Linee guida per il diritto allo studio degli alummi e degli studenti con disturbi specifici dell'apprendimento* (Guidelines for the right to education of students with specific learning disabilities).

Barbiero et al.'s (2019) findings imply that standardized practices for the diagnosis of dyslexia are needed to guarantee that all children are offered adequate educational opportunities and to avoid potential negative consequences of a misdiagnosis that may prevent these students from fulfilling their academic careers. The importance of an early diagnosis of dyslexia is a point to which we return below.

Unlike Italy, Germany does not have a unified educational system, and thus the assessment and treatment of dyslexia may vary across federal states. Overall, it is considered the school's responsibility to identify students with reading difficulties, and this is based on teachers' observations of the child's linguistic development (Wendt et al., 2017). Each federal state establishes guidelines for the provision of support for students with learning needs, including the implementation of compensatory measures and the development of individualized learning plans. The assessment and official diagnosis of reading are carried out by therapists, who undergo specific training recognized by the Federal Association for Dyslexia and Dyscalculia[3] (Moll et al., 2023; Schulte-Körne, 2010). Standardized tests are commonly employed to evaluate an individual's reading and spelling abilities (Schulte-Körne, 2010, pp. 721–722). The variable regulations for diagnosis and intervention therapies across federal states make it difficult to accurately estimate the prevalence of dyslexia in Germany.

One difference between Italy and Germany is the existence of special schools for children with special education needs in Germany.[4] However, in 2006, Germany underwent a significant policy shift towards promoting disability rights by ratifying the United Nations Conventions on the Rights of Persons with Disabilities.[5] This resulted in a gradual integration of individuals with special needs into mainstream educational settings. In the current Italian and German educational systems, children with dyslexia and other specific learning disorders do not (and must not) attend special schools. Rather, compensatory tools are provided to the students to overcome their literacy difficulties.

A general shift towards inclusivity in education, within a socially oriented disability model, has been instrumental in promoting equal rights and opportunities for people with disabilities. Article 21 of the United Nations Disability Rights Convention safeguards communication rights as fundamental human rights (McLeod, 2018). It grants individuals with impaired communication abilities the right to "seek, receive, and impart information and ideas on an equal basis with

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3. https://www.bvl-legasthenie.de/

4. https://eurydice.eacea.ec.europa.eu/national-education-systems/germany/educational-support-and-guidance. See https://eurydice.eacea.ec.europa.eu/national-education-systems/italy/special-education-needs-provision-within-mainstream-education for Italy.

5. See Footnote 4.

others and through all forms of communication of their choice" (McLeod, 2018, p. 6). Achieving this requires fostering inclusive education.

Cultural differences, differences in the educational systems and in the diagnosis and treatment of students with dyslexia and other learning difficulties may lead to cross-country differences in students' awareness of dyslexia. Therefore, we conduct a comparative analysis of Italian and German students' dyslexia awareness.

2.2 The impact of dyslexia on L2 development

Dyslexia can be considered a critical factor in the development of L2 proficiency because L2 proficiency encompasses not only speaking and understanding oral speech, but also the abilities to read fluently, comprehend a written text, and write, which are impaired in individuals with dyslexia.

The development of L2 literacy skills depends on a range of interrelated factors. L2 reading skills are predicted by the pre-existing development of L1 literacy skills, the language combination, as well as L2 proficiency subcomponents such as L2 listening skills, vocabulary, and grammar knowledge (Bernhardt, 2005; Jeon & Yamashita, 2014, 2022). L2 writing skills, in turn, are likely to be modulated by L2 reading and speaking skills, as well as L1 writing skills (Kojima et al., 2022). Additionally, L1 and L2 literacy skills are modulated by vocabulary size and the quality of lexical representations in the mental lexicon (Perfetti & Hart, 2002; Perfetti, 2007). According to the *Lexical Quality Hypothesis*, complete lexical representations lead to efficient lexical processing and improved comprehension. The difference between L1 and L2 reading development is that in the former case, lexical representations are 'complete' (i.e., the representation of a lexical item in the mental lexicon includes its orthographic, phonological, and semantic representations) and can therefore lead to fluent and accurate reading and enhance comprehension abilities. In the L2, by contrast, lexical representations are 'incomplete' and can therefore result in slower word decoding and incorrect pronunciation. 'Incompleteness' can imply a missing link between orthographic and phonological information and the lexical representation, or limited comprehension due to missing semantic information (Perfetti, 2007; Perfetti & Hart, 2002).

Besides the quality of lexical representations, the typological similarity between the L1 and L2 plays a crucial role in the development of L2 proficiency. According to Daloiso (2012), a higher degree of linguistic affinity between the L1 and L2 at the phonological, semantic, and morphosyntactic levels enhances the acquisition of the L2. Independently of dyslexia, typological similarity may facilitate the acquisition of L2 vocabulary and thus enhance the learners' reading and comprehension abilities.

L2 proficiency develops as a function of L1 proficiency (Cummins, 1979; Sparks et al., 1989; Verhoeven, 1994), and studies on dyslexic L2 learners provide evidence for this hypothesis. Most research focusing on the development of L2 literacy among dyslexic children indicates that they do not achieve the same level of proficiency as their typically developing peers in L2 reading and spelling tasks, as well as in tasks that measure phonological awareness or orthographic knowledge (Palladino et al., 2013; von Hagen et al., 2021). These findings suggest that both learning strategies as well as weaknesses are transferred from L1 to L2.

2.3 Linguistic and affective factors

While affective factors, such as motivation, perceived competence, and self-esteem, play an important role in L2 acquisition, these become even more important in L2 acquisition with dyslexia. Failure to develop adequate literacy skills can result in feelings of inferiority, higher linguistic anxiety (Cappelli, 2021), and reduced self-esteem (McNulty, 2003), which in turn affect motivation, learning, and life outcomes (e.g., personal, and social development), and may exacerbate problems with higher cognitive and executive functions (Livingston et al., 2018). This is particularly true for students with dyslexia, who tend to associate literacy skills with intelligence and compare their performance to that of their peers (Frederickson & Jacobs, 2001; Humphrey & Mullins, 2002; Ingesson, 2007).

Perceived competence is understood here as a common denominator of self-efficacy and self-concept, two terms that are often used interchangeably in educational research (Battistutta et al., 2018). Although both self-concept and self-efficacy pertain to individuals' general and domain-specific perceptions of themselves, they differ in their temporal orientation. Self-concept typically reflects one's past and present experiences of success and failure and is oriented toward the present. In contrast, self-efficacy is future-oriented and pertains to an individual's beliefs in their ability to successfully perform a specific task or activity (Battistutta et al., 2018). Given the importance of the academic setting in shaping an individual's perception of their competence, the administration of timely diagnostic evaluations and subsequent implementation of therapeutic interventions can be highly advantageous for students with dyslexia; not only do they promote the development of literacy skills, but they can also mitigate negative feelings resulting from academic failure (Livingston et al., 2018; Pino & Mortari, 2014; Pitt & Soni, 2017).

One factor that may shape affective factors is the timing of dyslexia diagnosis. Battistutta et al. (2018) studied its potential effects, finding that earlier diagnosis and subsequent intervention practices have a positive impact on students' self-perception. Hampton and Manson (2003) highlight that students' self-perception is not modulated by dyslexia per se, but rather by a lack of positive reinforcement

and effective support, which, in turn, is due to a general lack of awareness of what dyslexia is (Burden, 2008; Carrol & Iles, 2006; Ingesson, 2007). Moreover, teachers may lack adequate training to effectively support dyslexic students, particularly in the context of foreign language instruction (Njiakowska, 2014). In a systematic review of the literature on self-perception in dyslexic individuals, Gibby-Leversuch et al. (2021) found that the way individuals respond to a dyslexia diagnosis can range from resistance to acceptance (Gibby-Leversuch et al., 2021, p. 5607): While some dyslexics see the dyslexia label as a positive alternative to being labeled as 'lazy', others perceive it as stigmatizing. Upon receiving a diagnosis, some individuals may develop the belief that they are inherently different from their peers and that they lack the capacity to enhance their literacy skills. Therefore, fostering strong relationships with peers and parents, and creating a supportive educational environment where dyslexia is not stigmatized but rather properly understood, is essential.

To summarize, dyslexia can have serious consequences for the attainment of L2 proficiency. Difficulties in the development of L2 literacy may result from impaired L1 literacy skills and can have a negative impact on academic performance. This can lead to feelings of (linguistic) anxiety and frustration that ultimately affect learning outcomes and the students' self-perception. An early diagnosis of dyslexia has the potential to mitigate negative consequences by improving students' literacy skills and providing them with an identifiable cause for their difficulties (Glazzard, 2010). However, the effect of a diagnosis on students' perception of their competence remains unclear, as individuals vary in their reactions to it. Therefore, many studies emphasize the importance of enhancing awareness of the challenges faced by dyslexic students among teachers and educators to prevent the negative consequences of a diagnosis and support dyslexic students in their academic development.

