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Parental stress, quality of life, and behavioral alterations in children with dyslexia

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ABSTRACT

Introduction: Dyslexia is a learning disorder that, in addition to affecting reading skills, has a significant impact on emotional, social, and family well-being. Despite advances in understanding the disorder, its influence on parental stress and children's quality of life remains an underexplored area.

Objective: The aim of this study was to analyze differences in parental stress, quality of life, and behavioral profiles between children with dyslexia and those with typical development, as well as to assess possible relationships between these factors.

Method: A total of 100 children (50 diagnosed with dyslexia and 50 with typical development), aged between 8 and 10 years, participated in the study along with their caregivers. Variables were measured using the PSI-SF (parental stress), Kiddo-KINDL (quality of life), and BASC-3 (behavior) instruments, complemented by descriptive statistical analyses, t-tests, and a mediation model.

Results: Caregivers of children with dyslexia exhibited significantly higher levels of stress ($p < .001$) across all evaluated dimensions, with pronounced effects in the subscales of emotional distress and perceived difficulties in the child. Children with dyslexia showed reduced quality of life, particularly in areas such as self-esteem and social relationships, with statistically significant differences ($p < .001$). Additionally, they exhibited more behavioral problems, especially in aggression and anxiety. However, mediation analyses did not identify problematic behaviors as direct mediators between dyslexia diagnosis and parental stress.

Conclusions: The findings highlight how dyslexia affects both children and their families, exerting a multidimensional impact. This study underscores the importance of continued research into the interactions between emotional, social, and family factors to optimize support for this population.

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1. Introduction

Dyslexia is a specific learning disorder characterized by persistent difficulties in acquiring reading skills, including decoding, fluency, and reading comprehension, despite adequate intelligence and appropriate educational instruction (APA, 2022). It is a neurodevelopmental disorder that not only significantly interferes with academic performance but also affects emotional and social functioning throughout an individual's lifespan. Approximately 5–10 % of the global child population has dyslexia, making it one of the most prevalent conditions affecting academic achievement (Snowling, 2013). Given its high prevalence, dyslexia is widely studied in terms of cognitive deficits and reading intervention strategies. However, its far-reaching consequences beyond academic struggles have received comparatively less attention (Gabrieli, 2009; Peterson & Pennington, 2012).

Historically, research on dyslexia has focused primarily on the cognitive manifestations of the disorder, particularly in relation to phonological deficits, and on developing pedagogical strategies aimed at improving reading skills (Gabrieli, 2009; Peterson & Pennington, 2012). While these perspectives have provided crucial insights into dyslexia's cognitive underpinnings, they have also overshadowed other critical aspects of the disorder, such as its impact on emotional, social, and familial domains. Recent research has increasingly emphasized that dyslexia extends beyond the academic sphere and significantly influences the psychological well-being, self-esteem, and interpersonal relationships of affected individuals (Peterson & Pennington, 2015). This broader understanding of dyslexia calls for an integrated approach that not only addresses reading difficulties but also considers the disorder's social-emotional repercussions.

Dyslexia has also been examined from a developmental perspective, with researchers emphasizing the importance of early diagnosis and intervention. The earlier dyslexia is identified, the better the outcomes for academic success and self-esteem (Vellutino et al., 2004). Longitudinal studies indicate that children diagnosed and supported in their early years show fewer academic and emotional difficulties later in life (Shaywitz & Shaywitz, 2008). In contrast, individuals whose dyslexia goes undiagnosed until adolescence or adulthood often experience greater struggles in both educational and professional settings, highlighting the necessity of systematic screening and early intervention programs.

From a neuropsychological perspective, dyslexia is associated with structural and functional brain differences, particularly in areas involved in phonological processing, sensory integration, and reading fluency. Neuroimaging studies have consistently shown reduced activation in the left temporoparietal and occipitotemporal regions of the brain, which are critical for grapheme-phoneme conversion and the development of efficient word recognition pathways (Bruni et al., 2009; Saccani et al., 2022). These findings suggest that dyslexia results from inefficient neural connectivity in reading-related areas, leading to slow and effortful reading processes.

Moreover, the dual-route model of reading suggests that dyslexia arises from impairments in both the phonological route (grapheme-to-phoneme conversion) and the lexical route (whole-word recognition), leading to difficulties in word retrieval and fluency (Coltheart et al., 2001). This model supports the hypothesis that dyslexia is not a single deficit disorder but rather a spectrum of impairments involving multiple cognitive and neurological processes.

Additional research has identified a genetic basis for dyslexia, with studies showing that the disorder often runs in families (Fisher & DeFries, 2002). Specific genetic markers, such as those found on chromosomes 6 and 15, have been associated with increased risk for dyslexia (Scerri & Schulte-Körne, 2010). These genetic findings further reinforce the idea that dyslexia is a biologically rooted condition rather than simply a result of poor instruction or lack of motivation.

Furthermore, dyslexia is not limited to phonological impairments but also involves broader cognitive deficits, particularly in attention, memory, and executive functioning. Studies indicate that individuals with dyslexia exhibit difficulties in sustained and selective attention, making it challenging to concentrate for extended periods, particularly during reading tasks (Cheng et al., 2021). Deficits in working memory, especially verbal memory, further contribute to reading difficulties, as individuals with dyslexia struggle to retain and manipulate linguistic information while processing text (Gathercole & Alloway, 2008). Additionally, impairments in executive functions, including planning, organization, and inhibitory control, create further academic challenges, making it difficult for students with dyslexia to develop effective study strategies and adapt to structured learning environments (Reiter et al., 2005).

