



HAL
open science

Examining frustration intolerance beliefs among adults with dyslexia or developmental coordination disorder

Catherine Potard, Anne-Charlotte Auger, Stéphanie Lenoir-Perrotel,
Christophe Jarry

► **To cite this version:**

Catherine Potard, Anne-Charlotte Auger, Stéphanie Lenoir-Perrotel, Christophe Jarry. Examining frustration intolerance beliefs among adults with dyslexia or developmental coordination disorder. *Research in Developmental Disabilities*, 2022, 123, pp.104184. 10.1016/j.ridd.2022.104184 . hal-03746926

HAL Id: hal-03746926

<https://hal.science/hal-03746926v1>

Submitted on 4 Nov 2022

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

Examining frustration intolerance beliefs among adults with dyslexia or developmental coordination disorder

Catherine Potard ^{*,1}, Anne-Charlotte Auger ¹, Stéphanie Lenoir-Perrotel ¹, Christophe Jarry ¹

Department of Psychology, University of Angers, Angers, France

ARTICLE INFO

Number of review completed is 1

Keywords:

Developmental coordination disorder
Dyslexia
Dyspraxia
Frustration intolerance
Irrational beliefs

ABSTRACT

Background: Research suggests that adults diagnosed with specific learning disorders, such as dyslexia or developmental coordination disorder (DCD), are at greater risk of emotional problems related to frustration and anger.

Aims: The purpose of this study was to investigate patterns of frustration intolerance beliefs among two groups of adults with a specific learning disorder (dyslexia or DCD), compared with typical adults.

Methods and procedures: Participants were 235 French adults (students or in employment) with dyslexia ($M_{age} = 35.8$ years, $SD = 13.3$; females = 63 %), DCD ($M_{age} = 32.9$ years, $SD = 11.8$; females = 58 %) or typical development ($M_{age} = 33.2$ years, $SD = 12.7$; females = 65 %), who completed an online self-report questionnaire.

Outcomes and results: Analysis of variance revealed a significant between-groups difference, as both learning disorder groups had higher frustration intolerance beliefs than the typical adults. Post hoc analysis showed that participants with DCD scored higher than those with dyslexia on each type of frustration intolerance belief, while participants with dyslexia scored higher than typical adults on achievement frustration and discomfort intolerance.

Conclusions and implications: These results underline the usefulness of distinguishing between frustration intolerance dimensions, and of using rational emotive behavior therapy to reduce the irrational beliefs of people with DCD or dyslexia.

What this paper adds

Specific learning disorders, such as dyslexia and developmental coordination disorder (DCD), are diagnosed in approximately 4-5% of adults. Nevertheless, little is known about the internal evaluative cognitions of these adults, even though their learning difficulties have been shown to have a significant impact on psychosocial and emotional functioning in adulthood. This study improves our understanding of the frustration intolerance profiles of adults with DCD or dyslexia. Results showed that adults with DCD or dyslexia experience more frustration intolerance beliefs than typical developing adults. Moreover, individuals with DCD have more such beliefs, and at higher levels, than those with dyslexia. Results also revealed specific patterns of irrational beliefs related to frustration

* Corresponding author at: Catherine POTARD, Laboratoire de Psychologie des Pays de la Loire (EA 4638), Maison de la Recherche Germaine Tillon, Université d'Angers, 5 bis boulevard Lavoisier, 49045, Angers Cedex 1, France.

E-mail addresses: catherine.potard@univ-angers.fr (C. Potard), christophe.jarry@univ-angers.fr (C. Jarry).

¹ EA 4638 Pays de la Loire Psychology Laboratory (LPPL), Psychology Department, Angers University, Angers, France.

among adults with DCD or dyslexia. The present study suggests that rational emotive behavioral therapy might be useful in addressing psychological/emotional distress, especially among adults with DCD.

1. Introduction

Specific learning disorders (SLDs), such as dyslexia and developmental coordination disorder (DCD; often referred to as *dyspraxia*), describe individuals with cognitive functioning difficulties (without intellectual disability) that affect their learning and other life skills. *Dyslexia* is characterized by difficulties with accurate and fluent reading (APA, 2013), and has a prevalence of 24 % among adults (APA, 2013; López-Escribano, Suro Sánchez, & Leal Carretero, 2018). *DCD* is diagnosed on the basis of motor coordination dysfunction (not attributable to a learning disability or medical condition), which impacts activities of daily living and/or academic achievement (American Psychiatric Association, 2013). Approximately 26 % of the population experience difficulties related to DCD (American Psychiatric Association, 2013; Lingam, Hunt, Golding, Jongmans, & Emond, 2009). DCD and dyslexia have been well documented in childhood, but studies characterizing their signs and symptoms, and their effects on mental health in adulthood, are still rare (Gerber, 2011). Nonetheless, these are lifelong disorders, and a majority of individuals continue to experience problems arising from it in adulthood (Cousins & Smyth, 2003; Peterson & Pennington, 2015; Reiff & Gerber, 1992), such as difficulty with handwriting and organizational skills (Barnett, Henderson, Scheib, & Schulz, 2011; Kirby, Sugden, Beveridge, & Edwards, 2008).

