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SHORT REPORT

Secondary symptoms of dyslexia: a comparison of self-esteem and anxiety profiles of children with and without dyslexia

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ABSTRACT

The secondary symptoms of individuals with dyslexia, such as high anxiety and low self-esteem, have aroused various debates not only in the educational, but also in the clinical context. Since pro and contra arguments are supported by a more or less equal number of empirical findings, no final conclusion could be drawn for this specific phenomenon. The current study aims to contribute more data in this respect and offers a possible explanation for both sides that either support or reject the relationship between dyslexia and its secondary symptoms. The main investigation of this study is the comparison of anxiety and self-esteem profiles of children with and without dyslexia. Participants are 124 school children aged between eight and 11 years. Their IQ as well as their reading and writing ability were also measured and used as control variables. All data were collected and analysed using a quantitative approach. Effect sizes are also provided in order to facilitate meta-analysis in the future and to confirm the results of a significant test. The results indicate that children with dyslexia have anxiety and self-esteem issues in the specific context or domain. However, their general anxiety and self-esteem were not impaired. A discussion regarding the possibility and/or the necessity of the secondary symptoms of dyslexia is also provided.

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Introduction

Dyslexia is a specific learning difficulty with a neurobiological origin (Lyon, Shaywitz, and Shaywitz 2003). According to Lyon, Shaywitz, and Shaywitz (2003), dyslexia is characterised by difficulties with accurate and/or fluent word recognition and by poor spelling and decoding abilities. This difficulty should not correlate with IQ and/or psychosocial adversity (American Psychiatric Association 2013).

Over the last decades, special concern about dyslexia has led to ongoing debates about special classes vs. inclusion, about special treatment vs. self-development, and the importance of diagnosis vs. stigma. Studies have reported that being diagnosed with dyslexia can have benefits or negative impacts. On the one hand, diagnosis is regarded as relief

(Hellendoorn and Ruijsenaars 2000) and the opportunity to receive appropriate treatments. On the other hand, the label *dyslexia* can have an impact on self-esteem and amplify emotional and behavioural problems (Carroll and Iles 2006; Riddick et al. 1999).

Specifically, contradictory findings and arguments on the secondary consequences of dyslexia have become a new phenomenon, more than 100 years after the first case of dyslexia was identified. A gradual interest in this particular topic is an outcome of civil development, particularly in the field of formal education. Our modern society places great value and high expectations on scholastic performance. Therefore, individuals who struggle with reading tasks as a basic skill to determine academic achievement may be vulnerable to emotional consequences such as low self-esteem and high levels of anxiety.

McNulty (2003) interviewed 12 adults with dyslexia and found that by school age, all participants had self-esteem problems if they struggled at school or experienced failure during their school days, perceived as traumatic. Another study reported that children with slight reading disabilities at the age of eight and 12 were unhappier, more anxious, less competent scholastically, and that their parents rated them as being less competent in all measures of self-esteem compared to children without any specific difficulties (Casey et al. 1992). Similar anxiety problems were also reported by university students who were diagnosed with dyslexia (Carroll and Iles 2006), indicating that the anxiety issues of individuals with dyslexia could become permanent in adulthood.

On the contrary, Heiervang et al. (2001) found that children with and without dyslexia between the ages of 10 and 12 are not different in terms of their internalising symptoms. However, their parents and teachers reported that children with dyslexia have higher behavioural problems than their peers without similar difficulties (Heiervang et al. 2001). In this respect, the secondary problems of dyslexia are reported by the significant others, even though the individuals themselves do not seem to be aware of their problems. More substantial results that contradict the secondary problems of dyslexia were found by Lamm and Epstein (1992). They conducted a study in order to evaluate the emotional status of students diagnosed with dyslexia compared to students without any known specific difficulties and emotional issues. Specifically, Lamm and Epstein (1992) compared the HSCL-90 profiles of 133 adolescents and young adults (38 participants with developmental dyslexia, 28 participants with subjective complaints regarding general concentration and reading comprehension difficulties, 23 psychiatric patients and 44 skilled readers without any known emotional difficulties). A cluster analysis of participants did not show any substantial differences between participants with dyslexia and the control group. Both groups, however, were easily differentiated from psychiatric patients. A similar result was reported by Miller, Hynd, and Miller (2005), who investigated school-age children with reading problems, on the basis of reports from their parents, their teachers and themselves. In this study, children with dyslexia were reported to have similar profiles of anxiety, depression and somatisation as those children without dyslexia. Additionally, children within the last second percentile of the reading distribution were reported to have no significant issues related to internalising symptoms.