Beyond its cognitive impairments, dyslexia has a profound impact on emotional well-being and social interactions. Children with dyslexia frequently experience frustration and distress due to their persistent reading struggles, which can lead to low self-esteem and emotional dysregulation (Karande et al., 2009a). As a result, they are at a higher risk of developing anxiety, depression, and social withdrawal, further exacerbating their academic and personal challenges (Marchand-Krynski et al., 2018).

Dyslexia has been linked to learned helplessness, a condition in which repeated academic failure leads children to believe they have no control over their success (Burden, 2008). This can result in a lack of motivation to engage in reading or academic tasks, even when accommodations are provided. The social consequences of dyslexia can be severe, as peer relationships are often affected when children struggle with reading-related classroom activities, group projects, and oral presentations (Mugnaini et al., 2009).

Despite extensive research on the academic and psychological effects of dyslexia on children, its impact on family dynamics and parental stress has been significantly understudied. Because dyslexia is a chronic condition requiring continuous attention and intervention, it places a high emotional and psychological burden on both the affected children and their families (Hagan et al., 2016; Zhang et al., 2011). Parents of children with dyslexia often experience elevated stress levels due to the ongoing need to provide academic support, navigate school accommodations, and advocate for their child's educational rights (Hernández Pérez & Rabadán Rubio, 2023; Karande et al., 2009b).

Parental stress is often exacerbated by feelings of guilt and frustration, as parents may struggle to understand why their child faces difficulties despite their efforts to provide support (Shaywitz & Shaywitz, 2020). This stress can be compounded by negative interactions with teachers and school administrators, who may lack proper training in recognizing and addressing dyslexia, leading to misunderstandings and inadequate support structures.

Children with dyslexia frequently exhibit difficulties in emotional regulation and behavioral control, particularly in response to academic stressors. Frustration stemming from reading and writing tasks often translates into externalizing behaviors, such as aggression, impulsivity, and oppositional tendencies (Ramus, 2003; Willcutt & Pennington, 2000). Conversely, internalizing symptoms such as anticipatory anxiety related to reading performance can further exacerbate academic avoidance and social withdrawal (Goswami et al., 2011; Terras et al., 2009). These behavioral patterns not only hinder academic success but also contribute to heightened parental stress, creating a negative feedback loop that impacts the entire family system (Hernández Pérez & Rabadán Rubio, 2023).

Despite the growing attention to these multidimensional aspects of dyslexia, significant gaps remain in the current literature. Most studies have addressed the individual manifestations of the disorder without considering the interaction between parental stress, quality of life, and the behavioral profile of children with dyslexia. Therefore, the present study aimed to compare parental stress, quality of life, and behavioral profile between a group of children diagnosed with dyslexia and a group with typical development. Additionally, we examined the mediating role of behavioral problems in the relationship between parental stress and the diagnosis of dyslexia. Based on previous literature, we hypothesized that parents of children with dyslexia would report significantly higher levels of stress compared to parents of typically developing children. Furthermore, we expected that children with dyslexia would exhibit lower quality of life and more behavioral difficulties than their typically developing peers. Lastly, we hypothesized that behavioral problems would mediate the relationship between parental stress and the diagnosis of dyslexia, such that increased parental stress would be associated with greater behavioral issues, which in turn would be linked to dyslexia.

2. Method

2.1. Participants

The study included a total of 100 children, of whom 48 were girls and 52 were boys, aged between 8 and 10 years ($M = 9.2$, $SD = .6$), divided into two groups of 50 participants each. The selected age range was based on developmental milestones in reading acquisition, as children in this stage are expected to have consolidated basic reading skills, allowing for a clearer distinction between typical readers and those with reading difficulties. Participants in the dyslexia-diagnosed group (G-DYSLEXIA) were identified through formal clinical diagnoses of developmental dyslexia conducted by multidisciplinary teams at hospital and educational referral centers. These diagnoses followed standardized criteria, incorporating neuropsychological assessments, academic history reviews, and structured evaluations of phonological processing, reading fluency, and comprehension. Only children who had been diagnosed at least one year before the study were included, ensuring that their difficulties were persistent rather than transient delays in literacy acquisition.

Children with typical development (G-CONTROL) were selected to match the G-DYSLEXIA group in terms of age, gender distribution, and socioeconomic background, which was determined based on parental education and household income. These participants were recruited from the same schools as the experimental group to minimize potential confounding variables related to educational environment and instruction quality. None of the children in the control group had a history of learning difficulties, language impairments, or neurodevelopmental disorders, and their teachers confirmed that they demonstrated typical reading skills for their age. To further validate their inclusion, they underwent screening assessments, including measures of phonological awareness, rapid automatized naming, and word reading efficiency, to ensure they were within the expected range for their age and grade level.

Participants were recruited from public and private elementary schools that collaborated with hospital centers specializing in neurodevelopmental disorders. The schools provided additional information regarding the type of academic support children with dyslexia received, including specialized reading intervention programs, individualized education plans, and accommodations such as extra time for reading tasks. Parents of all participants provided informed consent, and children assented to participation after a detailed explanation of the study's objectives and procedures. Exclusion criteria were strictly applied, ruling out children with severe sensory pathologies, intellectual disabilities, psychiatric or neurodevelopmental disorders other than dyslexia, and any preexisting neurological or medical conditions that could influence cognitive or emotional abilities. By ensuring a rigorous selection process and a well-matched control group, the study aimed to isolate the specific effects of dyslexia on academic, emotional, and social variables.