Much research has focused on the early identification of individuals with SLDs and interventions to improve their cognitive symptoms (e.g., Pesova, Sivevska, & Runceva, 2014). However, there has been far less research on the specific emotional adjustment difficulties that these individuals exhibit when they reach adulthood. Psychosocial difficulties have been identified in individuals with dyslexia and DCD, including in adulthood. For example, social isolation, relationship difficulties, and poorer academic performance have been observed in people with SLDs (Aro et al., 2019; Shessel & Reiff, 1999). Psychological distress has also been reported, with more frequent depression, anxiety, suicidal ideation, and substance abuse (Hill & Brown, 2013; Kirby, Williams, Thomas, & Hill, 2013; Klassen, Tze, & Hannok, 2013; Wilson, Deri Armstrong, Furrrie, & Walcot, 2009). Studies have also underlined the emotional impact of SLDs (Livingston, Siegel, & Ribary, 2018; Tal-Saban, Zarka, Grotto, Ornoy, & Parush, 2012) and its negative quality-of-life issues (Cousins & Smyth, 2003; Engel-Yeger, 2020; Hill, Brown, & Sophia Sorgardt, 2011; Tal-Saban, Ornoy, & Parush, 2014). Previous studies (Engel-Yeger, 2020; Tal-Saban et al., 2014) have emphasized that the difficulties of people with SLDs, particularly DCD, extend far beyond their motor ones, to include socio-emotional problems. Frustration is therefore a common problem for many people with learning difficulties, often associated with anger and aggressive behaviors (Richardson, 2013).

Frustration with their lack of ability to perform activities that others are able to do may easily contribute to a sense of inadequacy in people with SLDs. The latter are often described as extremely frustrated, owing to their inability (e.g., poor motor skills, academic failure) to meet their own and others' expectations (Abdul Hamid, Admodisastro, & Kamaruddin, 2015; Klassen et al., 2013). People with dyslexia may exhibit a low tolerance of difficulty (Sako, 2016), and a high level of perfectionism (Stoerber & Rountree, 2020). Thus, many of the emotional problems (e.g., feelings of low self-worth and incompetence; Gibby-Leversuch, Hartwell, & Wright, 2019) related to dyslexia occur out of frustration with school or social situations (Alexander-Passe, 2006; Al-Lamki, 2012; Jacobs, Parke, Ziegler, Headleand, & De Angeli, 2020). It has been suggested that children with SLDs such as dyslexia experience more frustration than those with general learning problems (Kong, 2012). In particular, individuals with dyslexia appear to be extremely vulnerable to frustration, anxiety, and anger (Abdul Hamid et al., 2015; Sako, 2016). Concerning DCD, difficulty performing some daily tasks and frustration at repeated failure may have major social and emotional implications (Caçola, 2016; Gibbs, Appleton, & Appleton, 2007; Missiuna & Campbell, 2014). The motor impairments in DCD have a considerable impact on the ability to carry out daily self-care activities (e.g., personal hygiene, dressing, school/work-based activities such as writing and using utensils) in a variety of contexts (academic, work, domestic). Research has repeatedly highlighted lower self-esteem (Hill et al., 2011) and low frustration tolerance among children and adolescents with DCD (Missiuna, Rivard, & Pollock, 2004).

According to the rational emotive behavior therapy (REBT) approach, emotional problems and self-defeating behavior are learned maladaptive responses resulting from faulty thinking patterns. Thus, *frustration* is defined as a negative emotional response triggered by the omission and/or devaluation of an expected reward (Ramirez-Castillo et al., 2019), but it can also refer to irrational cognitions or beliefs (IBs). Irrational beliefs lead to dysfunctional or disturbed emotions. Emotional disturbances such as frustration both arise from and are sustained by personal beliefs that are assumed to be true, even if they are inconsistent with reality, illogical, non-pragmatic, and/or without empirical support (David, Lynn, & Ellis, 2009). These IBs tend to be rigid, and generally have maladaptive or unhealthy consequences (Dryden, 1999; Ellis, 1991). For the purposes of REBT (1996, Ellis, 1991, 1999, 2004), IBs are divided into two separate constructs: evaluation of self-worth, and intolerance of frustration/discomfort (David et al., 2009).

Frustration intolerance is an emotional/cognitive process (evaluative cognition) based on a refusal to accept the difference between desire and reality that has unhealthy emotional and behavioral consequences (David et al., 2009). *Frustration intolerance*, also called *discomfort disturbance*, is essentially an "attempt to shoehorn reality to fit our desires, whilst tolerance is the acceptance of the undesirable in order to achieve longer-term goals" (Harrington, 2007, p. 193). Frustration intolerance beliefs (FIBs) reflect a negative expectation of one's strength or ability to withstand frustration, discomfort or pain events, thereby making a situation appear intolerable (DiGiuseppe et al., 2014; Szentagotai & Jones, 2009). They also refer to the demand for comfortable and easy conditions (Harrington, 2005), and usually reflect low self-control (DiGiuseppe et al., 2014). FIBs have increasingly been viewed as playing a key role in the development and maintenance of multiple forms of psychopathology, emotional disturbance, and behavioral problems (e.g., Chang & D'Zurilla, 1996; DiGiuseppe, 1996; Rabinowitz, Melamed, Feiner, Weisberg, & Ribak, 1996).

Different forms of frustration intolerance have been described, including discomfort intolerance, entitlement, emotional intolerance, and achievement frustration (Harrington, 2005). *Discomfort intolerance* is the belief that life should be easy, comfortable and free

of hassle, effort or inconvenience (e.g., “I can’t stand doing things that involve a lot of hassle”; Harrington, 2005). *Entitlement* is the belief that wishes should be met (immediate gratification), and other people should indulge and not frustrate them (e.g., “I can’t bear it if other people stand in the way of what I want”; Harrington, 2005). *Emotional intolerance* is the belief that emotional distress is unbearable and must be quickly relieved or avoided (e.g., “I can’t bear disturbing feelings”; Harrington, 2005). *Achievement frustration* is a perfectionist belief and reflects intolerance of obstacles to achieving high standards (e.g., “I can’t stand feeling that I’m not on top of my work”; Harrington, 2005). These four dimensions are intercorrelated, and complex disorders may involve more than one. Overall, high frustration intolerance has been found to be significantly related to emotional disturbance, unassertive behavior, and lower self-control (Filippello, Harrington, Buzzai, Sorrenti, & Costa, 2014). The content of FIBs may play a central role in determining the type of emotional disturbance. For example, high emotional intolerance is related to high anxiety, depression, and low assertiveness, while high entitlement is significantly related to anger (Stanković & Vukosavljević-Gvozden, 2011).

