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IMPULSIVITY IN CHILDREN WITH DYSLEXIA

IMPULSIVNOST KOD DJECE SA DISLEKSIJOM

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ABSTRACT

The objective of this research was to investigate impulsivity among children with dyslexia and comorbid dyslexia/ADHD. Children with these disorders, along with a non-ADHD/dyslexia sample, completed a self-report on impulsivity. Additionally, a specific impulsivity scale was completed by the children's parents and teachers. The analysis revealed a main effect for groups, indicating that children with dyslexia and comorbid dyslexia/ADHD reported more symptoms of impulsivity than normally achieving children. Furthermore, differences were identified between children with dyslexia and those in the comorbid dyslexia/ADHD group. Specifically, children with comorbid dyslexia/ADHD exhibited more impulsive behavior than children with dyslexia alone. Notably, there was a high level of consensus in ratings of impulsivity between children and their teachers and parents.

Keywords: dyslexia, ADHD, impulsivity

SAŽETAK

Cilj ovog istraživanja bio je istražiti impulsivnost kod djece s disleksijom i komorbidnom disleksijom/ADHD-om. Samoprocjena impulsivnosti je primjenjena kod djece s ovim poremećajima, kao i na uzorku djece koja nemaju ADHD/disleksiju. Dodatno, specifičnu skalu impulsivnosti popunili su roditelji i nastavnici djece. Analiza je otkrila glavni učinak za grupe, što ukazuje da su djeca s disleksijom i komorbidnom disleksijom/ADHD-om prijavila više simptoma impulsivnosti nego djeca koja nemaju teškoća. Nadalje, uočene su razlike između djece s disleksijom i djece iz komorbidne disleksije/ADHD grupe. Konkretno, djeca sa komorbidnom disleksijom/ADHD-om pokazala su impulzivnije ponašanje od djece samo sa disleksijom. Naročito je postojao visok nivo konsenzusa u ocjenama impulsivnosti između djece i njihovih nastavnika i roditelja.

Ključne riječi: disleksija, ADHD, imuplsivnost.

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INTRODUCTION

Although reading and writing skills are relatively easy to master for most people, they are a source of frustration for individuals with dyslexia. This is especially true during school years when reading and writing skills are important for academic success (Gerber, 2009). Dyslexia is characterized by difficulties in reading in children and adults who have the appropriate intelligence, education, and motivation necessary for accurate and fluent reading. Difficulties are manifested in accurate and/or fluent word recognition and by poor spelling and decoding abilities (Lyon, Shaywitz, & Shaywitz, 2003).

The global prevalence of mental health problems affecting children and adolescents is estimated to be 10–20% (Kieling et al., 2011). Students with dyslexia are more likely than their age-matched peers to experience negative emotions. Over the last two decades, research has documented various mental health problems encountered by many students with dyslexia (e.g., Bryan, 2005; Rourke, 2005; Shalev et al., 2001; Siegel, 2003; Winer & Tardif, 2004).

A growing body of literature has shown that children with dyslexia are at risk for both internalizing (emotional) and externalizing (behavioral) problems (Boyes et al., 2016). Concerning internalizing symptoms, reading difficulties have been associated with depression (Arnold et al., 2005; Eissa, 2010; Wiener & Schneider, 2002), anxiety (Arnold et al., 2005; Browder et al., 2007; Carroll et al., 2005; Carroll & Iles, 2006; Eissa, 2010; Whitehouse et al., 2009; Wiener & Schneider, 2002), loneliness (Wiener & Schneider, 2002), somatic complaints (Arnold et al., 2005; Eissa, 2010), low mood (Carroll et al., 2005), and general socio-emotional problems (Terras, Thompson, & Minnis, 2009).

Regarding externalizing symptoms, reading difficulties have been associated with behavioral problems (Eissa, 2010; Snowling, Muter, & Carroll, 2007; Terras et al., 2009), conduct disorder (Carroll et al., 2005; Thambirajah, 2010), and anger and aggression (Eissa, 2010; McConaughy, Mattison, & Peterson, 1994). Additionally, students with dyslexia may lack skills in initiating and sustaining positive social relationships (Gresham, 1997) and may exhibit more negative verbal and nonverbal behaviors than their classmates (McConaughy, Mattison, & Peterson, 1994).

As students with dyslexia age, emotional difficulties tend to increase, suggesting a potential link between dyslexia and emotional problems (Siegel, 2003). The rising psychiatric morbidity among individuals with dyslexia underscores the crucial need for interventions that address reading deficits and associated vulnerabilities (Goldston et al., 2007).

The academic and social pressures faced by these youths are so overwhelming that approximately 30–40% of them drop out of high school each year (Haring & Lovett, 1990). As children with dyslexia encounter heightened stress in both social and academic settings, the analysis of their emotional reactions becomes increasingly critical, emerging as a major mental health concern. While various aspects of internalizing and externalizing problems in individuals with dyslexia have been discussed, there is limited research on the role of impulsivity.

The role of impulsivity in the etiology and maintenance of dyslexia remains unclear, despite its central position in conceptualizations of child psychopathology (Quay, 1993). Impulsivity is an enduring and timely individual difference. Defined as the inability to regulate behavior, attention, and emotions in the pursuit of valued goals, impulsivity—and its opposite, self-

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control—plays a central role in conceptions of socialization and development (Tsukayama, Duckworth & Kim, 2013)

Impulsivity represents a broad concept that includes the inability to inhibit or control actions regardless of the consequences, abnormalities in decision-making, and an increased propensity to engage in risky behaviors. Impulsivity traits characterize various mental disorders such as attention deficit/hyperactivity disorder (ADHD) (Spira & Fischel, 2005), drug addiction (Coffey et al., 2003; Dom et al., 2006), schizophrenia, and impulse control disorders (e.g., pathological gambling, compulsive eating, hypersexuality, and shopping) (Alessi & Petry, 2003; Bari & Robbins, 2013).