2.2. Design

The present study adopted a descriptive and cross-sectional design, with the aim of analyzing the differences and relationships between behavioral, emotional, and executive variables in children with and without dyslexia. The descriptive design allowed for characterizing and comparing the levels of parental stress, children's quality of life, and maladaptive behaviors in the two participant groups, while the cross-sectional nature focused on a single-point-in-time measurement, providing a snapshot of the variables of interest in the studied population (Hernández-Sampieri et al., 2014). This approach is particularly suitable when seeking to examine the impact of an independent variable—in this case, the diagnosis of dyslexia—on a series of dependent variables, without the need for experimental manipulation.

2.3. Instruments

2.3.1. Parental Stress Index – Short Form (PSI-SF)

The Parental Stress Index – Short Form (PSI-SF; Abidin, 1995) is a widely used tool for assessing the level of stress experienced by parents in their parental role. It is composed of 36 items organized on a five-point Likert scale. This instrument is divided into three

main subscales: Parental Distress, Dysfunctional Parent-Child Interaction and Difficult Child. The Parental Distress subscale focuses on the perceived quality of the bond between parent and child, while the Dysfunctional Parent-Child Interaction subscale evaluates parents' perceptions of the responsibilities and burdens associated with raising the child. Finally, the Difficult Child subscale measures the emotional well-being of the parents in relation to their parental role and external factors that may influence their experience of stress. The PSI-SF allows for a comprehensive evaluation of parental stress, facilitating the identification of specific areas requiring intervention. Studies have demonstrated its efficacy across different cultural and socioeconomic contexts, making it a versatile tool for research and clinical practice (Abidin, 1995). Its ability to discriminate between levels of parental stress provides valuable information for developing support programs aimed at improving family dynamics and the well-being of both parents and their children. The Cronbach's alpha obtained in the present study was.85. Given the absence of validated norms for the Spanish population, raw scores were used to compare relative differences between groups, following the approach adopted in previous international studies examining parental stress in diverse cultural contexts.

2.3.2. Kiddo-KINDL

The Kiddo-KINDL (Bullinger et al., 1994) is a questionnaire designed to measure children's quality of life across five fundamental dimensions, composed of 24 items evaluated on a five-point scale. The five dimensions it assesses are: Physical Well-being, Emotional Well-being, Self-esteem, Family Well-being, and Social Relationships. The Physical Well-being dimension focuses on the child's perception of their health status and physical abilities, while Emotional Well-being explores mood and the frequency of negative emotions such as sadness or anxiety. The Self-esteem dimension evaluates the child's perception of their personal worth—a crucial aspect in dyslexia studies, as children with this disorder often experience difficulties in this area. Additionally, the Family Well-being dimension measures the quality of family interactions and the perceived support at home, and the Social Relationships dimension assesses the quality of the child's interactions with peers and their social integration. The Cronbach's alpha obtained in the present study was.89. Since no newly adapted version for the Spanish population is currently available, the results were interpreted in relation to international benchmarks, ensuring comparability while acknowledging the need for future validation studies within the Spanish-speaking population.

2.3.3. Behavior Assessment System for Children and Adolescents – 3 (BASC-3)

The Behavior Assessment System for Children and Adolescents – 3 (BASC-3; Reynolds & Kamphaus, 2015) is a comprehensive tool used to evaluate children's emotions and behaviors through multiple informants, including parents, teachers, and self-reports. With a Cronbach's alpha coefficient of.90, the BASC-3 covers a wide range of behavioral and emotional variables, such as Aggressiveness, Anxiety, Depression, Somatization, Atypicality, Withdrawal, Attention Problems, Adaptability Problems, Social Skills Problems, Limitations in Daily Activities, and Lack of Functional Communication. Each variable is designed to provide a detailed and specific evaluation of different aspects of the child's behavior and emotional well-being. The versatility of the BASC-3 makes it suitable for a variety of clinical and educational contexts, enabling professionals to identify behavioral patterns that may interfere with academic performance and the social integration of children with dyslexia. Its multi-informant structure facilitates a comprehensive and balanced view of the child's behavior, which is essential for designing effective interventions that address both academic challenges and the emotional and social difficulties associated with dyslexia. The Cronbach's alpha obtained in the present study was.91.

2.4. Procedure

Data collection was carried out in two stages. In the first stage, initial interviews were conducted with parents or guardians by qualified researchers to gather demographic information, family history, and parental stress, complemented by the administration of the PSI-SF. These interviews were conducted in a quiet environment to ensure parents felt comfortable providing detailed responses. In addition to parental stress measures, the interviews included questions about the child's developmental history, educational background, and any previous interventions received for learning difficulties. Parents were also asked about their perceptions of their child's emotional well-being and social adaptation.

In the second stage, direct assessments of the children were conducted individually in a quiet, distraction-free setting within their school or at the research center, depending on parental preference and logistical feasibility. Each child participated in two 45-minute sessions administered by trained neuropsychologists and educational psychologists. The first session focused on behavioral and emotional assessment using the BASC-3, in which structured observations and self-report scales were completed to evaluate emotional functioning, adaptive behavior, and potential behavioral challenges. The second session included the administration of the Kiddo-KINDL, assessing the child's quality of life across multiple domains, including emotional well-being, self-esteem, social relationships, and school-related stress. Additional observations were recorded to note children's engagement, attentional capacity, and any signs of test anxiety.

To ensure standardized administration, examiners followed a structured protocol and received specialized training on the selected instruments. Any child who showed signs of excessive anxiety or fatigue was allowed breaks, and assessments were scheduled at optimal times to prevent cognitive overload. After the evaluations, parents received debriefing sessions where general insights about their child's performance were shared, without disclosing specific scores, to ensure ethical and non-harmful communication of results.

This research was approved by the Ethics Committee under approval code *120–2023-H*. Informed consent was obtained from the families and participating children, ensuring that they understood the objectives, procedures, risks, benefits, and data confidentiality, in compliance with LOPD-GDD 3/2018 and the GDPR (EU Regulation 2016/679).