The literature on REBT argues that frustration intolerance hampers people in achieving their goals, and mainly results in negative and damaging emotions and behaviors such as anxiety, depression, anger, or avoidance (Leyro, Zvolensky, & Bernstein, 2010). Although research has provided evidence that different FIBs are related to emotional behavioural problems (e.g., self-control problems) and affect psychological wellbeing (Filippello et al., 2014; Harrington, 2006), relatively little is known about FIBs in people with SLDs.

Previous studies have increased our understanding of how irrational beliefs can influence health outcomes. However, to our knowledge, no study has assessed irrational beliefs in relation to SLDs. Furthermore, while SLDs have been shown to be closely associated with anxious and/or depressive disorders, as well as anger, it is not known whether FIBs characterize people with SLDs. As such, a better understanding of the processes of frustration (in)tolerance could inform our knowledge of the adjustment skills of people with DCD or dyslexia. It is therefore important to conduct research on adulthood, an area that has so far received very little attention, even though this is when people with SLDs experience new environmental and developmental demands (e.g., entering university or the world of work). We therefore undertook a preliminary investigation of FIBs among a group of adults with or without a diagnosis of SLD, focusing on dyslexia and DCD. We addressed the following questions:

- Do adults with SLDs differ from their typically developing (TD) peers on FIBs? In view of the difficulties, they experience in their daily lives due to their disorder, we expected participants with SLDs to have higher FIB scores than their TD peers.
- Do adults with DCD differ from adults with other SLDs on FIBs? In view of the higher levels of everyday stress experienced by adults with DCD in wider spheres of daily life (Cairney, Rigoli, & Piek, 2013), and the poor social and medical recognition of DCD (Harris, Mickelson, & Zwicker, 2015), compared with dyslexia, we predicted that the DCD group would have higher FIB scores than the dyslexia group.
- Do sex and age influence the presence of FIBs in the SLD population? Given that age and sex both influence the FIBs of TD people (e.g., Harrington, 2005), we examined their interaction effect.

2. Method

2.1. Participants and procedure

After excluding participants with missing data ($n = 34$), those aged under 18 years ($n = 5$) or over 65 years ($n = 3$), and those who did not provide any details of a diagnosis of DCD or dyslexia by a relevant healthcare professional / center of excellence, the final sample comprised 235 participants aged 18-63 years ($M_{age} = 33.67$, $SD = 8.2$). According to self-reports, 79 adults (46 women, 33 men) had been diagnosed with DCD, 60 adults (38 women, 22 men) had been diagnosed with dyslexia, and 96 adults (62 women, 34

Table 1
Demographic Information (N = 235).

Categorical variables	Typical group $n = 96$		Dyslexia group $n = 60$			DCD group $n = 79$			
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)		
Sex	Men 34 (35.4)	Women 62 (64.6)	Men 22 (36.7)	Women 38 (63.3)	Men 33 (41.8)	Women 46 (58.2)			
Education level	Bac or less 23 (24)	Bac + 2/3 yrs 36 (37.5)	At least bac + 4 yrs 37 (38.5)	Bac or less 10 (16.7)	Bac + 2/3 yrs 37 (61.6)	At least bac + 4 yrs 13 (21.7)	Bac or less 37 (46.8)	Bac + 2/3 yrs 19 (24.1)	At least bac + 4 yrs 23 (29.1)
Continuous variables	Mean (SD)		Mean (SD)			Mean (SD)			
Age	33.16 (12.66)		35.80 (13.28)			32.94 (11.76)			
Age at diagnosis	-		10.92 (11.10)			21.19 (15.40)			

Note. DCD: developmental coordination disorder; Bac: French high-school diploma.

men) had no learning disability or psychiatric disorder (control group). There was no significant difference in either sex ratio, $\chi^2 = .794, p = .67$, or age, $F = 2.710, p = .07$, between the three groups. An analysis of variance (ANOVA) and Bonferroni post hoc comparison, $F = 4.512, p = .01$, revealed a significant difference in education level between the DCD and dyslexia groups, but not between either of the SLD groups and the control group. Participants' characteristics are shown in Table 1. Participants were recruited via advertisements on the webpages of DCD or dyslexia organizations, and via emails to DCD or dyslexia organizations and support groups. This cross-sectional, web-based survey was carried out in accordance with the Declaration of Helsinki and French Data Protection Authority (CNIL) guidelines.

2.2. Measures

An initial online questionnaire required participants to report whether they had been diagnosed with DCD or dyslexia, who made this diagnosis, and when it was made. Next, all participants completed the French version of the FDS (Chamayou, Tsenova, Gonthier, Blatier, & Yahyaoui, 2016) to probe their perceived ability to withstand frustration. This 23-item self-report questionnaire assesses four dimensions: *discomfort intolerance* (e.g., "I can't stand doing tasks that seem too difficult"), *entitlement* (e.g., "I can't stand it if other people act against my wishes"), *emotional intolerance* (e.g., "I can't bear disturbing feelings"), and *achievement frustration* (e.g., "I can't bear the frustration of not achieving my goals"). Respondents estimated the strength with which they held a particular belief when distressed or frustrated on a 5-point Likert-like scale ranging from 1 (*None*) to 5 (*Very strong*), with higher scores indicating greater frustration intolerance. We computed a mean subscore for each of the four dimensions, and a mean overall score. In the present study, internal consistency for the four FDS subscales was adequate ($\alpha = .72-.81$).