Moreover, Hellendoorn and Ruijsenaars (2000) interviewed 27 adults with dyslexia in the Netherlands. Participants reported mostly negative school memories, although family relations were perceived as being predominantly positive and supportive. According to this result, it is more likely that individuals with dyslexia only experience negative self-esteem in the school context rather than in their general living environment. Moreover, Frederickson

and Jacobs (2001) revealed a different pattern of variation in self-esteem between children with and without dyslexia. They investigated children with ($n = 20$) and without dyslexia ($n = 20$) in terms of their scholastic competences, social acceptance, athletic competences, physical appearance, behavioural conduct and global self-worth. Results showed that children with dyslexia have a lower perceived scholastic competence compared to their peers without similar difficulties. However, there were no significant differences between the two groups for other variables. These results reflected that dyslexia may relate to the specific domain of self-esteem (e.g. scholastic competence) without harming self-esteem in general (e.g. global self-worth).

Methods

Sample

A total of 124 children aged between 8 and 11 participated in this study. The ratio between children with and without dyslexia was 60 ($M_{\text{age}} = 9.23$) to 64 ($M_{\text{age}} = 8.86$). They were comparable in IQ ($M_{\text{IQdys}} = 97.72$, $M_{\text{IQnondys}} = 101.09$, $t = 1.45$, $p = 1.15$), gender (boys = 62, girls = 62), and were assigned to either year three ($n = 57$) or year four ($n = 67$) at school.

Several schools were invited to participate in this study. All of those schools that agreed to participate were automatically included in the study without any further sampling procedure.

The diagnostic procedure and treatment of dyslexia varies between the cities where the children live. Some cities develop a programme with special classes for dyslexia and implement a central diagnostic procedure that is organised by the city. Other cities do not provide any support for children with dyslexia and instead diagnoses and treatment(s) are organised privately by the parents or family. Even though the process is not exactly the same, all children with dyslexia in this study were diagnosed by qualified psychologists and received (or still receive) specific treatment(s) in terms of their reading difficulty. This should ensure a similarity of the specific domains observed in the diagnostic procedure since all psychologists participating in this study use the Diagnostic and Statistical Manual of Mental Disorders (5th ed; *DSM-5*; American Psychiatric Association 2013) and/or described this particular condition in the International Statistical Classification of Diseases and Related Health Problems 10th Revision (10th ed; *ICD-10*; World Health Organization 2014) as their diagnostic guideline.

Moreover, all children without dyslexia had no history of learning or other specific difficulties and were assigned to mainstream classes.

Instruments and procedure

The following instruments were applied to measure self-esteem (Self-Esteem Test for Children and Adolescents [ALS], see Schauder 1991), anxiety (Spence Children's Anxiety Scale [SCAS], see Spence 1998), reading and writing ability (Salzburg Reading and Writing Test [SLRT], see Landerl, Wimmer, and Moser 1997), and IQ (Culture Fair Intelligence Test-20 Revision [CFT-20R], see Weiss 2006).

The ALS is a valuable tool to use because it not only enables a differentiation between general self-esteem (total score) and self-esteem in a specific context (i.e. self-esteem at school (SESch), self-esteem at home (SEH) and self-esteem during free time (SEFT)), but also

makes an assumption regarding possible self-esteem issues in a school setting that may be experienced by children with dyslexia.

The SCAS was chosen for two reasons. First, SCAS was developed specifically for children, unlike previous anxiety scales and tests that were usually developed for adults and later adjusted for children. Second, SCAS was developed based on the Diagnostic and Statistical Manual of Mental Disorders (4th ed; *DSM-IV*; American Psychiatric Association 1994) criteria, allowing a specification of anxiety types into six categories (i.e. separation anxiety (SA), social phobia (SP), obsessive compulsive behaviour (OC), panic/agoraphobia, physical injury fears and generalised anxiety (GA)), enabling a calculation of anxiety in general (i.e. a total score).