Impulsive behavior is manifested by 'a lack of deliberation and a failure to consider risks and consequences before acting' (Fahy & Eisler, 1993). Studies employing various tasks to measure impulsivity have found high levels of impulsivity in attention deficit hyperactivity disorder (ADHD) (Moeller et al., 2001). Impulsivity is a symptom used to subcategorize children with ADHD in the Diagnostic and Statistical Manual of Mental Disorders – 5th edition (DSM-V, 2013). Children with ADHD exhibit inappropriate levels of inattention and impulsivity, significantly impacting their daily functioning (Barkley, 2014). Barkley and Fischer (2010) noted that emotional impulsiveness was the second greatest contributor, just after inattention, in individuals with ADHD.

Comorbidity of ADHD and dyslexia is very frequent (Germano, Gagliano, & Curatolo, 2010). There is a bidirectional relationship between ADHD and dyslexia, as comorbidity is very high when studying ADHD in children with dyslexia (Willcutt & Pennington, 2000) or dyslexia in children with ADHD (Sanson, Prior & Smart, 1996). The aim of this exploratory study was to investigate the possible relationship between impulsivity and dyslexia. We aimed to explore the characteristics of impulsivity in children with dyslexia, with and without behavior problems, and to clarify the presence of impulsivity in children with dyslexia as a result of their behavior or reading problems only. The role of sex was also investigated

Purpose of Study and Research Questions

The purpose of this study was to investigate impulsivity among elementary school children diagnosed with dyslexia or comorbid dyslexia/ADHD in Bosnia and Herzegovina (B&H). We aimed to contribute to clarifying potential differences in impulsivity among students with these disorders and those without them. Furthermore, our goal was to explore areas that have yet to be investigated in the literature on ADHD and dyslexia, including the roles of comorbidity and gender. To achieve the study's purpose, the following research questions were proposed:

Research Question 1: Do elementary school students with dyslexia, comorbid dyslexia/ADHD, and students without any difficulties differ in impulsivity?

Research Question 2: Do elementary school students with dyslexia and comorbid dyslexia/ADHD differ in impulsivity?

Research Question 3: Does impulsivity in children with dyslexia and comorbid dyslexia/ADHD vary based on gender?

Research Question 4: Is there agreement between children, parents, and teachers on children's impulsivity?

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MATERIAL AND METHODS

Sample of participant

The sample included 13 children in the dyslexia group, 26 children in the dyslexia/ADHD group, and 39 children in the non-dyslexia/ADHD control group. All participants were native speakers of Bosnian and were enrolled in public schools in Bosnia and Herzegovina (B&H).

Participants with dyslexia were identified by teachers and further assessed by individually administering the subtest of the Dyslexia Screening Test (Duranovic, 2013). Accuracy and speed in word and nonword reading, as well as spelling, were measured. For each child, the reading and spelling performance (errors and/or speed) fell below the 25th percentile. Falling below the 25th percentile served as the cutoff for diagnosing dyslexia (Dykman & Ackerman, 1992; Siegel, 1999). The validity of diagnoses was confirmed by poor performance on at least two measures (Brueggemann, Kamphaus, & Dombrowski, 2008). Means and standard deviations of all tests are presented in Table 1.

All children had no sensory or neurological deficits. None of the participants reported a history of neurological diseases, psychiatric disorders, or hearing problems. A psychologist evaluated all children to verify the criteria of normal intelligence. The average age for the dyslexic group was 9.32 years (SD= 1.69; range = 7–12).

Participants with comorbid dyslexia/ADHD

This group comprised participants who met the criteria for both dyslexia and ADHD. All participants with ADHD met the Diagnostic and Statistical Manual of Mental Disorders (5th ed.; DSM-V; American Psychiatric Association, 2013) diagnostic criteria for attention disorders. The Disruptive Behavior Disorder Rating Scale (DBD; Pelham, Gnagy, Greenslade, & Milich, 1992) was employed to gather information necessary for identifying children with ADHD symptoms. The instrument consists of 45 items, each with four close-ended response options ranging from 'not at all' to 'very much.' The number of symptoms endorsed as occurring 'pretty much' or 'very much' within DBD factors (inattention, impulsivity-overactivity, oppositional defiant disorder (ODD), and conduct disorder (CD) (Pelham, Evans, Gnagy, & Greenslade, 1992; Pelham, Gnagy, et al., 1992) were used to determine the presence of ADHD. These categorical variables reflected the presence or absence of ADHD, ODD, or CD. Dimensional subscale scores were calculated as the mean of the respective DBD factor items (inattention, 9 items; impulsivity-overactivity, 10 items; OD, 13 items; and CD, 13 items).

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Only participants meeting the criteria for predominantly inattentive type ADHD or combined type ADHD were included in the study. The average age for the comorbid dyslexia/ADHD group was 9.7 years (SD= 1.58; range = 7–14).