3. Results

Differences between groups on FIB variables (i.e., continuous variables) were evaluated using Kruskal-Wallis nonparametric ANOVAs and Dwass-Steel-Critchlow-Fligner post hoc comparisons. A 5 % level of significance was set for all statistical tests. Data analysis was performed using IBM SPSS® Statistics Version 24 and Jamovi®. We ran an ANOVA for each FIB dimension, to explore potential differences between the DCD, dyslexia and control groups. One-way ANOVAs revealed significant between-groups differences for all four dimensions (see Table 2 for more details). The post hoc test revealed that the DCD group reported higher FIB scores than either the control or dyslexic groups. Participants with dyslexia scored higher on achievement frustration and discomfort intolerance than the TD (control) group.

Next, to test potential sex and age effects, groups were compared on FIBs using Quade's analyses of covariance (ANCOVAs), with age and sex as covariates. Results showed no interaction effect of sex and age (see Table 3 for an overview).

4. Discussion

Individuals with SLDs are known to have a tendency to exhibit emotional difficulties, such as anger or frustration. However, to date, few studies have focused on their internal evaluative cognitions, and more particularly their specific IBs. Given the daily difficulties of individuals with dyslexia or DCD, IBs related to frustration intolerance could be responsible for their psychological functioning. The present study therefore explored FIBs in adults with SLDs, in comparison with typical adults, and how they differed according to the type of SLD (dyslexia or DCD). As hypothesized, participants with dyslexia or DCD tended to score higher on all FIBs, especially those with DCD. Comparison of the two SLD groups showed that participants with DCD scored higher than those with dyslexia on all four FIB dimension, while adults with dyslexia scored higher scores on discomfort intolerance and achievement than their TD peers did. We observed no interaction effect of sex or age on these results. These findings highlight the important role of FIBs in the psychological functioning of adults with SLDs, as well as their specificity according to the type of SLD.

Thus, the first result of the present study confirmed that adults with dyslexia or DCD exhibit more frustration intolerance than their TD peers. This is true for all four FIB dimensions in people with DCD, while higher levels of achievement frustration and discomfort intolerance seem more characteristic of people with dyslexia. FIBs may make adults with DCD or dyslexia unwilling to tolerate negative emotional events or daily stress, such that they become vulnerable to psychological distress, and more likely to seek flight

Table 2
Mean (Standard Deviation) Frustration Discomfort Scale Scores of the DCD, Dyslexia and Control Groups, and Results of ANOVA and Post Hoc Comparisons.

Variables		Typical group	Dyslexia group	DCD group	Group comparisons			
		n = 96 Mean (SD)	n = 60 Mean (SD)	n = 79 Mean (SD)	K-W test	p	ϵ^2	DSCF pairwise comparisons
Frustration intolerance beliefs	Discomfort intolerance	3.23 (.72)	3.51 (.83)	3.98 (.73)	36.80	***	.12	DCD > Dyslexia > Typical
	Entitlement	3.12 (.76)	3.30 (.77)	3.69 (.72)	21.82	***	.08	DCD > Dyslexia = Typical
	Emotional intolerance	3.59 (.77)	3.72 (.84)	4.02 (.64)	14.43	***	.04	DCD > Dyslexia = Typical
	Achievement frustration	3.68 (.68)	3.88 (.72)	4.19 (.55)	25.58	***	.08	DCD > Dyslexia > Typical
	Total score	3.38 (.59)	3.61 (.67)	3.97 (.49)	39.38	***	.09	DCD > Dyslexia > Typical

Note. K-W: Kruskal-Wallis ANOVA; DSCF: Dwass-Steel-Critchlow-Fligner; DCD: developmental coordination disorder. *** $p < .001$.

Table 3
ANCOVA Summary Table for the Four FIB Dimensions.

Dependent variable	df	Mean square	F	p	Partial η^2
Discomfort intolerance					
SLD group	2	5.673	9.557	.001	.152
Sex	1	1.220	2.056	.155	.019
Age	43	.756	1.273	.160	.339
SLD group x Sex	2	.212	.358	.700	.007
Sex x Age	19	1.357	2.574	.080	.034
SLD group x Age	46	.360	.606	.895	.097
SLD group x Sex x Age	8	.421	.710	.904	.234
Entitlement					
SLD group	2	2.438	4.341	.010	.075
Sex	1	1.815	3.246	.070	.029
Age	43	.503	.900	.645	.266
SLD group x Sex	19	1.819	3.252	.043	.057
Sex x Age	46	.752	1.345	.171	.193
SLD group x Age	8	.526	.940	.584	.288
SLD group x Sex x Age	8	.570	1.018	.427	.071
Emotional intolerance					
SLD group	2	2.227	3.707	.021	.065
Sex	1	.002	.004	.952	.000
Age	1	.520	.866	.699	.258
SLD group x Sex	2	.097	.162	.851	.003
Sex x Age	19	.534	.889	.597	.136
SLD group x Age	46	.480	.799	.802	.256
SLD group x Sex x Age	8	.546	.909	.512	.064
Achievement frustration					
SLD group	2	2.312	4.04	.005	.094
Sex	1	.135	.325	.570	.003
Age	1	.524	1.257	.173	.336
SLD group x Sex	2	1.044	2.506	.086	.045
Sex x Age	19	.487	1.168	.298	.172
SLD group x Age	46	.351	.843	.739	.266
SLD group x Sex x Age	8	.250	.600	.776	.043

from unbearable situations (Abrams & Ellis, 1994). Our study also established preliminary FIB profiles for the two types of SLD we studied. Adults with DCD expressed strong frustration intolerance overall, while those with dyslexia had more specific difficulties, with higher scores on the discomfort intolerance and achievement frustration dimensions. This difference on the overall FIB score may, in part, be related to the time of diagnosis. In the present study, participants with dyslexia were diagnosed earlier (i.e., during preadulthood) than individuals with DCD (i.e., during emerging adulthood), which may have made them more tolerant of their disorder and its impact on their daily lives (e.g., Battistutta, Commissaire, & Steffgen, 2018).