The SLRT was specifically chosen because it enables the analysis of word recognition and synthetic reading. The reading test consists of a subtest with frequent words, a text-reading (i.e. short and long text) subtest, and two subtests with pseudo words (i.e. pseudo words that are similar to words and pseudo words that are different from words). The first two subtests investigate the deficits of automatic direct word recognition, while the last two subtests analyse the deficits of synthetic reading out loud. Moreover, the time used to read the subtests were also measured so that the investigation is not limited to the reading success (i.e. the score from the reading task), but also the reading efficiency (i.e. the time required for reading). Therefore, SLRT is very valuable for dyslexia because it can differentiate between two deficits that are the main symptoms for this specific type of reading difficulty.

Finally, the CFT-20R was applied to this study because it consists of pictorial tasks that are appropriate for individuals with dyslexia, showing limitations in solving reading and writing tasks.

Children were asked to complete all questionnaires and tests. All instruments (except for the reading test) could be implemented in classical or individual settings. The reading test can only be administered in an individual setting and also requires a time measurement. The data were collected from six schools and one clinic for children with special needs. All permissions and the necessary administrative procedures were fulfilled. In the schools, all instruments (except for the reading test) were administered in a classical setting. The maximum number of children in one test group was 10 for the group of dyslexia and 30 for the group of non-dyslexia. In the clinic, children with dyslexia were tested individually. Irrespective of the classical or individual setting, all instruments were administered using a similar standardised procedure.

Effect size analysis

It is necessary to calculate the effect size as an additional analysis to the significant test for at least two reasons. First, the significant test depends on three indicators: the sample size, the effect size and errors (Sedlmeier and Renkewitz 2008). However, the objectives of studies are commonly to detect whether there is an effect relative to the sample size and error level. For this reason, a calculation of the effect size is substantially necessary. Second, the effect size provides appropriate data for future meta-analysis, which has a much greater power and, therefore has more advantages to explain the referred phenomenon. Compared to a single study, meta-analysis has a relatively higher power. In order to facilitate future research, particularly in the field of meta-analysis, the effect size analysis was conducted.

The effect size has been a major concern since Cohen (1988) published his work on populations. However, the interpretations of effect size are commonly made for a particular

sample of the study (Sedlmeier and Renkewitz 2008) and therefore, meta-analysis serves an important role (i.e. by achieving a more comprehensive deductive conclusion through a higher number of samples). There are two types of effect sizes: the measurement of deviation and the measurement of correlation. In this study, the measurement of deviation (d) was used as additional information, where, $d = \sqrt{\frac{S_A^2 n_A + S_B^2 n_B}{n_A + n_B}}$. Cohen defined d as follows: .2 = weak, .5 = medium, .8 = large effect.

Results

Discriminant analysis was conducted to reassess the reading and writing ability of children in two groups (dyslexia and non-dyslexia). Tables 1 and 2 and Figure 1 reported the results of discriminant analysis with dyslexia as a dependent variable and seven variables as predictors. The first predictor is words-true, which is the score of subtests for word and text reading. The second predictor is word time that represents the time needed to read the subtests for words and text. The third predictor is pseudo-true, that is the number of correct answers in the subtest pseudo-words. The fourth predictor is pseudo time, which reflects the time needed to read the subtest pseudo-words. The fifth predictor is reading-true, which represents the total score of the reading test. The sixth predictor is reading time, which is the time needed to read the entire reading test and the final predictor is writing, which is the score of the writing test.

According to Table 1, all predictors or independent variables (IVs) have a significant effect on the dependent variable *dyslexia*, which means that all IVs are good predictors for differentiating between children with and without dyslexia. Table 1 also provides the structure matrix of discriminant analysis, which represents the relative importance of the IVs. The values of the structure matrix are absolute. According to Table 1, writing, pseudo time and reading time are the three most important predictors for the dyslexic group.

Table 1. Test equality and structure matrix of discriminant analysis.

Predictors	Wilk's lambda	F	Structure matrix
Words_true	.93	8.86**	.33
Words_time	.85	21.34**	-.51
Pseudo_true	.88	16.58**	.45
Pseudo_time	.78	34.89**	-.65
Reading_true	.89	15.06**	.42
Reading_time	.79	33.30**	-.63
Writing	.70	57.71**	.83

Notes: Words_true and pseudo_true are total score of subtest words and pseudo-words in the reading test. Reading_true and writing are total score of reading test and writing test. Words_time, pseudo_time and reading_time are total time needed for words subtest, pseudo-words subtest, and reading test, respectively.