3. Goals and research questions

We have carried out a survey to further our understanding of how dyslexia affects the foreign-language learning process by comparing Italian and German learners of English (L2). The main goals of our survey were the following: First, we wanted to compare the two groups in their self-perceived L2 competence and see whether perceived competence in the L1 and in the L2 were related. Given the transparent alphabetic orthographies of German and Italian, similar patterns of perceived competence in English (their L2) would be expected. However, differences in perceived L2 competence may arise due to the greater lexical similarity between German and English. Second, we wanted to know whether the timing

of diagnosis affected the perception of L1 literacy skills, and whether this effect would carry over to the L2. Third, we aimed at a better understanding of the relationship between motivation in L2 learning and the perception of L2 competence in individuals with dyslexia. Finally, given the potential impact of teacher and peer relationships on dyslexic students' academic and social experiences, we further explored the extent to which cultural differences shape dyslexic students' awareness of their impairment (henceforth DYS *self*-awareness). Relatedly, we were interested in how the perception of dyslexia awareness among teachers and peers (henceforth DYS *other*-awareness) relates to students' feelings of self-stigma and shame associated with a dyslexia diagnosis (henceforth DYS diagnosis impact). Thus, our research questions are:

RQ1. How do Italian and German dyslexic students perceive their L2 competence and how does their perceived competence relate to:
   i. perceived competence in their L1,
   ii. time of dyslexia diagnosis,
   iii. motivation for language learning, and
   iv. typological similarity between the L1 and the L2?

RQ2. Are there differences between Italian and German students in terms of DYS *self*-awareness and DYS *other*-awareness, and how does their DYS *other*-awareness relate to the emotional reactions to a dyslexia diagnosis?

4. Method

4.1 Participants

We recruited 60 participants, including 29 Italian (age $M = 20.75$; $SD = 4.45$) and 31 German speakers (age $M = 23.45$, $SD = 6.6$) who reported a diagnosis of dyslexia. The participants were diagnosed with dyslexia at an age between 6 to 23 years, with a mean age of 10 years ($SD = 3.6$) for the German group and 11 years ($SD = 4.45$) for the Italian group. Following Battistutta et al. (2018), dyslexia diagnoses were categorized into *early* (during elementary school when literacy skills were still developing) and *late* (later in life). In the German group, early diagnoses were made between the ages of 6 and 10 ($N = 19$), while in the Italian group, they were made between the ages of 6 and 11 ($N = 14$). Information was also collected on whether participants received speech therapy aimed at enhancing reading and spelling skills after the diagnosis. In the Italian group, 6 participants reported never meeting a speech therapist, while 3 were uncertain. In the German group, 13 participants reported not receiving any intervention.

All participants were born and living in either Italy or Germany and grew up in Italian- or German-speaking homes. They all had prior experience learning English or other foreign languages at school. In terms of linguistic background, 28 of the Italian participants grew up monolingually with two parents whose native language was Italian. One participant stated their mother was a bilingual speaker of Italian and English. In the German group, 27 participants grew up monolingually with both parents speaking German as their native language. Three participants reported having one non-German speaking parent (1 English, 1 Dutch, and 1 Polish) and one participant had German-Italian bilingual parents. We excluded participants with one English-speaking parent from our data analysis. The final sample thus included 58 participants (Italian group = 28; German group = 30).

Participants' were first exposed to English at the age of 8.03 years ($SD = 2.31$) in the German group, and at the age of 6.39 ($SD = 1.66$) in the Italian Group. The majority of the participants were university students ($N = 30$) and secondary school students ($N = 11$). The remaining participants were not enrolled in any academic institution at the time of the questionnaire administration ($N = 11$) or provided unclear information on their educational status ($N = 6$). Despite their reading difficulties, participants in both groups demonstrated a rather strong motivation to engage in foreign language learning, as indicated by the number of foreign languages learned (between 1 and 4).[6]

4.2 Structure of the questionnaire

The questionnaire was divided into 4 sections. In Section 1 we gathered sociolinguistic background information on the participants as well as information about their dyslexia diagnosis. Sections 2 and 3 addressed participants' self-perception of their L1 and L2 linguistic competence, and their motivation for learning English (RQ1), while section 4 focused on dyslexia awareness, and on students' perception of their impairment (RQ2).

In Section 2, the participants rated their L1 (German or Italian) and L2 (English) competence in terms of reading aloud, reading comprehension, writing, speaking, and listening, on a 5-point Likert-scale ranging from 1 (very bad) to 5 (very good). Section 3 focused on the participants' motivation to improve their

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6. EU language policies advocate for citizens to acquire proficiency in two foreign languages (FLs) alongside their native language. In our study, some participants reported learning more than two FLs, including languages with different writing systems. This, we believe, highlights the motivation of (some) dyslexic students to engage in FL learning despite their literacy difficulties. It is important to acknowledge the potential bias in our sample as data were collected online, which suggests that participants may have had a particular interest in FL learning.

English proficiency. Inspired by Tseng et al.'s (2020) "L2 self-guides scale", we developed four comprehensive statements tapping into the four dimensions of *Ideal L2Self*$_{own,}$ Ideal *L2Self*$_{others,}$ *Ought-to L2self*$_{own,}$ and *Ought-to L2self*$_{others}$. These statements collectively paint a picture of the participants' motivation, expectations, and aspirations related to their English proficiency. Participants were asked to express their agreement with the statements on a scale from 1 (I totally disagree) to 5 (I totally agree). In Section 4, we asked participants how they would define dyslexia (i.e., *disability, learning difficulty, reading difficulty,* and *writing difficulty*), and what they think the general level of dyslexia awareness in the education system is. Participants were also asked to provide their agreement with statements pertaining to the impact of a dyslexia diagnosis on their self-esteem and motivation.

5. Results

5.1 L2 perceived competence

Our first research question concerned perceived L2 competence, and how this relates to perceived L1 competence, typological similarity between the L1 and L2, motivation towards language learning, and time of dyslexia diagnosis. The relationship between language abilities in the L1 and L2 was examined using a generalized linear model in R (*stats* package, R Core Team, 2023). The *glm* model included Group (German vs. Italian) and L1 Perceived Competence as fixed effects. The proficiency measures were calculated by aggregating participants' responses to questions evaluating their competence in their L1 and L2, specifically with respect to their reading comprehension, reading aloud, writing, speaking, and listening. We found a significant main effect of Perceived L1 Competence ($X^2 = 34.68$, $p < .001^{***}$) and Group ($X^2 = 4.38$, $p = 0.04^{*}$), showing that L1 Germans rate their L2 competence significantly higher than L1 Italians. Figure 1 illustrates that for both groups, perceived L1 competence is positively correlated with L2 competence.

To better explore this interaction, we implemented a linear mixed effect model in which participants' responses to L1 and L2 self-perceived competence questions was predicted by a two-way interaction between Group and Language, and by a two-way interaction between type of Skill investigated (reading aloud, reading comprehension, writing, speaking, and listening) and Language. The model included Participants as a random intercept. Within this model, we found a significant effect of Skill ($X^2 = 128.06$, $p < .001^{***}$) and Language ($X^2 = 26.28$, $p < .001^{***}$), but no effect of Group ($X^2 = 0.01$, $p = 0.9$). The interaction between