Emotional intolerance, that is, perceived sensitivity to and reduced ability to withstand uncomfortable emotional states (e.g., fear of anxious sensations), has already been observed in adults with DCD. The impact of motor impairment on the ability to perform activities of daily living is liable to produce *distressing feelings* in children with DCD (Crane, Summer, & Hill, 2017) that can lead them to have difficulty tolerating unpleasant feelings. People with DCD typically describe negative childhood experiences, particularly bullying at school, as emotionally painful or negative, and difficult to forget (Campbell & Missiuna, 2012). These *traumatic* experiences may be internalized in adulthood through IBs.

Entitlement refers to the *I must get what I want* cognition, which is related to demands for instant gratification, when nothing and no one must frustrate the individual's desires. Adults with DCD tended to ruminate about what they think they should receive or obtain. Entitlement attitudes are related to anger expression, and to academic effort and performance (Anderson, Halberstadt, & Aitken, 2014; Bonaccio, Reeve, & Lyerly, 2016; Pekrun, Lichtenfeld, Marsh, Murayama, & Goetz, 2017). Individuals with DCD display higher levels of anger (Farmer, Echenne, & Bentourkia, 2016). One possible explanation for this is that a combination of recurrent stressful events in daily life and FIBs makes adults with DCD unwilling to tolerate negative emotional events, and more likely to seek immediate gratification.

The *discomfort intolerance* dimension reflects beliefs associated with the intolerance of hassle, effort or inconvenience. Discomfort intolerance makes persons less able to tolerate aversive physical sensations (or physical stress and discomfort), and therefore more likely to try and escape or avoid situations (e.g., public settings) or activities (e.g., exercise) that may trigger them. It is not surprising that this dimension, representing the intolerance of task difficulty, reflects a key characteristic of people with SLDs (dyslexia or DCD), whose *performance* of everyday activities is so visibly disrupted (Cairney et al., 2013).

Achievement frustration-related IBs intersect with the desirable level of achievement-related outcomes or perfectionism (e.g., Ståhlberg, Tuominen, Pulkka, & Niemivirta, 2019). As failure undermines the achievement history of individuals with DCD or

dyslexia, it may lead to lower perceived competence and control, and negative emotions (Pekrun et al., 2017). High achievement frustration suggests an emphasis on high standards, and an intolerance of the frustration of these standards (e.g., “I can’t bear the frustration of not achieving my goals”). One previous study suggested that perfectionism self-presentation plays a central role in dyslexia (Stoerber & Rountree, 2020), and predicts negative reactions to impairment and disability (Read, Hill, Jowett, & Astill, 2019).

4.1. Limitations

Beyond the need for independent replication, the present study had several limitations that need to be taken in account. First, as the data came from participants with self-reported SLDs, there may have been a response bias. Future research should consider other measurement methods, such as clinical interviews or checklist screening, and try to replicate our findings in a clinical sample. With regard to comorbidities (estimated at least 20% in children, Pauc, 2005), another limitation of our study is that we did not include a group of participants with both dyslexia and DCD. Second, the cross-sectional study design meant that we could not establish clear causal relationships between variables. A longitudinal study is therefore needed to fully test both the intercorrelations and causal ordering of the constructs in this study. Experimental studies of frustration intolerance featuring emotion-provoking vignettes/scenarios are also needed to evaluate less conscious and observable IBs and state emotions than the conscious representations measured by the FDS. Moreover, it would be useful to investigate the relative importance of other IBs, such as self-worth beliefs (e.g., self-esteem) or the role of environmental factors (e.g., parenting stress), in SLDs. It is important to extend this research by including other potentially influential factors, such as mood (e.g., depression and anxiety), critical stressful life events, and perceived social support.

4.2. Conclusion

Our preliminary findings tend to confirm that FIB dimensions may be differentially related to distinct dysfunctional emotions and disorders (Bond & Dryden, 2000; Harrington, 2006), including learning disabilities. They lend support to the hypothesis that adults with dyslexia are characterized by discomfort intolerance and achievement frustration, while entitlement and emotional intolerance are also important FIB dimensions in adults with DCD. The consequences of FIBs and the attendant negative affectivity surrounding learning difficulties need to be studied. As (1) anxiety and depression are very common symptoms in individuals with SLDs (e.g., Hill & Brown, 2013; Pratt & Hill, 2011), and (2) FIBs play a well-established role in stress, anxiety, and depression in typical developing adults (Harrington, 2005, 2006; Stanković & Vukosavljević-Gvozden, 2011), more comprehensive research is needed to explain the direction of causation between the different variables, and links to psychological disturbance in people with SLDs. Future studies should also consider whether FIBs explain or increase the risk of additional mental health comorbidities in SLDs. As many SLDs have different etiologies and psychosocial impacts, understanding the internal cognitive evaluation patterns experienced by adults with dyslexia or DCD may increase the desire of mental health professionals and researchers to intervene more effectively. Importantly, FIBs are malleable cognitions that can be targeted in treatment. If other studies confirm this association between FIBs and SLD, REBT interventions for adults could be worthwhile. By evaluating IBs, challenging those related to frustration, and adjusting them so that they are more adaptive and rational, these interventions might help to reduce the emotional disturbance of individuals with dyslexia or DCD. However, further intervention research is needed to evaluate the effectiveness of REBT-based programs targeting IBs in individuals with learning disabilities.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

CRediT authorship contribution statement

Catherine Potard: Conceptualization, Methodology, Formal analysis, Supervision, Writing - original draft. **Anne-Charlotte Auger:** Investigation. **Stéphanie Lenoir-Perrotel:** Investigation. **Christophe Jarry:** Conceptualization, Methodology, Supervision.

Declaration of Competing Interest

The authors report no declarations of interest.