**Results are significant with $p < .01$.

Table 2. Prediction of discriminant analysis.

		Predicted group membership		Total
		Dyslexia	Non-dyslexia	
Count	Dyslexia	24 (77.4%)	7 (22.6%)	31
	Non-dyslexia	3 (10.3%)	26 (89.7%)	29

Notes: Since sample sizes are relatively equal, IVs have a 50% chance of predicting correctly. However, most researchers agree to accept a hit ratio that is 25% larger than that due to chance (Burns and Burns 2009). Cross-validated accuracy is 78.2% which is higher than the hit ratio.

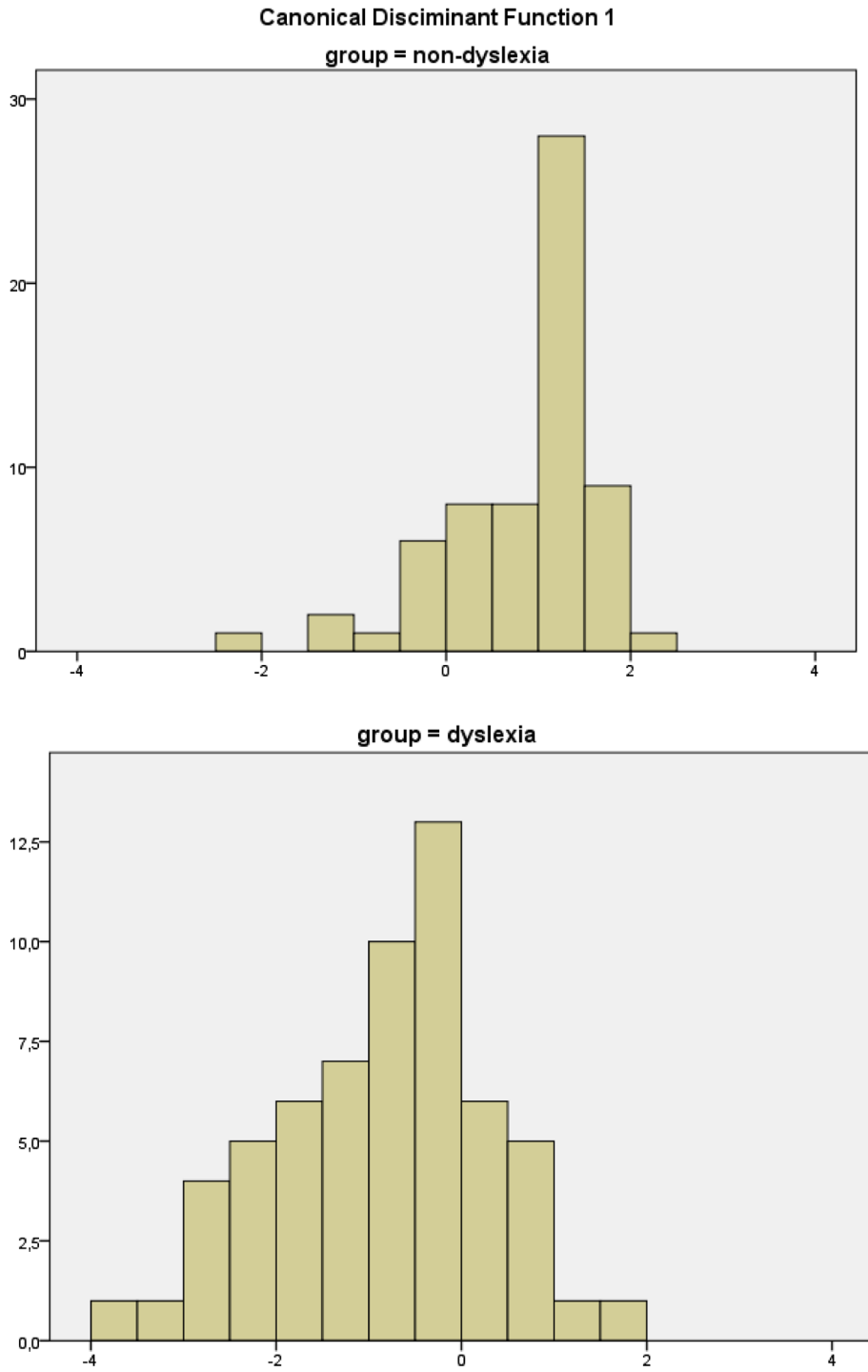


Figure 1. Separate group graph of discriminant analysis. Group dyslexia: $M = -.85$; $SD = 1.16$; $n = 60$. Group non-dyslexia: $M = .80$; $SD = .82$; $n = 64$.