Participants without ADHD and dyslexia

The control group was selected using the method of equivalent pairs—ensuring equality across gender and chronological age with the two clinical groups. The group included 39 children who exhibited average or above-average reading and spelling skills (at the 75th percentile and above). They underwent the same assessments as children with dyslexia. They did not display any symptoms of dyslexia or ADHD. The average age was 9.85 years (SD= 1.92; range = 7–14).

Table 1. Test scores and ages for participants with dyslexia, comorbid dyslexia/ADHD and typically achieving children

Variable	Dyslexic group		Comorbid dyslexic/ADHD group		Control group	
	Mean	SD	Mean	SD	Mean	SD
One minute reading[a]	20.08**	8.30	24.50**	13.28	72.33	17.83
Real word reading						
Errors [a]	9.23**	6.00	8.00**	8.88	.44	.68
Reading time (s) [a]	162.54**	140.40	189.35**	204.01	33.87	21.45
Nonword reading						
Errors [a]	19.54**	9.98	14.00**	10.62	1.95	2.19
Reading time (s) [a]	207.08**	100.72	269.35**	270.41	56.90	26.86
Spelling Errors[a]	27.85**	10.11	28.12**	10.70	47.79	2.13
ADHD factor items[b]	9.38	3.57	31.35**	10.00	5.62	7.98

Note. [a]Sub tests of the Dyslexia Screening Test (Duranovic, 2013); [b]the Disruptive Behavior Disorder Rating Scale (Pelham, Gnagy, et al. 1992)
** p < .01

Method of conducting research and measuring instruments

The Domain-Specific Impulsivity Scale for Children (DSIS-C) **(**Tsukayaman et al., 2013), available at http://www.sas.upenn.edu/~duckwort/images/DSIS-C.pdf, was utilized in this study. The scale included anonymous close-ended responses about behaviors that exemplified self-control or failures thereof in children's lives.

It comprised eight questions that asked children how often they forget something they need for class, interrupt other students, say something rude, can't find something because their desk is messy, lose their temper, can't remember what the teacher told them to do, mind-wander, and talk back to teachers or parents when upset.

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These tendencies do not seem obviously related to giving in to temptation or diversion. For example, mind-wandering and forgetfulness may reflect one's ability to stay focused on a task, while saying rude things and losing one's temper may have different psychological causes, such as latent anger and frustration. All of these tendencies can be interpreted in terms of giving in to temptation; for instance, mind-wandering involves giving in to the temptation of fleeting thoughts, rudeness involves giving in to the temptation to disregard others' feelings, and so on. However, in this broad sense, any action could be interpreted as giving in to temptation (Tsukayaman et al., 2013).

Students completed the DSIS-C, while teachers and parents filled out a teacher/parent-report version, which included items starting with "This student/My child..." instead of "I…". Five frequency levels were designed to be intuitively meaningful and to allow for maximal distribution in observed student behavior: 1 = almost never, 2 = about once per month, 3 = about 2 to 3 times per month, 4 = about once per week, and 5 = at least once per day.

Children were informed that the scale consists of statements that may or may not apply to them. They were instructed to think, during their responses, about how they compare to most people in the world, not just those they know well. It was emphasized that there are no right or wrong answers and that they should be honest, indicating how often they engaged in the proposed activities during the past school year.

Teachers and parents were asked to indicate how often the student/their child engaged in the proposed activities during the past school year.

RESULTS

Comparison of Clinical and Nonclinical Groups

The data were analyzed in two steps. First, multivariate analyses of variance (MANOVA) was to evaluate the effect of disability status on reported symptoms of impulsivity. Second, specific effects manipulated in each domain of DSIS-C were examined in separate ANOVAs. The independent variables were disability status with three levels (dyslexia, ADHD/dyslexia, and no disabilities). The dependent variables were scores on the DSIS-C for schoolwork impusivity, interpersonal impusivity and general impulsivity reported by children, parents and teachers.

The main effect for groups was statistically significant, Wilks's $\Lambda = .28$, $F(16.14) = 7.49$, $p = .000$. Table 2 displays the mean DSIS-C scores by disability group. To protect against Type I error, we used Bonferroni procedure and tested ANOVAs on each dependent variable with dysability group on the independent variable at the .025 level. The ANOVA on all DSIS-C scores was significant: self-raitings for schoolwork impulsivity F(2.35)=36.72, p=.000; self-raitings for interpersonal impulsivity F(2.12)=14.87, p=.000; self-raitings for impulsivity as a total score of DSIS-C F(2.85)=32.13, p=.000; parent-raitings for schoolwork impulsivity F(2.62)=76.20, p =.000; parent-raitings for interpersonal impulsivity F(2.18)=21.99, p= .000; parent -raitings for impulsivity as a total score of DSIS-C F(2.15)=59.72, p=.000; teacher-raitings for schoolwork impulsivity F(2.57)=76.31, p=.000; teacher-raitings for interpersonal impulsivity F(2.15)=16.94, p=.000; teacher-raitings for impulsivity as a total score of DSIS-C F(2.13)=52.55, p=.000.