Acknowledgements

The authors would like to thank the participants and the following support groups - Dyspraxie France Dys Association, Fédération Française des Dys, Apedys, and DYS fois 10 association - for disseminating links to the study, and all the adults who took part in the survey.

References

Abdul Hamid, S. S., Admodiasastro, N., & Kamaruddin, A. (2015). A study of computer-based learning model for students with dyslexia. *9th Malaysian Software Engineering Conference (MySEC)*, 284–289. <https://doi.org/10.1109/MySEC.2015.7475234>

- Abrams, M., & Ellis, A. (1994). Rational emotive behaviour therapy in the treatment of stress. *British Journal of Guidance & Counselling*, 22(1), 39–50. <https://doi.org/10.1080/03069889400760051>
- Alexander-Passe, N. (2006). How dyslexic teenagers cope: An investigation of self-esteem, coping and depression. *Dyslexia*, 12(4), 256–275. <https://doi.org/10.1002/dys.318>
- Al-Lamki, L. (2012). Dyslexia: Its impact on the individual, parents and society. *Sultan Qaboos University Medical Journal*, 12, 269–272.
- American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). American Psychiatric Association.
- Anderson, D., Halberstadt, J., & Aitken, R. (2014). Entitlement attitudes predict students' poor performance in challenging academic conditions. *International Journal of Higher Education*, 2(2), 151. <https://doi.org/10.5430/ijhe.v2n2p151>
- Aro, T., Eklund, K., Eloranta, A.-K., Närhi, V., Korhonen, E., & Ahonen, T. (2019). Associations between childhood learning disabilities and adult-age mental health problems, lack of education, and unemployment. *Journal of Learning Disabilities*, 52(1), 71–83. <https://doi.org/10.1177/0022219418775118>
- Barnett, A. L., Henderson, S. E., Scheib, B., & Schulz, J. (2011). Handwriting difficulties and their assessment in young adults with DCD: Extension of the DASH for 17- to 25-year-olds. *Journal of Adult Development*, 18(3), 114–121. <https://doi.org/10.1007/s10804-011-9121-3>
- Battistutta, L., Comissaire, E., & Steffgen, G. (2018). Impact of the time of diagnosis on the perceived competence of adolescents with dyslexia. *Learning Disability Quarterly*, 41(3), 170–178. <https://doi.org/10.1177/0731948718762124>
- Bonaccio, S., Reeve, C. L., & Lyerly, J. (2016). Academic entitlement: Its personality and general mental ability correlates, and academic consequences. *Personality and Individual Differences*, 102, 211–216. <https://doi.org/10.1016/j.paid.2016.07.012>
- Bond, F. W., & Dryden, W. (2000). How rational beliefs and irrational beliefs affect people's inferences: An experimental investigation. *Behavioural and Cognitive Psychotherapy*, 28(1), 33–43.
- Caçola, P. (2016). Physical and mental health of children with developmental coordination disorder. *Frontiers in Public Health*, 4. <https://doi.org/10.3389/fpubh.2016.00224>
- Cairney, J., Rigoli, D., & Piek, J. (2013). Developmental coordination disorder and internalizing problems in children: The environmental stress hypothesis elaborated. *Developmental Review*, 33(3), 224–238. <https://doi.org/10.1016/j.dr.2013.07.002>
- Campbell, W. N., & Missiuna, C. (2012). Peer victimization and depression in children with and without motor coordination difficulties. *Psychology in the Schools*, 49(4), 328–341. <https://doi.org/10.1002/pits.21600>
- Chamayou, J.-L., Tsenova, V., Gonthier, C., Blatier, C., & Yahyaoui, A. (2016). Validation française de l'échelle de frustration et d'inconfort (Frustration Discomfort Scale). [French validation of the Frustration Discomfort Scale]. *L'Encéphale*, 42(4), 325–332. <https://doi.org/10.1016/j.encep.2015.08.005>
- Chang, E. C., & D'Zurilla, T. J. (1996). Irrational beliefs as predictors of anxiety and depression in a college population. *Personality and Individual Differences*, 20(2), 215–219. [https://doi.org/10.1016/0191-8869\(95\)00166-2](https://doi.org/10.1016/0191-8869(95)00166-2)
- Cousins, M., & Smyth, M. M. (2003). Developmental coordination impairments in adulthood. *Human Movement Science*, 22(4–5), 433–459. <https://doi.org/10.1016/j.humov.2003.09.003>
- Crane, L., Summer, E., & Hill, E. L. (2017). Emotional and behavioral problems in children with developmental coordination disorder: Exploring parent and teacher reports. *Research in Developmental Disabilities*, 70, 67–74. <https://doi.org/10.1016/j.ridd.2017.08.001>
- David, D., Lynn, S., & Ellis, A. (2009). *Rational and irrational beliefs*. Oxford University Press.
- DiGiuseppe, R. (1996). The nature of irrational and rational beliefs: Progress in rational emotive behavior theory. *Journal of Rational-Emotive & Cognitive-Behavior Therapy*, 14(1), 5–28. <https://doi.org/10.1007/BF02238091>
- DiGiuseppe, R. A., Doyle, K. A., Dryden, W., & Backx, W. (2014). *A practitioner's guide to rationalemotive behavior therapy* (3rd ed.). Oxford University Press.
- Dryden, W. (1999). *Rational emotive behavioral counseling in action*. Sage.