Another way of interpreting the results from the discriminant analysis is to describe each group based on its profile, using the group's means of predictor variables (Burns and Burns 2009). In discriminant analysis, this means is called the centroid. The centroid for the dyslexic group is $-.85$ and $.80$ for the non-dyslexic group, which reflects a significant difference between the dyslexic and the non-dyslexic group. Table 2 reports the number of cases that are well predicted by the IVs. In this respect, the cross-validated accuracy is 78%. This value exceeds 75% of the hit ratio (see also the note of Table 2) (Burns and Burns 2009), meaning that the predictors are suitable to differentiate between the dyslexic group and the control group. Moreover, Figure 1 describes the distribution of cases in the dyslexic group and the non-dyslexic group. The mean of this distribution is the centroid. The dyslexic group shows a negative mean value, while the non-dyslexic group has a positive mean value. Based on the distribution in Figure 1, the two groups are easily differentiated by the predictors mentioned above.

Table 3 delivers the results of an ANOVA with dyslexia as the IV and anxiety and self-esteem as the dependent variables. Accordingly, children with dyslexia reported having a significantly higher GA and a lower SESch compared to their peers without similar difficulties. The incidences of other subtypes of anxiety and other domains of self-esteem, as well as anxiety and self-esteem in general, were similar between the two groups. These results were also supported by the distribution of effect size of each variable, explained as follows. Based on Cohen's criteria, the first group of variables has a weak-medium effect size (GA and SESch, these variables are significant with $p < .05$). The third group of variables has weak effect sizes – SP, OC, panic/agoraphobia, physical injury fears, SEFT, SEH and anxiety in general are classified in this group. The effect of dyslexia on these variables is clearly not significant. The effect sizes of the second group of variables lie between the first and the third groups. The second group consists of SA and self-esteem in general (these variables have very small p -values, but they are not less than $.05$).

Discussion

Studies on dyslexia have tried to reveal the incidences of secondary symptoms (e.g. the problems of anxiety and self-esteem) that could be developed by individuals who have been diagnosed with dyslexia. Different results were obtained and it seems that those differences

Table 3. ANOVA dyslexia on anxiety and self-esteem.

	<i>F</i>	<i>M</i>	<i>SD</i>	<i>d</i>
Separation anxiety	3.15	-.89	.50	-.32
Social phobia	1.30	-.53	.46	-.20
Obsessive compulsive	2.30	.75	.50	.27
Panic/agoraphobia	2.08	-.45	.31	-.26
Generalised anxiety	5.38*	-1.07	.46	-.42
Physical injury fears	.79	-.37	.42	-.16
Self-esteem at school	4.42*	3.62	1.72	.38
Self-esteem in the free time	1.44	1.91	1.60	.22
Self-esteem at home	2.49	2.65	1.68	.28
Anxiety	1.84	-2.55	1.88	-.24
Self-esteem	3.67	8.18	4.27	.34

Notes: Anxiety divided into following categories: separation anxiety, social phobia, obsessive compulsive, panic/agoraphobia, physical injury fears and generalised anxiety. Anxiety is the total score of six categories. Self-esteem observed three important life domains: self-esteem at school, self-esteem in the free time and self-esteem at home. Self-esteem is the total score of these three domains specific.

*Results are significant with $p < .05$.

Interpretation of d values (absolute value): 2 = weak, 5 = medium, 8 = large effect (Cohen 1988).

were the consequences of various contexts and experimental designs. Therefore, a general statement about the secondary problems of individuals with dyslexia cannot be proven. Accordingly, specific as well as multi-context studies should be conducted in order to analyse the particular and general issues of this complex phenomenon. Moreover, a multi-context design would allow us to understand and undertake comparisons among various possible situations for individuals with dyslexia.