2.5. Data analysis

Before proceeding with the comparative analyses, a normality analysis (Chi-square test, $p < .05$) and descriptive analyses (means, standard deviations, and frequencies) were conducted to ensure sociodemographic comparability between the groups and to characterize the variables of interest, thereby strengthening the internal validity of the study and preparing the data for subsequent analyses. Next, Welch's t-tests for independent samples were applied to compare the means of the dependent variables (parental stress, children's quality of life, and maladaptive behaviors) between children with dyslexia and those with typical development, as Welch's test is more robust to violations of homogeneity of variance. Within-group comparisons across different dimensions were conducted using paired-sample T-tests. Finally, mediation analyses were performed to explore whether behavioral problems mediate the relationship between the diagnosis of dyslexia and total parental stress. All statistical analyses were conducted using SPSS v.29 (IBM Corp, 2023).

3. Results

The chi-square analysis of all demographic variables (*sex, age, dyslexia diagnosis, years of treatment, comorbidity, school support, weeks of gestation, and Apgar score*) was not significant ($p > .50$), thereby confirming that no sample differences would arise as a function of these variables (Table 1).

To address the study's objectives, Welch's t-tests were conducted to compare the scores of both groups on variables related to parental stress, quality of life, and behavioral patterns (Table 2, Table 3, and Table 4). Levene's test confirmed the assumption of homogeneity of variances ($p > .05$), indicating that the variances of the groups in the evaluated variables are homogeneous.

The analysis of parental stress, measured through the subscales *Parental Distress, Parental-Child Dysfunctional Interaction*, and *Difficult Child*, revealed statistically significant differences ($p < .001$) between caregivers of G-DYSLEXIA and G-CONTROL. In *Parental Distress*, G-DYSLEXIA obtained a mean of 39.78 ($SD = 5.068$) compared to 19.60 ($SD = 4.463$) in G-CONTROL, reflecting greater emotional distress in the dyslexia group (a difference of −20.18 points; $t(96) = -21.130$, $p < .001$). In the *Parental-Child Dysfunctional Interaction* subscale, the dyslexia group averaged 39.00 ($SD = 5.402$) compared to 19.30 ($SD = 4.626$) in the control group (a difference of −19.70 points; t(96) = -19.586, p < .001), indicating greater difficulty in the parent-child interaction. Finally, in *Difficult Child*, G-DYSLEXIA reached 39.84 ($SD = 5.850$) compared to 18.84 ($SD = 4.533$) in G-CONTROL, with a difference of −21.00 points ($t(98) = -20.066$, $p < .001$, $\eta^2 = .681$), underscoring an increase in the perception of behavioral difficulties among children with dyslexia.

The analysis of the dimensions of quality of life (*Self-esteem, Emotional Well-being, Peer-Related Development/Activity, Family Well-being,* and *Physical Well-being*) shows statistically significant differences ($p < .001$) between the G-DYSLEXIA and G-CONTROL, with consistently lower means for G-DYSLEXIA on all scales. In *Self-esteem*, G-DYSLEXIA obtained 2.04 ($SD = .856$) compared to 8.12 ($SD = 2.545$) in the control group (a difference of −6.08 points; $t(98) = -16.013$, $p < .001$, $\eta^2 = .703$). In *Emotional Well-being*, the dyslexia group averaged 3.16 ($SD = 1.405$) versus 13.78 ($SD = 2.985$) in the control group (a difference of −10.62 points; $t(98) = -22.763$, $p < .001$, $\eta^2 = .841$). In *Peer-Related Development/Activity*, the values were 3.02 ($SD = 1.464$) for G-DYSLEXIA and 14.14 ($SD = 3.307$) for G-CONTROL (a difference of −11.12 points; $t(98) = -21.740$, $p < .001$, $\eta^2 = .623$). For *Family Well-being*, G-DYSLEXIA reached 2.00

Table 1
Participant Characteristics.

Variable	G-DYSLEXIA	G-CONTROL	Chi-square Test Results
Sex	52 % males (N = 26) 48 % females (N = 24)	52 % males (N = 26) 48 % females (N = 24)	Chi-square = 3.901 $p = .330$
Age	34.0 % 8 years old (N = 17) 32.0 % 9 years old (N = 16) 34.0 % 10 years old (N = 17)	34.0 % 8 years old (N = 17), 32.0 % 9 years old (N = 16), 34.0 % 10 years old (N = 17)	Chi-square = 7.230 $p = .622$
Dyslexia Diagnosis	50 % diagnosed (N = 50)	100.0 % not dyslexia diagnosis (N = 50)	Chi-square = 19.170 $p = .999$
Years of Treatment	28.0 % 1 year (N = 14) 32.0 % 2 years (N = 16) 40.0 % 3 years (N = 20)	100.0 % not treatment (N = 50)	Chi-square = 5.872 $p = .493$
Comorbidity	30.0 % dysgraphia (N = 15) 33.0 % dyscalculia (N = 17) 37.0 % both conditions (N = 18)	100.0 % not comorbidity (N = 50)	Chi-square = 6.988 $p = .582$
School Support	50.0 % receiving support (N = 25), 50.0 % not receiving support (N = 25)	100.0 % not receiving support (N = 50)	Chi-square = 20.170 $p = .999$
Gestational Weeks	32.0 % 30–35 weeks (N = 16), 34.0 % 35–40 weeks (N = 17), 34.0 % > 40 weeks (N = 17)	32.0 % 30–35 weeks (N = 16), 34.0 % 35–40 weeks (N = 17), 34.0 % > 40 weeks (N = 17)	Chi-square = 6.322 $p = .534$
Apgar Score	28.0 % at risk (N = 14) 36.0 % intermediate (N = 18) 36.0 % normal (N = 18)	28.0 % at risk (N = 14) 36.0 % intermediate (N = 18) 36.0 % normal (N = 18)	Chi-square = 6.079 $p = .516$

Table 2
Results of the differences in the measures related to parental stress between the G-DYSLEXIA and G-CONTROL groups, as evaluated through the PSI-SF instrument.