- Ellis, A. (1991). The revised ABC's of rational-emotive therapy (RET). *Journal of Rational-Emotive and Cognitive-Behavior Therapy*, 9(3), 139–172. <https://doi.org/10.1007/BF01061227>
- Ellis, A. (1996). The humanism of rational emotive behavior therapy and other cognitive behavior therapies. *The Journal of Humanistic Education and Development*, 35(2), 69–88. <https://doi.org/10.1002/j.2164-4683.1996.tb00356.x>
- Ellis, A. (1999). Why rational-emotive therapy to rational emotive behavior therapy? *Psychotherapy: Theory, Research, Practice, Training*, 36(2), 154–159. <https://doi.org/10.1037/h0087680>
- Ellis, A. (2004). Why rational emotive behavior therapy is the most comprehensive and effective form of behavior therapy. *Journal of Rational-Emotive & Cognitive-Behavior Therapy*, 22(2), 85–92. <https://doi.org/10.1023/B:JORE.0000025439.78389.52>
- Engel-Yeger, B. (2020). The role of poor motor coordination in predicting adults' health related quality of life. *Research in Developmental Disabilities*, 103, Article 103686. <https://doi.org/10.1016/j.ridd.2020.103686>
- Farmer, M., Echenne, B., & Bentourkia, M. (2016). Study of clinical characteristics in young subjects with developmental coordination disorder. *Brain & Development*, 38(6), 538–547. <https://doi.org/10.1016/j.braindev.2015.12.010>
- Filippello, P., Harrington, N., Buzzai, C., Sorrenti, L., & Costa, S. (2014). The relationship between frustration intolerance, unhealthy emotions, and assertive behaviour in Italian students. *Journal of Rational-Emotive & Cognitive-Behavior Therapy*, 32(4), 257–278. <https://doi.org/10.1007/s10942-014-0193-4>
- Gerber, P. (2011). The impact of learning disabilities on adulthood: A review of the evidenced-based literature for research and practice in adult education. *Journal of Learning Disabilities*, 45, 31–46. <https://doi.org/10.1177/0022219411426858>
- Gibbs, J., Appleton, J., & Appleton, R. (2007). Dyspraxia or developmental coordination disorder? Unravelling the enigma. *Archives of Disease in Childhood*, 92(6), 534–539. <https://doi.org/10.1136/adc.2005.088054>
- Gibby-Leversuch, R., Hartwell, B. K., & Wright, S. (2019). Dyslexia, literacy difficulties and the self-perceptions of children and young people: A systematic review. *Current Psychology*. <https://doi.org/10.1007/s12144-019-00444-1>
- Harrington, N. (2005). Dimensions of frustration intolerance and their relationship to self-control problems. *Journal of Rational-Emotive & Cognitive-Behavior Therapy*, 23(1), 1–20. <https://doi.org/10.1007/s10942-005-0001-2>
- Harrington, N. (2006). Frustration intolerance beliefs: Their relationship with depression, anxiety, and anger, in a clinical population. *Cognitive Therapy and Research*, 30(6), 699–709. <https://doi.org/10.1007/s10608-006-9061-6>
- Harrington, N. (2007). Frustration intolerance as a multidimensional concept. *Journal of Rational-Emotive & Cognitive-Behavior Therapy*, 25(3), 191–211. <https://doi.org/10.1007/s10942-006-0051-0>
- Harris, S. R., Mickelson, E. C. R., & Zwicker, J. G. (2015). Diagnosis and management of developmental coordination disorder. *Canadian Medical Association Journal*, 187(9), 659–665. <https://doi.org/10.1503/cmaj.140994>
- Hill, E. L., & Brown, D. (2013). Mood impairments in adults previously diagnosed with developmental coordination disorder. *Journal of Mental Health*, 22(4), 334–340. <https://doi.org/10.3109/09638237.2012.745187>
- Hill, E. L., Brown, D., & Sophia Sorgardt, K. (2011). A preliminary investigation of quality of life satisfaction reports in emerging adults with and without developmental coordination disorder. *Journal of Adult Development*, 18(3), 130–134. <https://doi.org/10.1007/s10804-011-9122-2>
- Jacobs, L., Parke, A., Ziegler, F., Headleand, C., & De Angeli, A. (2020). Learning at school through to university: The educational experiences of students with dyslexia at one UK higher education institution. *Disability & Society*, 1–22. <https://doi.org/10.1080/09687599.2020.1829553>
- Kirby, A., Sugden, D., Beveridge, S., & Edwards, L. (2008). Developmental coordination disorder (DCD) in adolescents and adults in further and higher education. *Journal of Research in Special Educational Needs*, 8, 120–131. <https://doi.org/10.1111/j.1471-3802.2008.00111.x>
- Kirby, A., Williams, N., Thomas, M., & Hill, E. L. (2013). Self-reported mood, general health, wellbeing and employment status in adults with suspected DCD. *Research in Developmental Disabilities*, 34(4), 1357–1364. <https://doi.org/10.1016/j.ridd.2013.01.003>
- Klassen, R. M., Tze, V. M. C., & Hannok, W. (2013). Internalizing problems of adults with learning disabilities: A meta-analysis. *Journal of Learning Disabilities*, 46(4), 317–327. <https://doi.org/10.1177/0022219411422260>
- Kong, S. Y. (2012). The emotional impact of being recently diagnosed with dyslexia from the perspective of chiropractic students. *Journal of Further and Higher Education*, 36(1), 127–146. <https://doi.org/10.1080/0309877X.2011.606898>