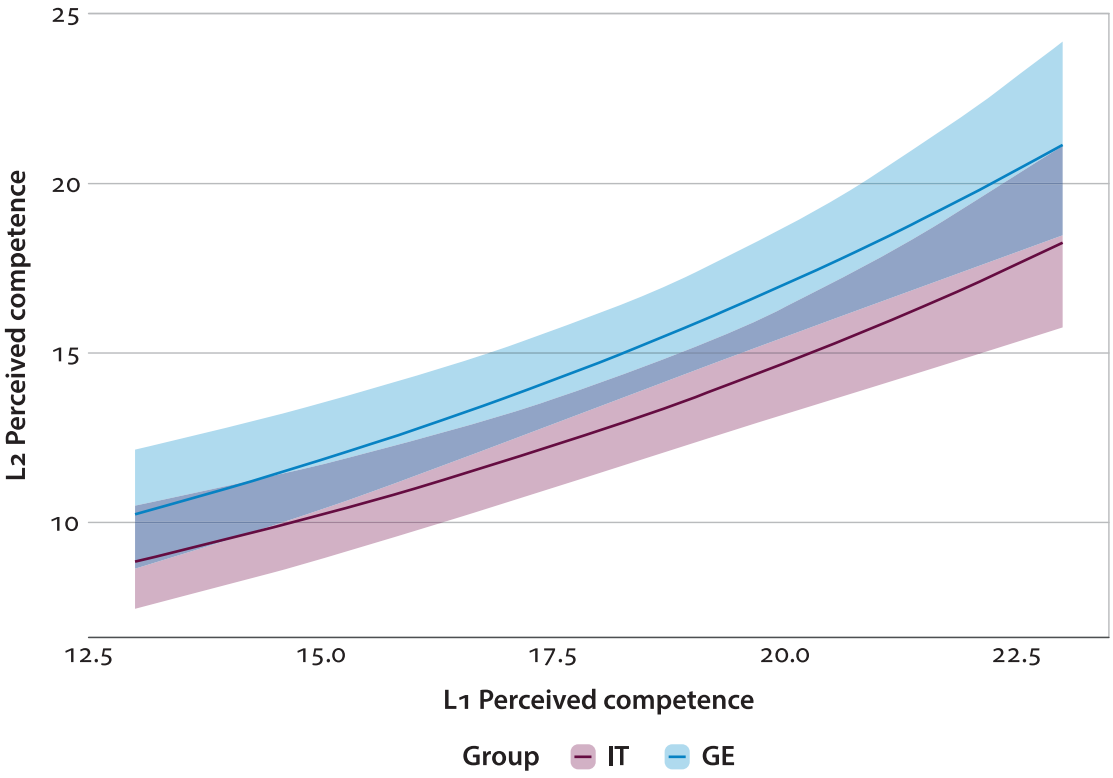

Figure 1. Perceived L2 competence by L1 competence and group

Group and Language was significant ($X^2 = 9.55$, $p = 0.002^{**}$), showing that German students consistently rate their L2 abilities significantly higher than Italian students, but not their L1 abilities. The interaction between Skill and Language was also significant ($X^2 = 10.86$, $p = 0.02^{*}$), showing that in both groups, L1 and L2 literacy skills are rated lower than speaking and listening skills; this is especially true for L1 and L2 writing skills and reading fluency.

To investigate the potential impact of timing of diagnosis on students' perceived L1 and L2 competence, our analysis focused on literacy skills. We implemented a linear mixed effect model with Perceived Competence as an outcome variable, predicted by a two-way interaction between L1 and L2 Literacy Skills (reading aloud, reading comprehension, writing) and Age of Diagnosis (early vs. late), and a two-way interaction between Skill and Group. Participants were included as random effects. The model yielded a significant main effect of Skill ($X^2 = 34.26$, $p < .001^{***}$), a significant interaction between Skill and Age of Diagnosis ($X^2 = 16.17$, $p = 0.006^{**}$), and between Skill and Group ($X^2 = 13.66$, $p = 0.017^{*}$). Age of Diagnosis alone was not significant ($X^2 = 0.001$, $p = 0.97$) nor was Group ($X^2 = 0.54$, $p = 0.45$). The output of the model is shown in Figure 3, which illustrates that an *early* diagnosis has a strong positive impact on the perception of L1 writing skills for both German and Italian students, but not on any of the other investigated skills.

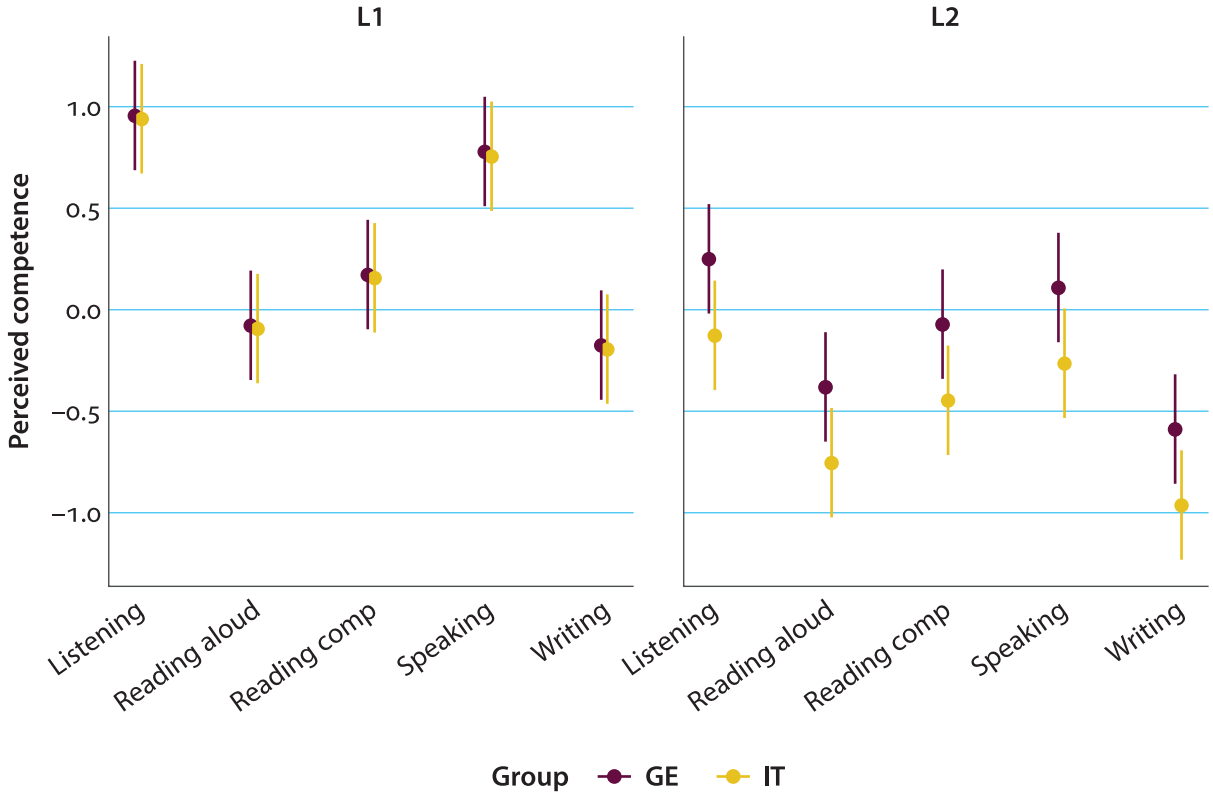

Figure 2. Perceived competence by skill and group

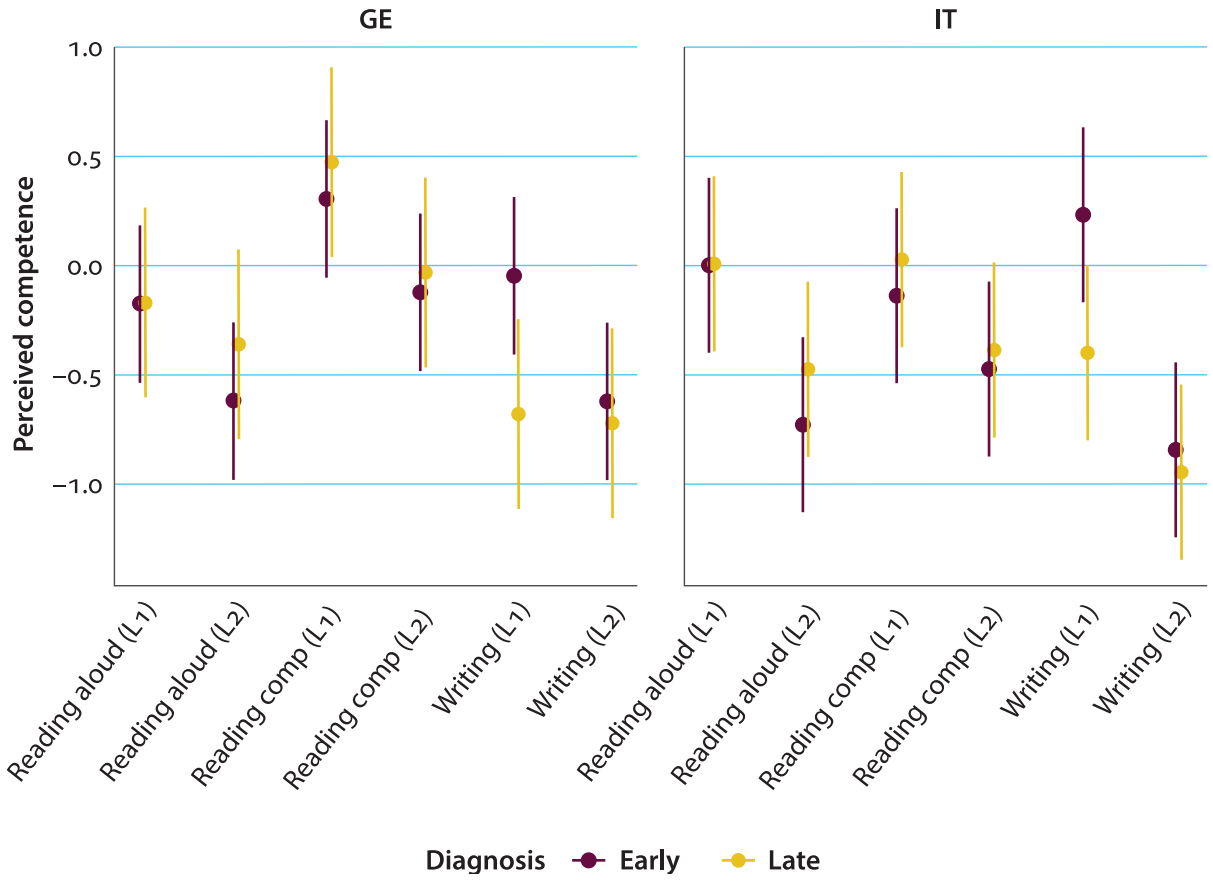

Figure 3. Perceived competence by skill and diagnosis time (*early* vs. *late* diagnosis)