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Independent samples t tests were conducted to further test the impact of dysability on the DSIS-C scores. Differences were not found for interpersonal impulsivity, but all other tests were significant. The trend was in the direction of higher scores on the DSIS-C for children with dyslexia compared to children without dyslexia for the self-raitings for schoolwork impulsivity $t(50) = 4.09$, $p = .000$; self-raitings for impulsivity as a total score of DSIS-C $t(50) = 3.44$, $p = .001$; parent-raitings for schoolwork impulsivity $t(50) = 5.27$, $p = .000$; parent-raitings for impulsivity as a total score of $t(50) = 4.03$, $p = .000$; teacher-raitings for schoolwork impulsivity $t(50) = 4.73$, $p = .000$; teacher-raitings for impulsivity as a total score of DSIS-C $t(50) = 3.51$, $p = .000$. The same trend was found within the comorbid dyslexia/ADHD group compared to children without dyslexia, with the direction of higher scores on the DSIS-C for children with the comorbid dyslexia/ADHD for the self-raitings for schoolwork impulsivity $t(63) = 8.550$, $p = .000$; for the self-raitings for interpersonal impulsivity $t(63) = 5.03$, $p = .000$; self-raitings for impulsivity as a total score of DSIS-C $t(63) = 7.53$, $p = .000$; parent-raitings for schoolwork impulsivity $t(63) = 13.12$, $p = .000$; parent-raitings for interpersonal impulsivity $t(63) = 6.37$, $p = .000$; parent-raitings for impulsivity as a total score of $t(63) = 10.83$, $p = .000$; teacher-raitings for schoolwork impulsivity $t(63) = 12.58$, $p = .000$; teacher-raitings for interpersonal impulsivity $t(63) = 5.69$, $p = .000$; teacher-raitings for impulsivity as a total score of DSIS-C $t(63) = 9.98$, $p = .000$.

Comparison of Clinical Groups

A one-way MANOVA was conducted to determine the effect of dysability subtype (dyslexia vs. comorbid dyslexia/ADHD) on the DSIS-C scores. The MANOVA was statistically significant, Wilks's $\Lambda = .60$, $F(8.30) = 2.51$, $p = .032$.

ANOVAs with dysability subtype groups as the independent variables and scores for each domain of DSIS-C as the dependent variables were conducted as follow-up tests to the MANOVA. The ANOVAs on the DSIS-C scores approached statistical significance for: self-raitings for schoolwork impulsivity $F(1.11)=7.53$, $p=.009$; self-raitings for interpersonal impulsivity $F(1.84)=7.13$, $p=.011$; self-raitings for impulsivity as a total score of DSIS-C $F(1.39)=9.52$, $p=.004$; parent-raitings for schoolwork impulsivity $F(1.22)=16.24$, $p=.000$; parent-raitings for interpersonal impulsivity $F(1.14)=10.05$, $p= .003$; parent -raitings for impulsivity as a total score of DSIS-C $F(1.72)=17.95$, $p=.000$; teacher-raitings for schoolwork impulsivity $F(1.25)=20.73$, $p=.000$; teacher-raitings for interpersonal impulsivity $F(1.10)=7.09$, $p=.011$; teacher-raitings for impulsivity as a total score of DSIS-C $F(1.70)=17.53$, $p=.000$.

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Table 2. Descriptive Statistics of Domain-Specific Impulsivity Scale

Scale	Dyslexic group		Comorbid dyslexic/ADHD group		Nonclinical group	
	Mean	SD	Mean	SD	Mean	SD
Self-ratings	N=13		N=26		N=39	
Schoolwork Impulsivity	8.62	3.07	12.19	4.16	5.51	2.10
Interpersonal impulsivity	5.85	1.52	8.96	4.05	5.18	1.96
Impulsivity	14.46	2.88	21.15	7.51	10.69	3.58
Parent-ratings	N=13		N=26		N=39	
Schoolwork Impulsivity	9.92	3.62	14.00	3.75	5.08	1.65
Interpersonal impulsivity	5.68	2.56	9.69	4.16	4.92	1.77
Impulsivity	14.62	4.75	23.73	6.97	10.00	3.11
Teacher-ratings	N=13		N=26		N=39	
Schoolwork impulsivity	8.23	2.98	13.62	3.70	5.08	1.65
Interpersonal impulsivity	5.77	2.80	9.19	4.18	4.92	1.75
Impulsivity	14.00	4.30	22.96	7.06	10.00	3.29

Agreement among children, parents and teachers

Table 3 reports correlations for ratings of the DSIS-C conducted by children with dyslexia and comorbid dyslexia/ADHD and their parents and teachers. There was a high level of consensus of raitings between children and their teachers and parents. With regard to self-ratings correlations, teachers' ratings agree slightly better with self-ratings than parents ratings do. There is a high level of consensus between children and teachers with correlation of .77 for rating of impulsivity in total, while correlation between children and parents was .74. Teachers rate childrens' impulsivity in a same manner compared with parents. The median correlations for parents and teachers ratings for impulsivity in total was .79.
Correlations demonstrated substantial stability, ranging from .44 to .91, and all correlation coefficients differed significantly between the data sets at the .01 level.

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Table 3. Pearson Correlations for Ratings on the Domain-Specific Impulsivity Scale by Children with Dyslexia and Comorbid Dyslexia/ADHD, Teachers and Parents

	Self-ratings: School work impulsivity	Self-ratings: Interpersonal impulsivity	Self-ratings: Impulsivity	Teacher-ratings: School work impulsivity	Teacher-ratings: Interpersonal impulsivity	Teacher-ratings: Impulsivity	Parent-ratings: School work impulsivity	Parent-ratings: Interpersonal impulsivity	Parent-ratings: Impulsivity
Self-ratings: School work impulsivity	1	,616**	,911**	,723**	,474**	,681**	,682**	,443**	,640**
Self-ratings: Interpersonal impulsivity		1	,886**	,478**	,752**	,704**	,435**	,819**	,702**
Self-ratings: Impulsivity			1	,676**	,672**	,769**	,630**	,690**	,744**
Teacher-ratings: School work impulsivity				1	,554**	,878**	,878**	,502**	,784**
Teacher-ratings: Interpersonal impulsivity					1	,879**	,403**	,672**	,602**
Teacher-ratings: Impulsivity						1	,725**	,671**	,788**
Parent-ratings: Schoolwork impulsivity							1	,581**	,897**
Parent-ratings: Interpersonal impulsivity								1	,881**
Parent-ratings: Impulsivity									1

Note. **. Correlation is significant at the 0.01 level (2-tailed).