- Leyro, T. M., Zvolensky, M. J., & Bernstein, A. (2010). Distress tolerance and psychopathological symptoms and disorders: A review of the empirical literature among adults. *Psychological Bulletin*, 136(4), 576–600. <https://doi.org/10.1037/a0019712>
- Lingam, R., Hunt, L., Golding, J., Jongmans, M., & Emond, A. (2009). Prevalence of developmental coordination disorder using the DSM-IV at 7 years of age: A UK population-based study. *Pediatrics*, 123(4), e693–700. <https://doi.org/10.1542/peds.2008-1770>
- Livingston, E. M., Siegel, L. S., & Ribary, U. (2018). Developmental dyslexia: Emotional impact and consequences. *Australian Journal of Learning Difficulties*, 23(2), 107–135. <https://doi.org/10.1080/19404158.2018.1479975>
- López-Escribano, C., Suro Sánchez, J., & Leal Carretero, F. (2018). Prevalence of developmental dyslexia in Spanish university students. *Brain Sciences*, 8(5), 82. <https://doi.org/10.3390/brainsci8050082>
- Missiuna, C., & Campbell, W. N. (2014). Psychological aspects of developmental coordination disorder: Can we establish causality? *Current Developmental Disorders Reports*, 1(2), 125–131. <https://doi.org/10.1007/s40474-014-0012-8>
- Missiuna, C., Rivard, L., & Pollock, N. (2004). They're bright but can't write: Developmental coordination disorder in school aged children. *Teaching Exceptional Children Plus*, 1. <https://eric.ed.gov/?id=EJ966505>.
- Pauc, R. (2005). Comorbidity of dyslexia, dyspraxia, attention deficit disorder (ADD), attention deficit hyperactive disorder (ADHD), obsessive compulsive disorder (OCD) and Tourette's syndrome in children: A prospective epidemiological study. *Clinical Chiropractic*, 8(4), 189–198. <https://doi.org/10.1016/j.clch.2005.09.007>
- Pekrun, R., Lichtenfeld, S., Marsh, H. W., Murayama, K., & Goetz, T. (2017). Achievement emotions and academic performance: Longitudinal models of reciprocal effects. *Child Development*, 88(5), 1653–1670. <https://doi.org/10.1111/cdev.12704>
- Pesova, B., Sivevska, D., & Runceva, J. (2014). Early intervention and prevention of students with specific learning disabilities. *Procedia - Social and Behavioral Sciences*, 149, 701–708. <https://doi.org/10.1016/j.sbspro.2014.08.259>
- Peterson, R. L., & Pennington, B. F. (2015). Developmental dyslexia. *Annual Review of Clinical Psychology*, 11, 283–307. <https://doi.org/10.1146/annurev-clinpsy-032814-112842>
- Pratt, M. L., & Hill, E. L. (2011). Anxiety profiles in children with and without developmental coordination disorder. *Research in Developmental Disabilities*, 32, 1253–1259. <https://doi.org/10.1016/j.ridd.2011.02.006>
- Rabinowitz, S., Melamed, S., Feiner, M., Weisberg, E., & Ribak, J. (1996). Hostility and hearing protection behavior: The mediating role of personal beliefs and low frustration tolerance. *Journal of Occupational Health Psychology*, 1(4), 375–381. <https://doi.org/10.1037/1076-8998.1.4.375>
- Read, D. J., Hill, A. P., Jowett, G. E., & Astill, S. L. (2019). The relationship between perfectionism self-presentation and reactions to impairment and disability following spinal cord injury. *Journal of Health Psychology*, 24(3), 362–375. <https://doi.org/10.1177/1359105316674268>
- Reiff, H. B., & Gerber, P. J. (1992). Adults with learning disabilities. In N. N. Singh, & I. L. Beale (Eds.), *Learning disabilities: Nature, theory, and treatment* (pp. 170–198). Springer. https://doi.org/10.1007/978-1-4613-9133-3_6.
- Richardson, T. (2013). Aggressive behaviour in adults with learning disabilities. *Clinical Psychology and People With Learning Disabilities*, 11(1&2), 64–63.
- Sako, E. (2016). The emotional and social effects of dyslexia. *European Journal of Interdisciplinary Studies*, 2(2), 233. <https://doi.org/10.26417/ejiss.v2i2.p233-241>
- Shessel, I., & Reiff, H. B. (1999). Experiences of adults with learning disabilities: Positive and negative impacts and outcomes. *Learning Disability Quarterly*, 22(4), 305. <https://doi.org/10.2307/1511264>
- Ståhlberg, J., Tuominen, H., Pulkka, A.-T., & Niemivirta, M. (2019). Maintaining the self? Exploring the connections between students' perfectionistic profiles, self-worth contingency, and achievement goal orientations. *Personality and Individual Differences*, 151, Article 109495. <https://doi.org/10.1016/j.paid.2019.07.005>
- Stanković, S., & Vukosavljević-Gvozden, T. (2011). The relationship of a measure of frustration intolerance with emotional dysfunction in a student sample. *Journal of Rational-Emotive & Cognitive-Behavior Therapy*, 29(1), 17–34. <https://doi.org/10.1007/s10942-011-0128-2>
- Stoeber, J., & Rountree, M. L. (2020). Perfectionism, self-stigma, and coping in students with dyslexia: The central role of perfectionistic self-presentation. *Dyslexia*. <https://doi.org/10.1002/dys.1666>
- Szentagotai, A., & Jones, J. (2009). The behavioral consequences of irrational beliefs. In D. David, S. J. Lynn, & A. Ellis (Eds.), *Rational and irrational beliefs: Research, theory, and clinical practice* (pp. 75–97). Oxford University Press.
- Tal-Saban, M., Ornoy, A., & Parush, S. (2014). Young adults with developmental coordination disorder: A longitudinal study. *American Journal of Occupational Therapy*, 68(3), 307. <https://doi.org/10.5014/ajot.2014.009563>
- Tal-Saban, M., Zarka, S., Grotto, I., Ornoy, A., & Parush, S. (2012). The functional profile of young adults with suspected developmental coordination disorder (DCD). *Research in Developmental Disabilities*, 33(6), 2193–2202. <https://doi.org/10.1016/j.ridd.2012.06.005>
- Wilson, A. M., Deri Armstrong, C., Furrie, A., & Walcot, E. (2009). The mental health of Canadians with self-reported learning disabilities. *Journal of Learning Disabilities*, 42(1), 24–40. <https://doi.org/10.1177/0022219408326216>