We further explored the relationship between students' perception of their L2 skills and their motivation for language learning. To assess students' motivation towards learning English as an L2, participants expressed their agreement with the statements in (1):

(1) a. I imagine that one day I will speak English fluently with friends and colleagues, I will be able to write posts on social networks, and work with English daily (*Ideal L2Self*$_{own}$),
b. I imagine that in the future, my friends, parents, and colleagues will be impressed by my ability to conversate in English without any problems (*Ought L2Self*$_{own}$),
c. I think that in the future I will necessarily have to be able to speak, understand, and write in English fluently (*Ideal L2Self*$_{other}$),
d. My teachers, classmates, and parents think that I need to improve my English (*Ought L2Self*$_{other}$).

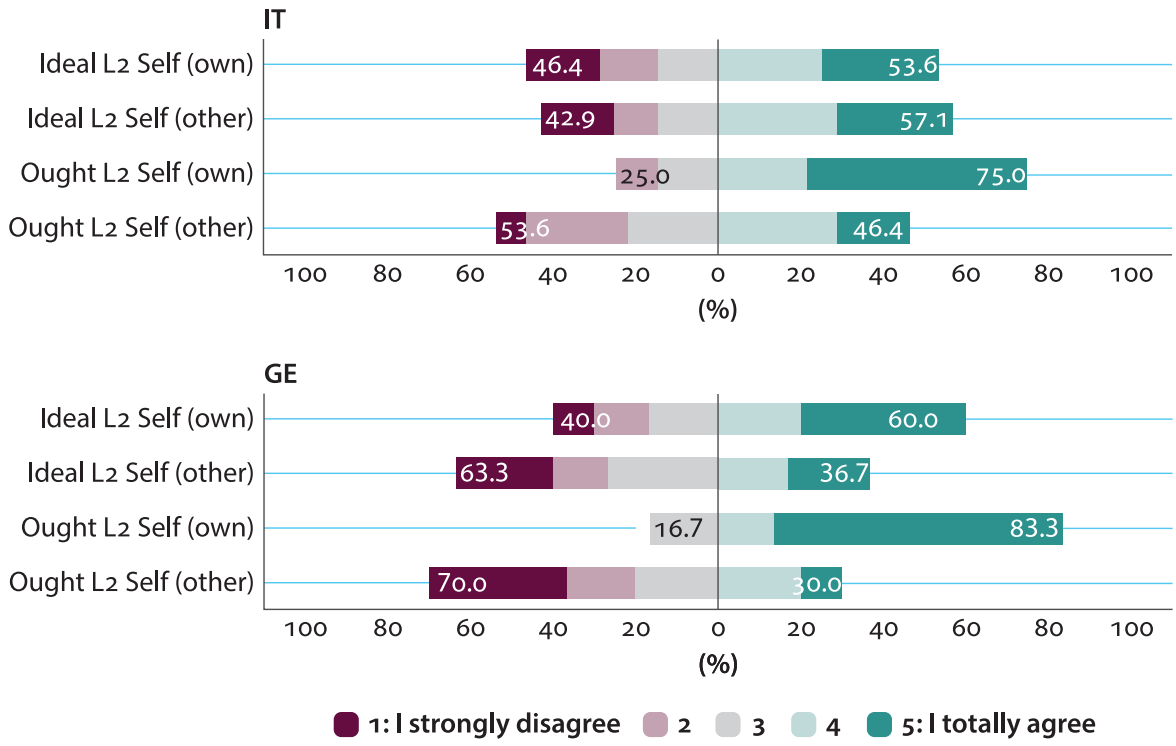

Figure 4. German and Italian students' answers to *language learning motivation* questions

Figure 4 shows how students answered the four motivation questions. Similar patterns are observed between the two groups. A composite motivation score was calculated by aggregating participants' agreement with the four statements. To explore the relationship between motivation and perceived L2 competence, we implemented a generalized linear model including Motivation and Group as predictor variables and Perceived L2 Competence as outcome variable. The model output showed a significant positive effect of both Motivation ($X^2 = 11.70$,

$p < .001^{***}$) and Group ($X^2 = 6.43$, $p = 0.011^{*}$). These findings suggest that higher levels of motivation are related to higher perceived L2 competence in both the German and the Italian group, and that German students tend to have higher motivation compared to Italian students (Figure 5).

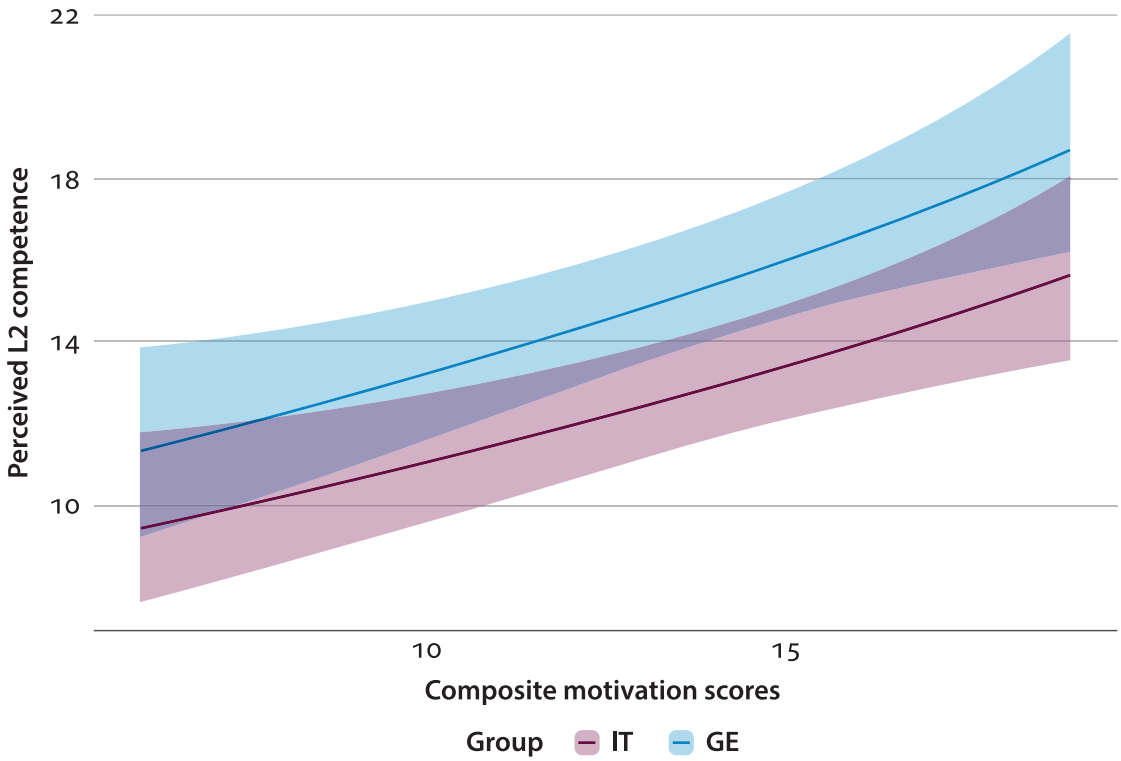

Figure 5. Relationship between perceived L2 competence and motivation

5.2 Perception of dyslexia and dyslexia awareness among students and teachers

Our second research question focused on the three dimensions of DYS *self*-awareness, DYS *other*-awareness, and DYS diagnosis impact. Further, we aimed to assess whether students' DYS *other*-awareness determines the emotional implication of a dyslexia diagnosis.

To examine students' *DYS self-awareness,* we asked them to express their agreement with the statements in (2):

(2) DYS *self*-awareness:
   a. I think dyslexia is a disability,
   b. I think dyslexia is a reading difficulty,
   c. I think dyslexia is a writing difficulty, and
   d. I think dyslexia is a learning difficulty.