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Comparison of Clinical Groups by Gender

A one-way MANOVA was conducted to determine the effect of gender on the DSIS-C scores. The MANOVA was nonsignificant, Wilks's $\Lambda = .69$, $F(8, 30) = 1.66$, $p = .15$. The mean scores of clinical male groups did not differ from those of the female clinical groups.

Table 4. Descriptive Statistics of Domain-Specific Impulsivity Scale by Gender

Scale	Male		Female	
	Mean	SD	Mean	SD
Self-ratings	N=24		N=15	
Schoolwork impulsivity	11.20	4.26	10.64	4.09
Interpersonal impulsivity	8.64	3.77	6.64	3.32
Impulsivity	19.84	7.46	17.29	6.22
Parent-ratings	N=24		N=15	
Schoolwork impulsivity	13.00	4.10	11.07	4.76
Interpersonal impulsivity	9.16	3.69	6.93	4.62
Impulsivity	22.20	6.96	19.00	8.24
Teacher-ratings	N=24		N=15	
Schoolwork impulsivity	12.28	4.13	11.00	4.61
Interpersonal impulsivity	8.96	3.69	6.43	4.01
Impulsivity	22.20	6.96	17.71	7.85

DISCUSSION

Given the high prevalence of dyslexia and ADHD in children and the long-term consequences of these difficulties, understanding the relationship between reading achievement and emotional behavior is crucial. Such studies are significant not only for identifying the challenges but also for informing the development of appropriate interventions for children with these difficulties (Grills-Taquechel, Fletcher, Vaughn, & Stuebing, 2012). The primary aim of this study was to investigate impulsivity among elementary school children with dyslexia and comorbid dyslexia/ADHD, aiming to clarify whether impulsivity in children with dyslexia is a result of their behavior or reading problems alone.

Impulsivity was assessed by administering the DSIS-C questionnaire. A comparison between children with dyslexia and comorbid dyslexia/ADHD, considered clinical groups, and normally achieving children, considered a nonclinical group, revealed a significant difference in all the subscales of the questionnaire, as well as in the total scores. This indicates that impulsivity is a characteristic trait of the clinical population.

Children with dyslexia and comorbid dyslexia/ADHD reported more symptoms of impulsivity than normally achieving children. Factor, Reyes, and Rosen (2014) noted that severe emotional impulsivity results in a number of negative outcomes in children with ADHD, primarily internalizing and externalizing problems (Rosen & Factor, 2012). Additionally, children with dyslexia are at an elevated risk for both internalizing and externalizing problems (Boyes, Leitao, Claessen, Badcock, & Nayton, 2016), which may explain the higher impulsivity scores observed in the group of children with dyslexia only.

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Differences in impulsivity were observed between children with dyslexia and the comorbid dyslexia/ADHD group. Notably, children with comorbid dyslexia/ADHD displayed more impulsive behavior than their counterparts with dyslexia alone. This finding aligns with expectations, as ADHD has been consistently linked to various manifestations of impulsivity, including elevated rates of other impulsive disorders, substance use, questionnaire-based impulsivity scores, and inhibitory dysregulation on neurocognitive tests (Chamberlain et al., 2016).

The relatively less manifested impulsivity in children with dyslexia compared to the comorbid dyslexia/ADHD group highlights the need for a deeper investigation into the nature of impulsivity in children with dyslexia alone. Future studies should incorporate different laboratory tasks to measure various categories of impulsivity, providing a more comprehensive understanding of specific areas where children with dyslexia may exhibit more or less impulsive behavior. The reliance on self-report instruments alone to assess impulsivity in children with dyslexia marks just the beginning of research in this broad field. An examination of impulsivity through a multi-informant and multimethod approach, incorporating different laboratory tests, would likely offer a more complete understanding. Such an approach would also lead us towards research less biased by children's self-perception and closer to biological models of impulsivity (Bari & Robbins, 2013)

One of the questions addressed in this research was whether there is agreement between children, parents, and teachers on children's impulsivity. Generally, poor agreement has been found in investigations of internalizing symptoms, such as ratings of anxiety (Grills & Ollendick, 2003; Youngstrom, Loeber & Stouthamer-Loeber, 2000; Safford et al., 2005). Many studies have indicated that school-aged individuals self-report more internalizing symptoms than parents or teachers report for them (Bird, Gould, & Staghezza, 1992; Youngstrom et al., 2000), although some have indicated that parents report more internalizing symptoms for their children than the children report for themselves (Krain & Kendall, 2000). Teachers tend to report lower levels of internalizing symptomatology among their students, not only in comparison to students' reports but also in comparison to parents' reports (Youngstrom et al., 2000).

More agreement is typically found about externalizing behaviors, as internalizing behaviors might be more challenging to analyze and have fewer disruptive consequences for family life or classroom functioning, making them less likely to be recognized by adults (Kolko & Kazdin, 1993). However, impulsivity tends to attract the attention of adults. The results of this research showed that the presentation of impulsivity was consistent at both schools and home. There was no significant difference in the reporting of the presence of impulsive behavior between children and their parents and teachers.