Parental Stress	Groups		Levene's Test			Welch's t-tests for Comparison of Means				
	G-DYSLEXIA	G-CONTROL	*F*	Sig.	η^2	*t*	df	Sig. (bilateral)	Mean Difference	ð
Parental Distress	*M* = 39.78 *SD* = 5.068	*M* = 19.60 *SD* = 4.463	1.267	.263	-	−21.130	96	< .001*	−20.180	4.764
Dysfunctional Parent-Child Interaction	*M* = 39.00 *SD* = 5.402	*M* = 19.30 *SD* = 4.626	2.039	.156	-	−19.586	96	< .001*	−19.700	4.929
Difficult Child	*M* = 39.84 *SD* = 5.850	*M* = 18.84 *SD* = 4.533	7.648	.007	.681	−20.0.66	98	< .001*	−21.000	5.228

* $p < .05$

Table 3
Results of the differences in the measures related to quality of life between G-DYSLEXIA and G-CONTROL, evaluated through the Kiddo-KINDL instrument.

Quality of life	Groups		Levene's Test			Welch's t-tests for Comparison of Means				
	G-DYSLEXIA	G-CONTROL	*F*	Sig.	η^2	*t*	df	Sig. (bilateral)	Mean Difference	ð
Self-esteem	M = 2.04 *SD* = .856	*M* = 8.12 *SD* = 2.545	47.291	< .001*	.703	−16.013	98	< .001*	−6.080	1.952
Emotional Well-being	*M* = 3.16 *SD* = 1.405	*M* = 13.78 *SD* = 2.985	32.162	< .001*	.841	−22.763	98	< .001*	−10.620	2.348
Peer-Related Development/ Activity	*M* = 3.02 *SD* = 1.464	*M* = 14.14 *SD* = 3.307	43.933	< .001*	.623	−21.740	98	< .001*	−11.120	2.531
Family Well-being	*M* = 2.00 *SD* = .902	*M* = 7.86 *SD* = 2.587	37.938	< .001*	.831	−15.120	98	< .001*	−5.860	1.942
Physical Well-being	*M* = 2.10 *SD* = .735	*M* = 7.48 *SD* = 2.742	89.637	< .001*	.902	−13.399	98	< .001*	−5.380	1.982

* $p < .05$

(*SD* =.902) versus 7.86 (*SD* = 2.587) in G-CONTROL (a difference of −5.86 points; *t*(98) = -15.120, $p < .001$, $\eta^2 = .831$). Lastly, in *Physical Well-being*, the dyslexia group reported 2.10 (*SD* =.735) compared to 7.48 (*SD* = 2.742) in the control group (a difference of −5.38 points; *t*(98) = -13.399, $p < .001$, $\eta^2 = .902$). These results indicate a large effect on the perception of quality of life in children with dyslexia, particularly in the emotional, social, and physical dimensions.

The statistical analysis of the behavioral profile scores showed significant differences ($p < .001$) between G-DYSLEXIA and G-CONTROL on all evaluated scales, with consistently higher averages in G-DYSLEXIA. For example, in Aggressiveness, G-DYSLEXIA obtained a mean of 53.18 (*SD* = 8.34) compared to 17.40 (*SD* = 6.07) in G-CONTROL (a difference of 35.78; *t*(98) = 24.514, $\eta^2 = .586$). Similarly, in Anxiety, Depression, and Somatization, the mean differences ranged between 33.22 and 37.58 points ($p < .001$). The scales related to social and adaptive skills also showed remarkable discrepancies; in Social Skills Problems, G-DYSLEXIA obtained 55.64 (*SD* = 8.30) compared to 19.86 (*SD* = 5.31) in G-CONTROL (a difference of 35.78; *t*(98) = 25.671, $p < .001$, $\eta^2 = .611$). Moreover, in Social Development Disorders, the gap reached 37.30 points (*t*(98) = 26.539, $p < .001$, $\eta^2 = .834$). In general, the effect sizes ranged between.509 and.971, indicating a moderate to high impact on the behavioral and emotional dimensions associated with dyslexia.

Finally, the mediation analysis conducted using the PROCESS procedure for SPSS explored whether behavioral problems mediate the relationship between the diagnosis of dyslexia and total parental stress. The results revealed that the diagnosis of dyslexia has a significant impact on both aversive behavioral aspects and parental stress levels, although no evidence was found of a mediating effect of behavioral alterations in this relationship.

In the first model, the effect of the diagnosis of dyslexia on behavioral problems was evaluated. The results showed that the diagnosis of dyslexia explains 43.1 % of the variability in behavioral problems (R^2 =.4314). The effect of the diagnosis on behavioral alterations was significant ($\beta = -1.3071$, $p < .001$), with an estimated coefficient of −1.4400 and a 95 % confidence interval between −1.7714 and −1.1086. This indicates a significant inverse relationship between the diagnosis of dyslexia and the behavioral aspect. The specific results of this model are presented in Table 5.