Figure 6 illustrates the students' agreement with the four statements and the difference between the two groups. While the German group tended to view dyslexia

primarily as a writing difficulty (93.3%), Italian students perceived it mostly as a learning difficulty (78.6%). Significant differences are observed between the Italian and German groups concerning their perceptions of dyslexia as a disability. Specifically, higher levels of agreement were reported in the German group in relation to the definition of dyslexia as a disability (40%), whereas the Italian group exhibited comparatively lower agreement levels (14.3%).

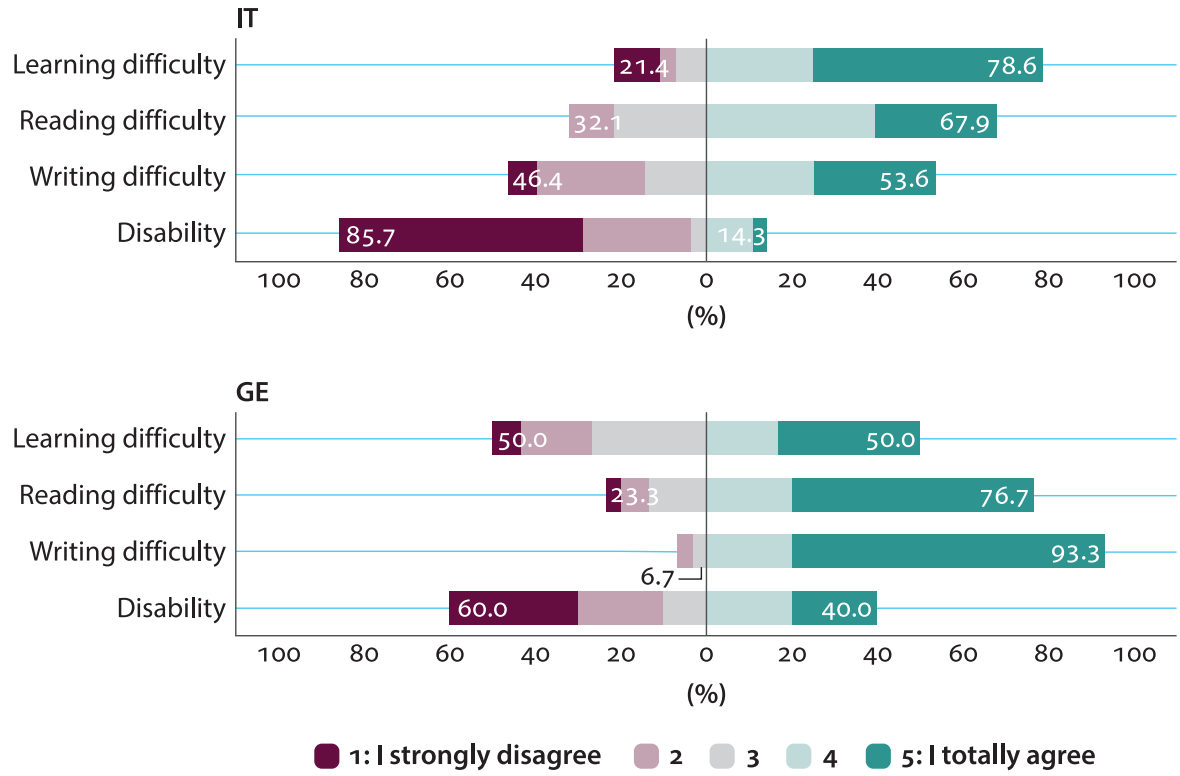

Figure 6. German and Italian students' agreement with statements in (2): DYS *self*-awareness

We next explored the relationship between students' *DYS other-awareness* and *DYS diagnosis impact*, asking the participants to evaluate the statements in (3) and (4):

(3) DYS *other*-awareness:
   a. I think my teachers are **not** aware of what dyslexia really is,
   b. I think my peers are **not** aware of what dyslexia really is,
   c. Students with dyslexia are often underestimated,
   d. There are a lot of stereotypes about dyslexia.

(4) DYS diagnosis impact:
   a. I have often felt ashamed of my diagnosis,
   b. I have often felt lack of motivation in starting to learn a L2,
   c. My diagnosis has often had a negative impact on my self-esteem.

Participants' answers to the statements in (3) and (4) are illustrated in Figure 7 and Figure 8 respectively, which show strong tendencies to perceive a lack of awareness, as well as negative feelings associated with the diagnosis.

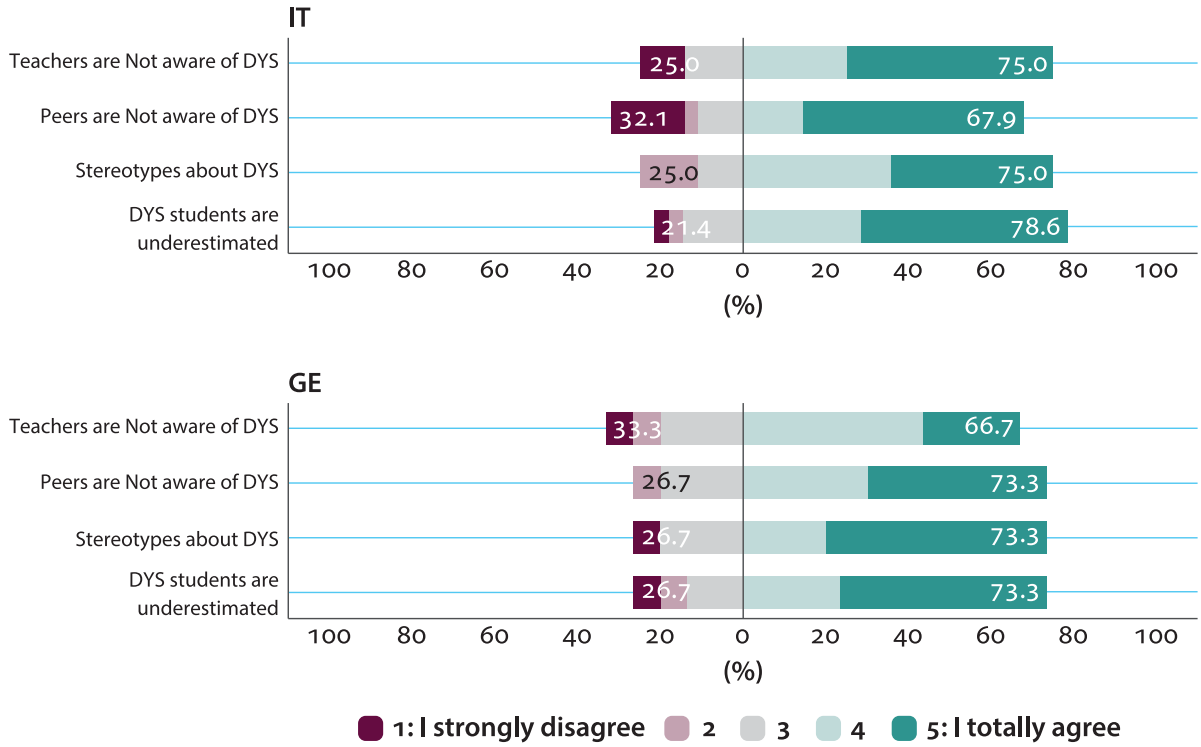

Figure 7. German and Italian students' agreement with statements in (3): DYS *other*-awareness