Parent ratings of impulsivity in elementary school children were evaluated by examining their correspondence and discrepancies with parallel child, parent, and teacher ratings. Children, parents, and teachers reported similar levels of impulsivity in children, including those with dyslexia, comorbid dyslexia/ADHD, and children without disabilities. The levels of impulsivity reported by parents and teachers were comparable to those reported by the children themselves

The last research question in this study investigated the role of gender in the manifestation of impulsivity in children with dyslexia and the comorbid dyslexia/ADHD group. Studies on the

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effect of gender on self-control have yielded mixed results. Some studies have noted greater self-control in girls (Logue & Chavarro, 1992; Sonuga-Barke, Lea, & Webley, 1989), while others have demonstrated more self-control in boys (Forzano et al., 2003). Still, others have shown no gender effect (Logue, Forzano, & Ackerman, 1996; Peake, Hebl, & Mischel, 2002). In the current research, no significant relationships were found between gender and measures of impulsivity. This finding aligns with other studies that have not found a gender effect (see Logue et al., 1996; Peake et al., 2002). It is also consistent with a meta-analysis conducted by Silverman (2003). While the overall results favored girls in that analysis, the studies varied in their results, and effect sizes were low.

CONCLUSION

Children with dyslexia face a high risk of psychological comorbidity. The coexistence of dyslexia with internalizing and externalizing disorders, as well as other learning disabilities, underscores the need for cognitive and behavioral approaches in intervention programs. Such programs aim to enhance the self-confidence and social competency of children with dyslexia, providing them with more opportunities in school and the world of work (Sahoo, Biswas, & Padhy, 2015).

Based on the results of this study and considering its limitations, it appears that children with dyslexia may exhibit a pattern of impulsivity more frequently than their peers. Further studies are necessary to develop methods for the early identification and treatment of impulsivity in children with dyslexia, enabling these students to reach their full potential. Impulsive behavior in children is a matter of considerable practical importance to clinicians, group workers, and teachers (Sutton-Smith & Rosenberg, 1959), with particular emphasis on children with dyslexia, as impulsive clients are more likely to drop out of substance abuse, smoking cessation, and obesity programs than other clients (Krishnan-Sarin et al., 2007; Nederkoorn et al., 2006).

REFERENCES

1. Alessi, S.M., & Petry, N.M. (2003). Pathological gambling severity is associated with impulsivity in a delay discounting procedure. *Behavioural Processes, 6*: 345–354.
2. American Psychiatric Association: DSM-V (2013). *Diagnostic and statistical manual of mental disorders.* Washington, DC, USA, London, England: American Psychiatric Association.
3. Arnold, E., Goldston, D., Walsh, A., Reboussin, B., Daniel, S., Hickman, E., & Wood, F. (2005). Severity of emotional and behavioral problems among poor and typical readers. *Journal of Abnormal Child Psychology, 33:* 205–217.
4. Bari, A., & Robbins, T.W. (2013). Inhibition and impulsivity: behavioral and neural basis of response control. Progress in Neurobiology, 108: 44-79.
5. Barkley, R.A., & Fischer, M. (2010). The unique contribution of emotional impulsiveness to impairment in major life activities in hyperactive children as adults. *Journal of the American Academy of Child & Adolescent Psychiatry, 49*(5):503–513.

Research in Education and Rehabilitation 2023; 6(2): 175-190. **DOI**: 10.51558/2744-1555.2023.6.2.175