The inclusion of "problematic behavior patterns" as a mediating variable was based on existing evidence suggesting that children with dyslexia are at a higher risk of developing emotional and behavioral difficulties due to the cumulative impact of academic struggles, frustration, and social challenges (Goswami et al., 2011; Willcutt & Pennington, 2000). These behavioral problems can manifest as externalizing behaviors (e.g., aggression, hyperactivity, oppositionality) or internalizing symptoms (e.g., anxiety, depression, withdrawal), both of which can influence family dynamics and parental stress (Terras et al., 2009). The justification for this mediation model lies in the theoretical framework that posits that learning difficulties, such as dyslexia, do not operate in isolation but rather interact with psychological and environmental factors, shaping broader developmental outcomes (Snowling & Melby-Lervåg,

Table 4
Results of the differences in the measures related to the behavioral profile between G-DYSLEXIA and G-CONTROL, evaluated through the BASC-3.

Behavioral profile	Groups		Levene's Test			Welch's t-tests for Comparison of Means				
	G-DYSLEXIA	G-CONTROL	*F*	Sig.	η^2	*t*	*df*	Sig. (bilateral)	Mean Difference	ð
Scores of the Composite, Clinical, and Adaptive Scales										
Aggressiveness	$M = 53.18$ $SD = 8.344$	$M = 17.40$ $SD = 6.074$	11.232	.001*	.586	24.514	98	< .001*	35.780	7.246
Anxiety	$M = 56.16$ $SD = 7.552$	$M = 18.58$ $SD = 6.341$	1.337	.250	-	26.947	98	< .001*	37.580	6.990
Depression	$M = 53.50$ $SD = 7.643$	$M = 19.63$ $SD = 6.56$	.850	.359	-	23.431	98	< .001*	33.680	6.964
Somatization	$M = 52.28$ $SD = 7.70$	$M = 19.82$ $SD = 6.700$	2.649	.107	-	23.467	98	< .001*	33.220	7.049
Atypicality	$M = 55.78$ $SD = 7.937$	$M = 18.68$ $SD = 5.727$	11.368	.001*	.971	26.805	98	< .001*	37.100	7.156
Withdrawal	$M = 53.56$ $SD = 8.011$	$M = 19.88$ $SD = 6.100$	5.973	.016*	.685	23.653	98	< .001*	33.680	7.050
Attention Problems	$M = 52.30$ $SD = 8.011$	$M = 19.52$ $SD = 5.444$	4.383	.039*	.753	25.664	98	< .001*	32.780	6.603
Adaptability Problems	$M = 54.64$ $SD = 7.690$	$M = 19.32$ $SD = 5.995$	4.151	.044*	.698	25.614	98	< .001*	35.320	7.248
Social Skills Problems	$M = 55.64$ $SD = 8.305$	$M = 19.86$ $SD = 5.307$	15.809	< .001*	.611	25.671	98	< .001*	35.780	7.159
Limitations in Daily Activities	$M = 52.92$ $SD = 7.134$	$M = 19.58$ $SD = 5.621$	1.330	.252	-	25.957	98	< .001*	33.340	6.560
Lack of Functional Communication	$M = 54.86$ $SD = 7.871$	$M = 18.80$ $SD = 6.471$	1.933	.168	-	25.023	98	< .001*	36.060	7.414
Scores of the Content Scales										
Anger Control Problems	$M = 54.48$ $SD = 8.671$	$M = 18.14$ $SD = 6.230$	5.979	.016*	.814	24.066	98	< .001*	36.340	7.350
School Bullying	$M = 53.52$ $SD = 7.166$	$M = 19.20$ $SD = 6.455$	.201	.655	-	25.161	98	< .001*	34.320	6.643
Social Development Disorders	$M = 56.26$ $SD = 7.868$	$M = 18.96$ $SD = 6.071$	6.024	.016*	.834	26.539	98	< .001*	37.300	6.851
Lack of Emotional Self-Control	$M = 55.10$ $SD = 7.739$	$M = 19.10$ $SD = 5.963$	5.936	.017*	.812	26.056	98	< .001*	36.000	6.908
Executive Functioning Problems	$M = 53.78$ $SD = 7.760$	$M = 17.52$ $SD = 6.469$	2.296	.133	-	25.379	98	< .001*	36.260	7.122
Negative Emotionality	$M = 55.62$ $SD = 7.309$	$M = 18.58$ $SD = 5.786$	2.520	.116	-	28.097	98	< .001*	37.040	6.554
Resilience Problems	$M = 52.10$ $SD = 8.438$	$M = 18.64$ $SD = 5.813$	5.744	.018*	.509	23.092	98	< .001*	33.460	7.282

* $p < .05$

Table 5
Relationship between the diagnosis of dyslexia and the behavioral profile.

Variable	Coefficient	Standard Error	*t*	*p*	95 % CI Lower	95 % CI Upper
Constant	2.8800	.2640	10.9077	< .001*	2.3560	3.4040
Diagnosis	−1.4400	.1670	−8.6233	< .001*	−1.7714	−1.1086
R^2	.4314					

* $p < .05$

2016). By analyzing behavioral problems as a mediating variable, this study aimed to explore whether these emotional and behavioral responses act as an explanatory mechanism linking dyslexia to increased parental stress. Previous research has indicated that children with dyslexia who exhibit higher levels of behavioral difficulties tend to elicit greater stress responses from their caregivers, reinforcing a negative cycle that impacts both the child's adaptation and family well-being (Hendren et al., 2018). Furthermore, the conceptualization of behavioral difficulties in this study was grounded in standardized measures such as the BASC-3, which evaluates a broad spectrum of maladaptive behaviors. These include difficulties with emotional regulation, social interactions, and impulse control—factors that have been identified as common comorbidities in children with dyslexia (Gabay et al., 2016). Therefore, the decision to include behavioral problems as a mediating variable was intended to provide a more comprehensive understanding of the pathways through which dyslexia influences parental stress and overall family dynamics.