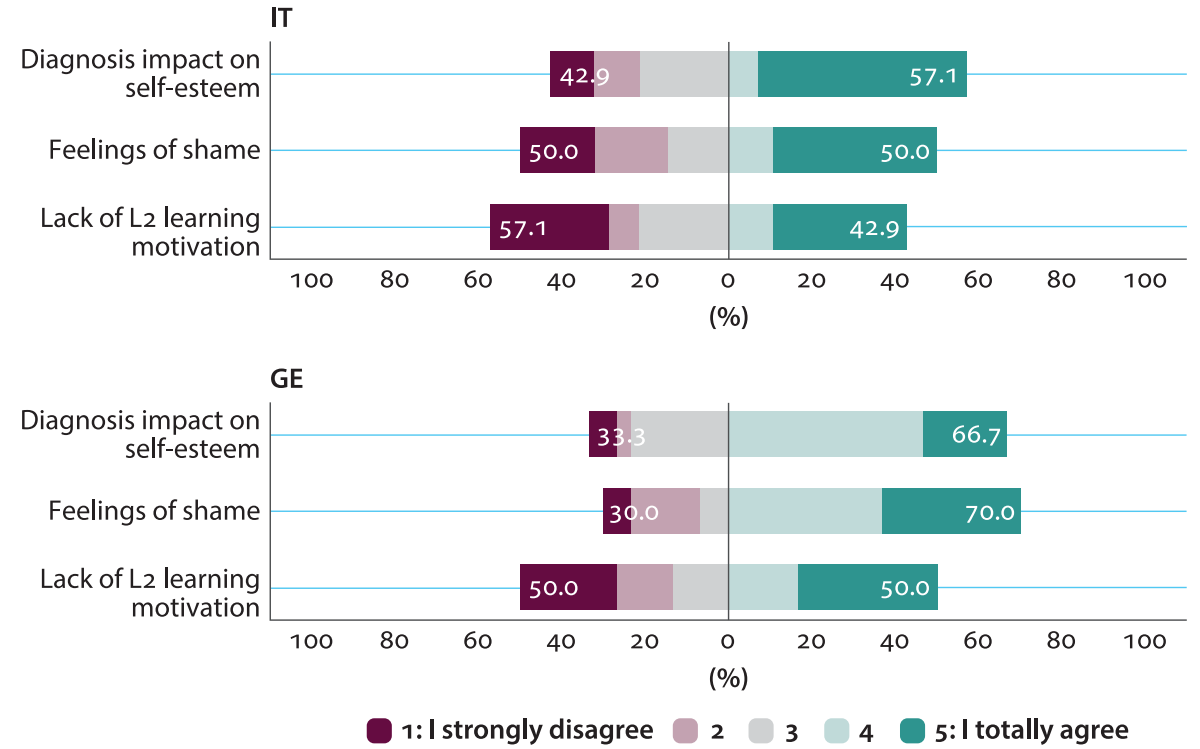

Figure 8. German and Italian students' agreement with statements in (4): DYS diagnosis impact

To assess *DYS other*-awareness, we created a composite score by aggregating students' agreement with questions in (3), so that higher scores corresponded to lower levels of perceived *DYS other*-awareness. Using a linear model, we examined the relationship between DYS *other*-awareness and DYS diagnosis impact, which was determined by a composite measure of students' responses to (4). Again, higher scores corresponded to a more negative impact of a dyslexia diagnosis on students' self-esteem and motivation. Our model included DYS diagnosis impact as an outcome variable, and *DYS other*-awareness and Group as predictor variables. The model yielded a significant effect of *DYS other*-awareness ($X^2 = 504.01$, $p < .001^{***}$), but no effect of Group ($X^2 = .02$, $p = 0.96$). These results (Figure 9) suggest that the more students agree on a general lack of dyslexia awareness in the educational setting, the more likely they are to report feelings of shame about their diagnosis, lack of motivation to learn an L2, and that their diagnosis has had a negative impact on their self-esteem.

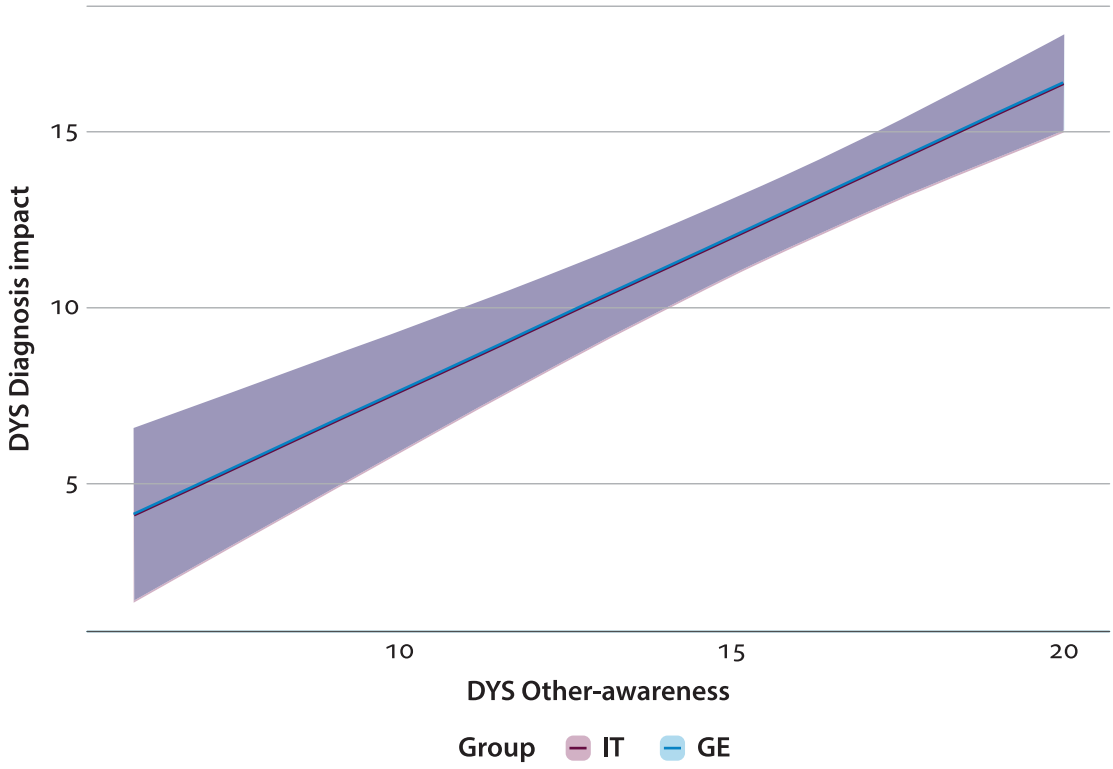

Figure 9. Relationship between DYS *other*-awareness and DYS diagnosis impact. The two lines overlap, as no between-group difference emerged

6. Discussion

We have explored how dyslexic students perceive their L2 competence and how this relates to their L1 competence, time of diagnosis, motivation towards English language learning, and typological similarity between L1 and L2. We further examined how students with dyslexia perceive their impairment, and whether the dyslexia awareness they perceive amongst their teachers and peers relates to the emotional impact of their dyslexia diagnosis. 58 Italian and German L2 learners of English who were diagnosed with dyslexia were included in the study.

6.1 Factors determining perceived L2 competence

Our findings suggest that perceived L1 competence and perceived L2 competence are significantly related, mirroring Sparks et al.'s (1989) finding for non-dyslexic learners that better L1 skills lead to better L2 skills. This was especially the case in reading and writing, as both groups consistently rated their literacy skills (reading aloud, reading comprehension, and writing) as lower than their speaking and listening abilities, in both their first and their second language. This finding is consistent with prior research suggesting that individuals with dyslexia possess a high level of self-awareness regarding their specific difficulties (Burden, 2008; Gibby-Leversuch et al., 2021), which in turn affects their self-perceived linguistic competence. Among various literacy skills, dyslexic learners considered their reading aloud and writing proficiency in both their L1 and L2 to be the most limited. Finally, our results indicate that language skills are interdependent (Cummins, 1979; Verhoeven, 1994) and this has an impact on perception, such that perceived impairments in one language are also perceived as impairments in the other language.

Our results further show a significant difference between the Italian-speaking and the German-speaking students' perception of their L2 competence. German-speaking students consistently rated their L2 competence higher than their Italian-speaking peers, but not their L1 competence. This difference could potentially be accounted for by the closer typological similarity between German and English, in contrast to Italian and English, which could foster positive transfer from the L1 to the L2 and facilitate the acquisition of linguistic properties that overlap between the two systems (Cappelli, 2021), irrespectively of dyslexia. This hypothesis could be investigated further by assessing the extent to which students' perceived competence matches measurable differences in proficiency in future studies. Alternative explanations such as differences in teaching methods employed in German and Italian schools could also play a role, although this is merely a speculation as we are not aware of any data or comparative studies on teaching methods.

In addition to teaching and learning strategies, students' willingness to communicate (WTC) in their L2 could explain the observed group differences. Fol-

lowing MacIntyre et al. (1998, p.547), WTC refers to students' likelihood of engaging in conversations using their L2, and it can be influenced by individual and social contexts, including societal attitudes towards the specific L2, and it is correlated with perceived communicative competence. Future research could explore the potential impact of different teaching and learning strategies on students' WTC and self-perception across languages, as well as how societal attitudes influence these dimensions. Such investigations, together with more research on how different dyslexia therapies influence students' L1 and L2 self-perception, could provide insights into additional factors that contribute to the acquisition of L2 skills and inform the development of more effective language learning curricula and strategies.

Among the factors that modulate the perception of L2 competence, we investigated the impact of motivation and timing of dyslexia diagnosis. Our results indicate that in both groups, higher motivation was associated with greater self-perceived L2 competence. Interestingly, we found a significant difference between the two groups in terms of their motivation for learning English. Again, this result may reflect variations in teaching methods, learning strategies, as well as the type and amount of exposure to English within the two educational systems. However, as mentioned above, since we did not directly examine the effects of teaching methods on motivation, we can only speculate about relationships between variations in teaching methods, motivation, and self-perception of L2 competence.