6. Barkley, R.A. (2014). *Attention-Deficit Hyperactivity Disorder: A Handbook for Diagnosis and Treatment*. New York, NY: Guilford Press.
7. Bird, H.R., Gould, M.S., & Staghezza, B. (1992). Aggregating data from multiple informants in child psychiatry epidemiological research. *Journal of the American Academy of Child & Adolescent Psychiatry, 31:* 78–85.
8. Boyes, M.E., Leitao, S., Claessen, M., Badcock, N.A., & Nayton, M. (2016). Why Are Reading Difficulties Associated with Mental Health Problems? *Dyslexia, 22:* 263–266.
9. Browder, D.M., Wakeman, S.Y., Flowers, C., Rickelman, R.J., Pugalee, D., & Karvonen, M. (2007). Creating access to the general curriculum with links to grade-level content for students with significant cognitive disabilities. *Journal of Special Education, 41*, 1, 2-16.
10. Bryan, T. (2005). Science-based advances in the social domain of learning disabilities. *Learning Disability Quarterly, 28*: 119-121.
11. Carroll, J.M., Maughan, B., Goodman, R., & Meltzer, H. (2005). Literacy difficulties and psychiatric disorders: Evidence for comorbidity. *Journal of Child Psychology and Psychiatry, 46(*5): 524–532.
12. Carroll, J.M., & Iles, J. (2006). An assessment of anxiety levels in dyslexic students in higher education. *British Journal of Educational Psychology, 76:* 651-662.
13. Cassady, J.C., & Johnson, R.E. (2002). Cognitive Test Anxiety and Academic Performance. Contemp Educ Psychol; 27:270–295.
14. Chamberlain, S.R., Ioannidis, K., Leppink, E.W., Niaz, F., Redden, S.A., & Grant, J.E. (2016). ADHD symptoms in non-treatment seeking young adults: relationship with other forms of impulsivity. *CNS Spectrums, 29*:1-9.
15. Coffey, S.F., Gudleski, G.D., Saladin, M.E., & Brady, K.T. (2003). Impulsivity and rapid discounting of delayed hypothetical rewards in cocaine-dependent individuals. *Experimental and Clinical Psychopharmacology, 11:*18–25.
16. Dykman, R.A., & Ackerman, P.T. (1992). Diagnosing dyslexia: IQ regression plus cutpoints. Journal of Learning Disabilities, 25: 574-576.
17. Dom, G., De Wilde, B., Hulstijn, W., van den Brink, W., & Sabbe, B. (2006). Behavioural aspects of impulsivity in alcoholics with and without a cluster-B personality disorder. *Alcohol and Alcoholism, 41:* 412–420.
18. Duranovic, M. (2013). *Test za procjenu disleksije [Dyslexia Screening Test*]. In M. Duranovic & Z. Mrkonjic (Eds.), Procjena disleksije [Dyslexia assessment]. Tuzla, Bosnia: Print-Com.
19. Eissa, M. (2010). Behavioral and emotional problems associated with dyslexia in adolescence. *Current Psychiatry, 17:* 17–25.
20. Factor, P.I., Reyes, R.A., & Rosen, P.J. (2014). Emotional Impulsivity in Children with ADHD Associated with Comorbid—Not ADHD—Symptomatology. *Journal of Psychopathology and Behavioral Assessment*, 36: 530-541.
21. Fahy, T., & Eisler, I. (1993). Impulsivity and eating disorders. *British Journal of Psychiatry, 162(*2):193-197.
22. Forzano, L.B., Michels, J.L., Carapella, R.K., Conway, P., & Chelonis, J.J. (2011). Self-Control and Impulsivity in Children: Multiple Behavioral Measures. *Psychological Record, 61:*425–448.
23. Gerber, P.J. (2009). *Impact of learning disabilities on adults*. In: JM Taymans (Ed.).

Research in Education and Rehabilitation 2023; 6(2): 175-190. **DOI**: 10.51558/2744-1555.2023.6.2.175

Learning to achieve: A review of the research literature on serving adults with learning disabilities. Washington, DC: National Institute for Literacy, pp. 231–252.

24. Germano, E., Gagliano, A., & Curatolo, P. (2010). Comorbidity of ADHD and Dyslexia. Developmental. Neuropsychology, 35(5): 475-493.
25. Goldston, D.B., Walsh, A., Arnold, E.M., Reboussin, B., Daniel, S.S., Nutter, D., Hickman, E., Palmes, G., Snider, E., & Wood, F.B. (2007). Reading problems, psychiatric disorders, and functional impairment from mid- to late adolescence. *Journal of the American Academy of Child & Adolescent Psychiatry, 46(*1): 25-32.
26. Gresham, F. (1997). Social competency and students with behavioral disorders: Where we've been, where we are, and where we should go. *Education & Treatment of Children, 2:* 233-249.
27. Grills, A.E., & Ollendick, T.H. (2003). Multiple informant agreement and the Anxiety Disorders Interview Schedule for parents and children. *Journal of the American Academy of Child & Adolescent Psychiatry, 42:* 30–40.
28. Haring, K.A., & Lovett, D.L. (1990). A follow-up study of special education graduates. *Journal of Special Education, 23(*4):463–477.
29. Kieling, C., Baker-Henningham, H., Belfer, M., et al.: Child and adolescent mental health worldwide: evidence for action. *Lancet, 378*: 1515–25.
30. Kolko, D.J., & Kazdin, A.E. (1993). EmotionaNoehavioral problems in clinic and nonclinic children: Correspondence among child, parent and teacher reports. *Journal of Child Psychology and Psychiatry, 34*: 991-1006.
31. Krain, A.L., & Kendall, P.C. (2000). The role of parental emotional distress in parent report of child anxiety. *Journal of Clinical Child & Adolescent Psychology, 29:* 328–335.
32. Krishnan-Sarin, S., Reynolds, B., Duhig, A., Smith, A., Liss, T., McFetfridge, A., Cavall, D., Carroll, K., & Potenza, M. (2007). Behavioral impulsivity predicts treatment outcome in a smoking cessation program for adolescent smokers. *Drug and Alcohol Dependence, 88* (1):79-82.
33. Logue, A.W., & Chavarro, A. (1992). Self-control and impulsiveness in preschool children. *Psychological Record, 42(*2):189–204.
34. Logue, A.W., Forzano, L.B., & Ackerman, K.T. (1996). Self-control in children: Age, preference for reinforcer amount and delay, and language ability. *Learning and Motivation, 27:* 260–277.
35. Lyon, G.R., Shaywitz, S.E., Shaywitz, B.A. (2003). A Definition of Dyslexia. *Annals of Dyslexia, 53:*1-14.
36. McConaughy, S., Mattison, R.E., & Peterson, R.L. (1994). Behavioral/emotional problems of children with serious emotional disturbances and LD. *School Psychology Review, 2(*3): 8-15.
37. Meadan, H., & Monda-Amaya, L. (2008). Collaboration to promote social competence for students with mild disabilities in the general classroom: A structure for providing social support. *Intervention in School and Clinic, 43(*3):158-167.
38. Moeller, G.F., Barratt, E.S., Dougherty, D.M., Schmitz, J.M., & Swann, A.C. (2001). Psychiatric Aspects of Impulsivity. *American Journal of* Psychiatry, *158*:1783-1793.
39. Nederkoorn, C., Braet, C., Van, Eijs, Y., Tanghe, A., & Janse, A. (2006). Why obese children cannot resist food: The role of impulsivity. *Eating Behaviors, 7*:315-322.