The results of this study found that children with and without dyslexia have similar anxiety and self-esteem profiles in general. However, children with dyslexia have a higher GA and a lower self-esteem in the school setting compared to children without similar difficulties. Therefore, it can be argued that children with dyslexia develop higher anxiety and lower self-esteem in certain contexts and settings rather than in their general living environment. To support this argument, it is valuable to mention some studies that have emphasised the importance of looking at differences of self-esteem in various domains (e.g. Chapman 1988; Montgomery 1994; Prout, Marcal, and Marcal 1992). It is even more important to note that whereas adults with dyslexia generally rated themselves worse academically compared to their peers in both primary and secondary school, their self-esteem in other domains such as their personal and social lives are not impaired (Riddick et al. 1999).

Self-esteem is a personal characteristic that develops over one's life span. Battle (1990) found that a relatively undifferentiated self-esteem can develop into a differentiated hierarchical self-esteem model as young children grow older. An important remark arises due to the nature of self-esteem, that is a comparison of the self with the ideal self or with significant others. If we focus on the comparison with significant others, does the class type (i.e. mainstream vs. special classes) play a significant role in shaping the self-esteem profile of children with dyslexia? Should we expect different effects of reading difficulties on self-esteem if the class type is controlled? These questions cannot be answered specifically by this study since the class type and the interventions received by children with dyslexia were not controlled. However, it is important to note that the environmental condition plays a significant role in shaping the self-esteem model.

Furthermore, an extensive study about the sources and the manifestations of stress in children with dyslexia was conducted by Alexander-Passe (2006). He found that children with dyslexia in the third to fifth year at school experience the highest stress levels, causing emotional (e.g. fear, shyness, loneliness) and physiological (e.g. nausea, tremors, rapid heart-beat) manifestations. These findings are partly consistent with the results from the current study regarding the disadvantages of children with dyslexia in GA (e.g. rapid heart-beat during anxious events). However, this study does not provide evidence of other anxiety-subtypes (e.g. SA that could be represented by loneliness and SP that could be detected through shyness). These more positive results could be regarded as consequences of sample characteristics. All of the children with dyslexia in this study received special treatment in order to improve their reading skills as well as develop a positive personal character. These treatments may benefit children with dyslexia, in particular by preventing them from developing specific anxiety-subtypes. However, since the current study did not specify the treatments received by the children with dyslexia, the argument related to the benefit of the treatment is regarded as a proposed explanation rather than a proven outcome.

To conclude, children with dyslexia showed two general risk factors that were related to the specific domain of self-esteem and a particular type of anxiety. The secondary issues of dyslexia are reported to be significant in the school setting rather than in general life

situations such as in the family or during free time. This result should be substantially considered by the school staff, especially teachers who play a significant role in managing the classroom.

Limitations of the study

Three limitations of the study should be taken into consideration when making future comparisons and/or analysis. First, it is necessary to increase the sample size since power depends directly on it. Some results in this study could not find any significant differences, even though the effect size was not really that small. In comparison to another study, for example, Elbaum and Vaughn (2001) found significant differences with an effect size of .19. In this study, some effect sizes yielded $d > .30$. However, according to a significant test, the differences between two groups are not significant.

Second, the study did not control the treatments that were received by children with dyslexia. Since the variability of treatments may also have certain effects on the results of the study, it is recommended for future studies to classify the treatments of dyslexia (e.g. special classes, particular individual therapies, group therapies, etc.). Moreover, the specification of treatments could also provide evidence on the effectiveness of a particular treatment in enhancing reading skills as a primary issue as well as in reducing secondary consequences (e.g. anxiety and self-esteem issues).

Third, this study was not specifically designed to analyse cultural differences and therefore the generalisation of the results in a cross-cultural perspective is not recommended.

Implications

Even though children with dyslexia reported similar profiles of self-esteem and anxiety in general, they clearly have issues with GA and (SESch). Since this study did not control the class type and the treatments received by the children with dyslexia, it is hard to conclude which treatment and class type are more useful in preventing the development of secondary symptoms of dyslexia. However, since the problem occurs at school rather than in another context, further attention should be delivered to the scholastic programme. For example, appropriate teaching and support practices during school years are expected to be among those variables that play a significant role in this respect. Teachers should be aware that children with dyslexia could develop more problems than 'only' difficulties in reading and therefore classroom management, task distribution, instruction of the task, and other scholastic activities should take into account this condition as an important factor.

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