Subsequently, in the second model, both the diagnosis of dyslexia and behavioral problems were included to predict levels of parental stress. This model showed an excellent fit, explaining 91.78 % of the variability in parental stress (R^2 =.9178). The diagnosis of dyslexia had a strong and significant direct effect on parental stress ($\beta = -1.8769$, $p < .001$), with an estimated coefficient of

−59.9450 and a 95 % confidence interval between −64.8148 and −55.0753. This indicates that the diagnosis of dyslexia is strongly associated with higher levels of parental stress. However, the pattern of problematic behavior did not show a significant effect on parental stress ($\beta = .0224$, $p = .5632$), suggesting that this variable does not contribute significantly to explaining the levels of parental stress. The complete results of this model are presented in Table 6.

Finally, the direct and indirect effects of the diagnosis of dyslexia on parental stress were evaluated. The direct effect of the diagnosis was strong and significant (-59.9450, $p < .001$), while the indirect effect through behavioral problems was not significant (-.9350, 95 % CI: [-4.4122, 2.6409]). This confirms that behavioral problems do not significantly mediate the relationship between the diagnosis of dyslexia and parental stress levels. These results highlight that the diagnosis of dyslexia has a significant direct impact on parental stress, whereas behavioral problems do not act as a mediator in this relationship. The overall model explains a high percentage of the variability in parental stress, emphasizing the relevance of the dyslexia diagnosis as the main predictor of this phenomenon.

4. Discussion

The present study aimed to compare the levels of parental stress, quality of life, and behavioral profile between G-DYSLEXIA and G-CONTROL. The results indicate that dyslexia significantly impacts not only academic performance but also the emotional and behavioral well-being of the children, as well as the family environment. These findings reinforce the view that dyslexia, beyond being a reading disorder, is a condition that affects multiple areas of development (Snowling, 2013; Peterson & Pennington, 2015).

4.1. Parental stress

The findings highlight that parents of children with dyslexia experience higher levels of stress, as evidenced by increased scores in *Parental Distress*, *Dysfunctional Parent-Child Interaction*, and the *Perception of a Difficult Child*. These data are consistent with research portraying dyslexia as a chronic stressor for families, given the additional demands imposed by the need for constant academic support, the complexity of compensatory strategies, and the uncertainty regarding the child's future development (Karande et al., 2009b). Added to this are subjective factors, such as the degree of understanding and acceptance that parents have regarding the child's condition or their ability to manage both their own expectations and those of their environment (Hernández Pérez & Rabadán Rubio, 2023).

The literature indicates that the overload experienced by caregivers of children with learning difficulties can be explained by the simultaneous occurrence of multiple demands. On one hand, they must address academic challenges through coordination with teachers, remedial sessions, tutoring, and continuous reviews of reading progress. On the other hand, they face social pressure derived from comparisons with other children and the fear that dyslexia might negatively affect their child's future opportunities (Remache Bunci et al., 2024). This combination of factors can reinforce the feeling of distress and strain the parent-child relationship when coping strategies prove ineffective or when it is assumed that the child could "try harder" to overcome their reading difficulties (Cuéllar Calvo & Gallego Echeverri, 2024).

The fact that no clear mediating effects of problematic behaviors were found in the relationship between the diagnosis and stress suggests that the dyslexia label, by itself, may carry enough weight to trigger emotional overload in parents (Carotenuto et al., 2017). This finding does not diminish the relevance of disruptive behaviors, but it does indicate that the very experience of dyslexia—coupled with the process of finding adequate support and living with constant uncertainty—can trigger levels of tension that manifest even in families with children who do not exhibit extremely difficult behaviors (Vite Sierra & Vázquez Ramírez, 2014). This circumstance underscores the multifactorial nature of the parental experience and the need to study in greater detail other elements (for example, family resilience or the availability of support networks) that could also moderate how dyslexia affects the emotional state of caregivers (Hernández Pérez & Rabadán Rubio, 2023).

4.2. Quality of life

Regarding the quality of life of the children, the differences found between the dyslexia group and the control group were markedly evident in dimensions such as Self-esteem, Emotional Well-being, and Peer-Related Development. This pattern is consistent with abundant evidence linking dyslexia with recurring feelings of failure, a low perception of competence, and the experience of a school environment perceived as hostile or unsupportive (Humphrey, 2003; Mugnaini et al., 2009). The fact that these reading difficulties emerge at an early age and persist over time increases the likelihood that the child internalizes the label "I'm not capable," which

Table 6
Relationship between diagnosis, comorbidities, and parental stress.

Variable	Coefficient	Standard Error	*t*	*p*	95 % CI Lower	95 % CI Upper
Constant	177.6300	4.3527	40.8088	< .001*	168.9910	186.2690
Diagnosis	−59.9450	2.4536	−24.4314	< .001*	−64.8148	−55.0753
Conduct Problems	.6493	1.1192	.5802	.5632	−1.5719	2.8705
R^2	.9178					

* $p < .05$

affects not only their self-confidence but also their willingness to take academic and social risks (Zou et al., 2022).

Evidence suggests that children with dyslexia tend to find themselves in a vulnerable position when placed in a school context that prioritizes speed and reading accuracy, especially if the feedback they receive focuses predominantly on their errors (Zuppardo et al., 2020). This situation can consolidate a sense of isolation and limit opportunities for integration with peers, as reflected in the lower scores on peer-related development. Studies such as Grills-Taquechel et al. (2012) also argue that an unsupportive school environment fosters stigma and triggers rejection behaviors, which exacerbates feelings of loneliness and a low quality of life.