As to the potential effect of the timing of dyslexia diagnosis on self-perceived L1 and L2 competence, our findings did not yield clear results. It seems that an early diagnosis of dyslexia may have a positive impact on the perception of L1 writing abilities, indicating that the earlier dyslexia is diagnosed, the more likely it is for dyslexic students to perceive their writing skills in a positive light. However, this was not found for other L1 and L2 literacy skills, including L2 writing. This unclear pattern could be due to the high individual variability in the emotional impact of a dyslexia diagnosis (Gibby-Leversuch et al., 2021). Being diagnosed with dyslexia has an impact on affective factors, e.g., self-efficacy and self-concept, that are determined by an individual's perception of their competence (Battistutta et al., 2018). Whether an early dyslexia diagnosis has a positive effect on the development of writing abilities needs to be investigated further. To say the least, it is plausible to assume that individuals who were diagnosed with dyslexia while their literacy skills were still developing may have had more opportunities to receive the necessary support and improve their L1 spelling skills, which may have influenced their self-perception in these skills. Additionally, interventions aimed at enhancing literacy in the L1 are typically prioritized, which might explain why no similar effect is seen in L2 writing. The inconspicuous nature of reading errors, unlike visible writing errors (which teachers often highlight in red despite research advising against it, as noted by Dukes & Albanesi, 2013), could be the

reason why comparable positive effects on reading-related skills are absent. Individuals with dyslexia may be less capable of detecting improvements in their reading abilities, which arguably contributes to the lack of a positive effect of an early diagnosis on literacy skills.

6.2 Dyslexia awareness and emotional implications

Our second research question addressed three dimensions, i.e., students' DYS *self*-awareness (perception of their impairment), DYS *other*-awareness (students' perception of dyslexia awareness among teachers and peers), as well as how the latter is related to negative emotions associated with a dyslexia diagnosis.

First, our findings demonstrate that students have a clear understanding of what dyslexia is. However, interesting differences were observed between German and Italian students in their conceptualization of dyslexia. German students predominantly view dyslexia as a writing difficulty, while Italian students mostly perceive it as a learning difficulty (although both groups show very high levels of agreement with statements defining dyslexia as a writing and reading difficulty). This contrast between participants in the two countries could be ascribed to cultural influences on students' understanding of dyslexia, including how it is defined, labeled, and addressed within the educational system. In Italy, dyslexia is commonly referred to as DSA, which stands for *Disturbo Specifico dell'Apprendimento* (specific learning disorder). DSA students are a well-known category within the school setting. Thus, it may be that Italian students' perceptions of dyslexia were informed by a more formal understanding of their condition, while German students' responses were influenced by the subjective perception of their difficulties. The results further indicate that the majority of students in both groups did not agree with the definition of dyslexia as a disability. However, differences emerged between Italian and German students in this respect: A significantly greater proportion of German students embraced the definition of dyslexia as a disability. This discrepancy can be attributed to cultural differences. As stated by Riddick (2001, p. 224), the extent to which dyslexia-related impairments are perceived as a disability depends on cultural factors, among which literacy standards. Despite the general trend towards inclusivity and a socially oriented model of disability, the different approaches towards students with specific educational needs in the Italian and German educational systems may influence people's conceptualization of *specific learning disorders*, which could explain the higher percentage of German participants (40%) who view dyslexia as a disability, compared to only 14.3% in the Italian group.

Second, our results indicate that German and Italian students perceive a low level of dyslexia awareness within the educational system, as there was a high level

of agreement among participants with statements highlighting a lack of understanding of dyslexia among teachers and peers, and the presence of stereotypes that contribute to dyslexic students feeling underestimated. Our investigation further focused on the potential relationship between dyslexia awareness amongst teachers and peers and its impact on the emotional implications of a dyslexia diagnosis. We found a relationship between students' perception of others' awareness in the educational setting, and the impact of a dyslexia diagnosis on their self-esteem, emotional well-being in the classroom (e.g., feelings of shame), and motivation to learn foreign languages. This may be taken to indicate that a higher awareness of the nature of dyslexia within the educational setting could mitigate students' negative feelings towards their diagnosis, and thus reduce feelings of shame, lack of self-esteem, and L2 learning motivation. The students' low perception of dyslexia awareness among teachers and peers is in line with earlier research that has highlighted a general lack of understanding regarding the nature of dyslexia (Burden, 2008; Carrol & Iles, 2006; Ingesson, 2007), and insufficient training of teachers to provide effective support to dyslexic students, especially in the context of foreign language learning (Njiakowska, 2014).

We acknowledge several limitations of our study. Firstly, the small sample size may limit the generalizability of our findings. Secondly, we did not include a control group of typical readers, which makes it difficult to draw solid conclusions as to whether differences between German and Italian students in their L1 and L2 self-perception were only due to dyslexia, or potentially to other factors. Lastly, we did not include an objective measure of L1 and L2 proficiency to compare it with students' self-perception of their L1 and L2 competence. This comparison could be addressed in future research, including the relation between objective proficiency and the three dimensions of DYS *self*-awareness, DYS *other*-awareness, and DYS diagnosis impact. Future research should also focus on the potential effect of teaching methods on students' self-perception of linguistic competence and motivation for foreign language learning.

7. Conclusion

Our study has shown that students with dyslexia are highly aware of their language difficulties, as reflected in their L1 and L2 skills self-evaluation. The perception of L2 competence is further influenced by students' motivation for language learning. German and Italian students differed in their self-perceived L2 competence, possibly due to typological similarity, with German students rating their L2 skills consistently higher than Italian students, although we cannot exclude the role of additional factors, such as teaching, learning methods, and quality and quantity

of L2 input. Our results were more unclear regarding the potential benefits of an early diagnosis on perceived language competence. While we found that an early diagnosis may be beneficial for the perception of L1 writing skills, this was not observed for other L1 and L2 literacy skills. Finally, German and Italian students differed in their understanding of dyslexia, with Italian students perceiving it as a learning difficulty and German students conceptualizing it as a writing difficulty. However, the two groups do not differ in their perception of dyslexia awareness, and we show that increasing awareness of what dyslexia is within the educational setting could mitigate how dyslexic students cope with their diagnosis.

Acknowledgements

We wish to thank Ines Schumacher for contributing to collecting data from the German group and translating the original questionnaire into German.

References

doi Barbiero, C., Lonciari, I., Montico, M., Monasta, L., Penge, R. et al. (2012). The submerged dyslexia iceberg: How many school children are not diagnosed? Results from an Italian Study. *PloS One*, 7(10).

doi Barbiero, C., Montico, M., Lonciari, I., Monasta, L., Penge, R., et al. (2019). The lost children: The underdiagnosis of dyslexia in Italy. A cross-sectional national study. *PloS One*, 14(1).

doi Battistutta, L., Commissaire, E., & Steffgen, G. (2018). Impact of the time of diagnosis on the perceived competence of adolescents with dyslexia. *Learning Disability Quarterly*, 41(3), 170–178.

doi Bernhardt, E. (2005). Progress and procrastination in second language reading. *Annual Review of Applied Linguistics*, 25, 133–150.

doi Brizzolara, D., Pecini, C., Chilosi, A., Cipriani, P., Gasperini, F., & Mazzotti, S. (2006). Do phonological and rapid automatized naming deficits differentially affect dyslexic children with and without a history of language delay? A study on Italian dyslexic children. *Cognitive and Behavioural Neurology*, 19(3), 141–149. https://10.1097/01.wnn.0000213902.59827.19.

doi Burden, R. (2008). Is dyslexia necessarily associated with negative feelings of self-worth? A review and implications for future research. *Dyslexia*, 14(3), 188–196.

doi Cappelli, D. (2021). Dyslexia in L2 learning: Comparison between languages and Linguistic anxiety. *Quaderni di Linguistica e Studi Orientali*, 7, 265–288.

doi Carroll, J.M., & Iles, J.E. (2006). An assessment of anxiety levels in dyslexic students in higher education. *British Journal of Educational Psychology*, 76(3), 651–662.

doi Chung, K.K.H., & Ho, C.S. (2010). Second language learning difficulties in Chinese children with dyslexia: What are the reading-related cognitive skills that contribute to English and Chinese word reading? *Journal of Learning Disabilities*, 43(3), 195–211.

Cummins, J. (1979). Linguistic interdependence and the educational development of bilingual children. *Review of Educational Research*, 49(2), 222–251.

Daloiso, M. (2012). *Lingue straniere e dielssia evolutiva. Teoria e metodologia per una glottodidattica accessibile*. UTET Università.

Dörnyei, Z. (1994). Motivation and motivating in the foreign language classroom. *The Modern Language Journal*, 78(3), 273–284.