Research in Education and Rehabilitation 2023; 6(2): 175-190. **DOI**: 10.51558/2744-1555.2023.6.2.175

40. Quay, H.C. (1993). The psychobiology of undersocialized aggressive conduct disorder. *Development and Psychopathology, 5:*165-180.
41. Peake, P.K., Hebl, M., & Mischel, W. (2002). Strategic attention development for delay of gratification in working and waiting situations. *Developmental Psychology, 38:* 313–326.
42. Pelham, W.E., Evans, S., Gnagy, E., & Greenslade, K.E. (1992). Teacher ratings of DSM–III–R symptoms for the disruptive disorders: Prevalence, factor analyses, and conditional probabilities in a special education sample. *School Psychology Review, 21:*285–299.
43. Pelham, W.E., Gnagy, E.M., Greenslade, K.E., & Milich, R. (1992). Teacher ratings of DSM–III–R symptoms for the disruptive behavior disorders. *Journal of the American Academy of Child & Adolescent Psychiatry, 31:* 210–218.
44. Rosen, P.J., & Factor, P.I. (2012). Emotional impulsivity and emotional and behavioral difficulties among children with ADHD: an ecological momentary assessment study. *Journal of Attention Disorders, 19*(9):779-793.
45. Rourke, B.P. (2005). Neuropsychology of learning disabilities: Past and future. *Learning Disability Quarterly*, 28:111-114.
46. Safford, S.M., Kendall, P.C., Flannery-Schroeder, E., Webb, A., & Sommer, H. (2005). A longitudinal look at parent-child diagnostic agreement in youth treated for anxiety disorders. *Journal of Clinical Child and Adolescent Psychology, 34:* 747–757.
47. Sahoo, M.K., Biswas, H., & Padhy, S.K. (2015). Psychological Co-morbidity in Children with Specific Learning Disorders. *Journal of Family Medicine and Primary Care, 4(*1):21-5.
48. Sanson, A., Prior, M., & Smart, D. (1996). Reading disabilities with and without behaviour problems at 7-8 years: Prediction from longitudinal data from infancy to 6 years. *Journal of Child Psychology and Psychiatry, 37*:529–541.
49. Shalev, R.S., Manor, O., Kerem, B., Ayali, M., Badichi, N., Friedlander, Y., & Gross-Tsur, V. (2001). Developmental dyscal culia is a familial learning disability. *Journal of Learning Disabilities, 34:* 59-71.
50. Siegel, L.S. (1999). Issues in the definition and diagnosis of learning disabilities: A perspective on Guckenberger v. Boston University. *Journal of Learning Disabilities, 32,* 304-319.
51. Siegel, L.S. (2003). *Learning disabilities.* In: I. B. Weiner (Ed.), Handbook of psychology. Hoboken, NJ: Wiley, pp. 455-486.
52. Silverman, I.W. (2003). Gender differences in delay of gratification: A meta-analysis. Sex Roles, 49:451–463.
53. Sonuga-Barke, E.J., Lea, S.E., & Webley, P. (1989). Children's choice: Sensitivity to changes in reinforcer density. *Journal of the Experimental Analysis of Behavior, 51,* 185–197.
54. Spira, E.G., & Fischel, J.E. (2005). The impact of preschool inattention, hyperactivity, and impulsivity on social and academic development: a review. *Journal of Child Psychology and Psychiatry, 46*:755–773.
55. Sutton-Smith, B., & Rosenberg, B.G. (1959). A scale to identify impulsive behavior in children. *Journal of Genetic Psychology, 95*:211-6.

Research in Education and Rehabilitation 2023; 6(2): 175-190. **DOI**: 10.51558/2744-1555.2023.6.2.175

56. Terras, M., Thompson, L., & Minnis, H. (2009). Dyslexia and psycho-social functioning: An exploratory study of the role of self-esteem and understanding. *Dyslexia,15*: 304–327.
57. Thambirajah, M.S. (2010). Developmental dyslexia: Clinical aspects. *Advances in Psychiatric Treatment, 16:* 380–387.
58. Tsukayaman, E., Duckworth, A.L., & Kim, B. (2013). Domain-Specific Impulsivity in School-Age Children. *Developmental Science, 16(*6):879-893.
59. Wiener, J., & Schneider, B. (2002). A multisource exploration of friendship patterns of children with and without LD. *Journal of Abnormal Child Psychology, 3:*127-141.
60. Willcutt, E.G., & Pennington, B.F. (2000). Comorbidity of reading disability and attention-deficit/hyperactivity disorder: Differences by gender and subtype. *Journal of Learning Disabililities, 33:*179–191.
61. Winer, J., & Tardif, C.Y. (2004). Social and emotional functioning of children with learning disabilities: Does special education placement make a difference? *Learning Disabilities Research & Practice, 19*: 20-32.
62. Whitehouse, A., Spector, T., & Cherkas, L. (2009). No clear genetic influences on the association between dyslexia and anxiety in a population-based sample of female twins. *Dyslexia, 15:*282–290.
63. Youngstrom, E., Loeber, R., & Stouthamer-Loeber, M. (2000). Patterns and correlates of agreement between parent, teacher, and male adolescent ratings of externalizing and internalizing problems. *Journal of Consulting and Clinical Psychology, 68:*1038–1050.