Emotional well-being is further compromised by the coexistence of other variables that tend to accompany dyslexia, such as anxiety about public reading or the fear of being judged for decoding difficulties (Goswami et al., 2011). As Terras et al. (2009) point out, this anxiety can operate both as a cause and a consequence of dyslexia: on one hand, it anticipates failure, and on the other, it is reinforced with every negative classroom experience. Consequently, the impact of these experiences on the children's quality of life is profound, affecting their academic, social, and intrapersonal spheres (McNulty, 2003).

4.3. Behavioral profile

The results revealed that children with dyslexia exhibit higher levels of aggressiveness, anxiety, and attention problems compared to the control group. These observations are in line with both classic and current studies documenting how learning disorders can be associated with maladaptive behavioral and emotional responses, fueled by the repeated feeling of difficulty and the potential for bullying or misunderstanding by the environment. The accumulated stress from reading or writing tasks—often intensified by school demands that are not appropriately adapted—could explain the irritability and defensive outbursts of aggressiveness.

Anxiety emerges as a central variable in this profile. Consistent with Terras et al. (2009), there is evidence that many children with dyslexia develop an "anticipatory fear" related to reading or linguistic processing, which not only affects their academic performance but also extends to their interactions with peers and their self-worth. The finding of attention problems, as also reported in the literature (Smith-Spark & Fisk, 2007), suggests that reading difficulties could converge with deficits in self-regulation and executive function (Varvara et al., 2014), complicating the child's ability to concentrate in class, manage impulsivity, and handle frustration (Thomson & Crewther, 2022).

Nonetheless, one of the significant contributions of this work was the analysis of whether these disruptive or anxious behaviors mediate the relationship between dyslexia and parental stress. The data did not show a clear mediating effect, which supports the idea that the mere presence of the diagnostic label may be sufficient to elevate family tension (Hernández Pérez & Rabadán Rubio, 2023). This result diverges from proposals that expect maladaptive behaviors to inevitably amplify parental burden (Bonifacci et al., 2019). On the contrary, while problematic behaviors might reinforce the emotional overload, they do not determine it in caregivers who are already immersed in a context of high demand stemming from dyslexia (Leitão et al., 2017).

4.4. Limitations and future perspectives

Although the results are consistent with the existing literature, it is important to consider some limitations of the study. The cross-sectional design employed prevents establishing causal relationships between parental stress and the children's behavioral problems. Additionally, the reliance on self-reports from parents for data collection may introduce subjective biases. Future research could include evaluations from multiple informants, such as teachers and educational psychologists, to obtain a more comprehensive view of the behavioral and emotional difficulties. Incorporating longitudinal designs in future studies could also help clarify the directionality of the relationships identified, providing stronger evidence of causality.

Furthermore, the study treated dyslexia as a homogeneous condition, without exploring possible subtypes or variations in severity. Investigating these differences could provide a more detailed understanding of how dyslexia affects family dynamics and the well-being of children. Given that dyslexia manifests in diverse ways, future research should consider subgroups based on phonological deficits, rapid naming difficulties, or visual processing challenges, as these distinctions may have different implications for both academic performance and behavioral outcomes.

Despite these limitations, the findings highlight the complexity of dyslexia and underscore the importance of interdisciplinary approaches to address its multiple dimensions, promoting interventions that enhance both the well-being of the children and that of their families. The practical implications of these results are significant, as they emphasize the need for early detection and targeted interventions that extend beyond academic support. Schools should implement programs that incorporate psychological and behavioral support for children with dyslexia, fostering emotional resilience and reducing stress within the family unit. Additionally, parental training programs could be developed to equip caregivers with strategies to manage stress and effectively support their children's learning process.

One of the key strengths of this study is its contribution to the understanding of the bidirectional relationship between dyslexia and parental stress. By demonstrating how behavioral difficulties mediate this association, the study provides valuable insights into the broader impact of dyslexia on family life. Furthermore, the use of standardized behavioral and quality-of-life assessments strengthens the reliability of the findings, making them relevant for both clinical and educational settings. Future research should build upon these findings by designing intervention models that integrate academic, emotional, and family-based support, ensuring a more holistic approach to addressing the challenges associated with dyslexia.

5. Conclusions

In conclusion, this study has identified significant differences between children with dyslexia and those with typical development in terms of parental stress, quality of life, and behavioral profile. The results underscore that dyslexia not only affects academic performance but also impacts emotional well-being and family dynamics, increasing parental stress and deteriorating the quality of life of the children—particularly in areas such as self-esteem and interpersonal relationships. Additionally, a higher prevalence of behavioral problems was observed among children with dyslexia, reinforcing the need for comprehensive interventions that address both academic difficulties and associated emotional and behavioral issues to improve the quality of life for these children and their families. These difficulties not only affect academic performance but also have a considerable impact on social adaptation and overall well-being. These findings highlight the importance of approaching dyslexia from an interdisciplinary perspective that considers both academic challenges and emotional and behavioral implications, thereby promoting interventions that improve the quality of life of these children and their families.

Ethics committee

The study was approved by the ethics committee of the University of Málaga (UMA) under code 120–2023-H. Informed consent was obtained from all subjects involved in the study.

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CRediT authorship contribution statement

Cano-Villagrasa Alejandro: Writing – review & editing, Writing – original draft, Methodology, Investigation, Conceptualization. **López-Chicheri Isabel:** Writing – review & editing, Writing – original draft, Methodology, Investigation, Conceptualization. **Porcar-Gozalbo Nadia:** Writing – original draft, Resources, Methodology, Investigation, Data curation. **López-Zamora Miguel:** Writing – review & editing, Supervision, Project administration, Funding acquisition.

Declaration of Competing Interest

There are no conflicts of interest.

Data Availability

Data will be made available on request.

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