Dukes, R. L., & Albanesi, H. (2013). Seeing red: Quality of an essay, color of the grading pen, and student reactions to the grading process. *The Social Science Journal*, 50(1), 96–100.

Frederickson, N., & Jacobs, S. (2001). Controllability attributions for academic performance and the perceived scholastic competence, global self-worth and achievement of children with dyslexia. *School Psychology International*, 22(4), 401–416.

Gibby-Leversuch, R., Hartwell, B. K., & Wright, S. (2021). Dyslexia, literacy difficulties and the self-perceptions of children and young people: A systematic review. *Current Psychology*, 40, 5595–5612.

Glazzard, J. (2010). The impact of dyslexia on pupils' self-esteem. *Support for Learning*, 25(2), 63–69.

Hampton, N. Z., & Mason, E. (2003). Learning disabilities, gender, sources of efficacy, self-efficacy beliefs, and academic achievement in high school students. *Journal of School Psychology*, 41(2), 101–112.

Ho, C. S., & Fong, K. M. (2005). Do Chinese dyslexic children have difficulties learning English as a second language? *Journal of Psycholinguistic Research*, 34(6), 603–618.

Humphrey, N., & Mullins, P. M. (2002). Self-concept and self-esteem in developmental dyslexia. *Journal of Research in Special Educational Needs*, 2(2).

Ingesson, S. G. (2007). Growing up with dyslexia. *School Psychology International*, 28(5), 574–591.

Jeon, E. H., & Yamashita, J. (2014). L2 reading comprehension and its correlates: A meta-analysis. *Language Learning*, 64(1), 160–212.

Jeon, E. H., & Yamashita, J. (2022). L2 reading comprehension and its correlates: An updated meta-analysis. In E. H. Jeon & J. Yamashita (Eds.), *Understanding L2 proficiency: Theoretical and meta-analytic investigations.* (pp. 29–86). John Benjamins.

Katz, L., & Frost, R. (1992). The reading process is different for different orthographies: The orthographic depth hypothesis. (pp. 67–84). North-Holland.

Kojima, M., In'nami, Y., & Kaneta., T. (2022). L2 writing and its internal correlates: A meta-analysis. In E. H. Jeon, & J. Yamashita (Eds.), *Understanding L2 proficiency: Theoretical and meta-analytic investigations.* (pp. 159–211). John Benjamins.

Livingston, E. M., Siegel, L. S., & Ribary, U. (2018). Developmental dyslexia: Emotional impact and consequences. *Australian Journal of Learning Difficulties*, 23(2), 107–135.

Lyon, G. R., Shaywitz, S. E., & Shaywitz, B. A. (2003). A definition of dyslexia. *Ann. of Dyslexia*, 53, 1–14.

MacIntyre, P. D., Clément, R., Dörnyei, Z., & Noels, K. A. (1998). Conceptualizing willingness to communicate in a L2: A situational model of L2 confidence and affiliation. *The Modern Language Journal*, 82(4), 545–562.

McNulty, M. A. (2003). Dyslexia and the life course. *Journal of Learning Disabilities*, 36(4), 363–381.

Ministero dell'Istruzione, dell'Università e della Ricerca. (2011). *Linee guida per il diritto allo studio degli alunni e degli studenti con disturbi specifici dell'apprendimento*. Retrieved on 13 December 2023 from https://www.miur.gov.it/disturbi-specifici-dell-apprendimento-dsa

Moll, K., Georgii, B. J., Tunder, R., & Schulte-Körne, G. (2023). Economic evaluation of dyslexia intervention. *Dyslexia*, 29(1), 4–21.

Nijakowska, J. (2010). *Dyslexia in the foreign language classroom*. Multilingual Matters.

Nijakowska, J. (2014). Dyslexia in the European EFL teacher training context. In M. Pawlak & L. Aronin, L. (Eds.), *Essential topics in applied linguistics and multilingualism. Second language learning and teaching*. Springer.

Nuove norme in materia di disturbi specifici di apprendimento in ambito scolastico, Public Law N.170. 8 October 2010. *Gazzetta Ufficiale della Repubblica Italiana* 2010(244).

Palladino, P., Bellagamba, I., Ferrari, M., & Cornoldi, C. (2013). Italian children with dyslexia are also poor in reading English words, but accurate in reading English pseudowords. *Dyslexia*, 19(3), 165–177.

Perfetti, C., & Hart, L. (2002). The lexical quality hypothesis. *Precursors of Functional Literacy*, 11, 67–86.

Perfetti, C. (2007). Reading ability: lexical quality to comprehension. *Scientific Studies of Reading*, 11(4), 357–383. https://10.1080/10888430701530730.

Perry, C., Zorzi, M., & Ziegler, J. C. (2019). Understanding Dyslexia Through Personalized Large-Scale Computational Models. *Psychol Sci*, 30(3), 386–395.

Pino, M., & Mortari, L. (2014). The inclusion of students with dyslexia in higher education: A systematic review using narrative synthesis. *Dyslexia*, 20(4), 346–369.

Pitt, S., & Soni, A. (2017). Students' experiences of academic success with dyslexia: A call for alternative intervention. *Support for Learning*, 32(4), 387–405.

Ramus, F., Marshall, C. R., Rosen, S., & van der Lely, H. K. J. (2013). Phonological deficits in specific language impairment and developmental dyslexia: Towards a multidimensional model. *Brain*, 136(2), 630–645.

Ramus, F., Rosen, S., Dakin, S. C., Day, B. L., Castellote, J. M., & Frith, U. (2003). Theories of developmental dyslexia: Insights from a multiple case study of dyslexic adults. *Brain*, 126(4), 841–856.

Riddick, B. (2001). Dyslexia and inclusion: Time for a social model of disability perspective? *International Studies in Sociology of Education*, 11(3), 223–236.

Schulte-Körne, G. (2010). The prevention, diagnosis, and treatment of dyslexia. *Dtsch Arztebl Int*, 107(41).

Serrano, F., & Defior, S. (2008). Dyslexia speed problems in a transparent orthography. *Ann. of Dyslexia*, 58, 81–95.

Sparks, R., Ganschow, L., & Pohlman, J. (1989). Linguistic coding deficits in foreign language learners. *Ann. of Dyslexia*, 39, 177–195.

Szenkovits, G., & Ramus, F. (2005). Exploring dyslexics' phonological deficit: Lexical vs sub-lexical and input vs output processes. *Dyslexia*, 11(4), 253–268.

Tressoldi, P. E., Stella, G., & Faggella, M. (2001). The development of reading speed in Italians with dyslexia: A longitudinal study. *Journal of Learning Disabilities*, 34(5), 414–417.

Tseng, W.-T., Cheng, H.-F., & Gao, X. (2020). Validating a motivational self-guide scale for language learners. *Sustainability*, 12(16).

Vellutino, F.R., Fletcher, J.M., Snowling, M.J., & Scanlon, D.M. (2004). Specific reading disability (dyslexia): What have we learned in the past four decades? *Journal of Child Psychology and Psychiatry*, 45(1), 2–40.

Vender, M., Vernice, M., & Sorace, A. (2021). Supporting bilingualism in vulnerable populations. *Sustainability*, 13(24).

Verhoeven, L.T. (1994). Transfer in bilingual development: The linguistic interdependence hypothesis revisited. *Language Learning*, 44(3), 381–415.

von Hagen, A., Kohnen, S., & Stadie, N. (2021). Foreign language attainment of children/adolescents with poor literacy skills: A systematic review and meta-analysis. *Educ Psychol Rev*, 33, 459–488.

Wagner, R.K., Zirps, F.A., Edwards, A.A., Wood, S.G., Joyner, R.E., Becker, B.J., Liu, G., & Beal, B. (2020). The prevalence of dyslexia: A new approach to its estimation. *Journal of Learning Disabilities*, 53(5), 354–365.

Wendt, H., Walzebug, A., Bos, W., Smith, D.S., & Bremerich-Vos, A. (2017). Germany. In Mullis, I.V.S., Martin, M.O., Goh, S., & Prendergast, C. (Eds.), *PIRLS 2016. Encyclopedia: Education policy and curriculum in reading*. Boston College, TIMSS & PIRLS International Study Center. Retrieved on 13 December 2023 from https://timssandpirls.bc.edu/pirls2016/encyclopedia/

Ziegler, J.C., & Goswami, U. (2005). Reading acquisition, developmental dyslexia, and skilled reading across languages: A psycholinguistic grain size theory. *Psychological Bulletin*, 131(1), 3–29.

Ziegler, J.C., Perry, C., & Zorzi, M. (2020). Learning to read and dyslexia: From theory to intervention through personalized computational models. *Curr Dir Psychol Sci*, 29(3), 293–300.