V IBEROAMERICAN CONFERENCE OF NEUROPSYCHOLOGY

IV INTERNATIONAL SYMPOSIUM OF NEUROPSYCHOLOGY AND REHABILITATION

Unraveling dyslexia comorbidity rates: A systematic review

Soraia Saramago[1]*, Jorge Amorim[1], Joana R. Rato[1], Ana Paula Vale[2,3]

[1] Center for Interdisciplinary Research in Health, Universidade Católica Portuguesa, Lisboa, Portugal
[2] Child Studies Centre – CIEC, Universidade do Minho
[3] Center for Psychology at University of Porto CPUP, Research Group Neurocognition and Language

*s-ssaramago@ucp.pt

INTRODUCTION

Dyslexia is commonly associated with other neurodevelopmental disorders (NDs), and the co-occurence rates are consistently higher than expected by chance (1–5). However, the co-occurrence rates show substantial variation across studies, making this data inconclusive. Methodological aspects of the studies and diferences in the diagnostic criteria used contribute to these discrepancies

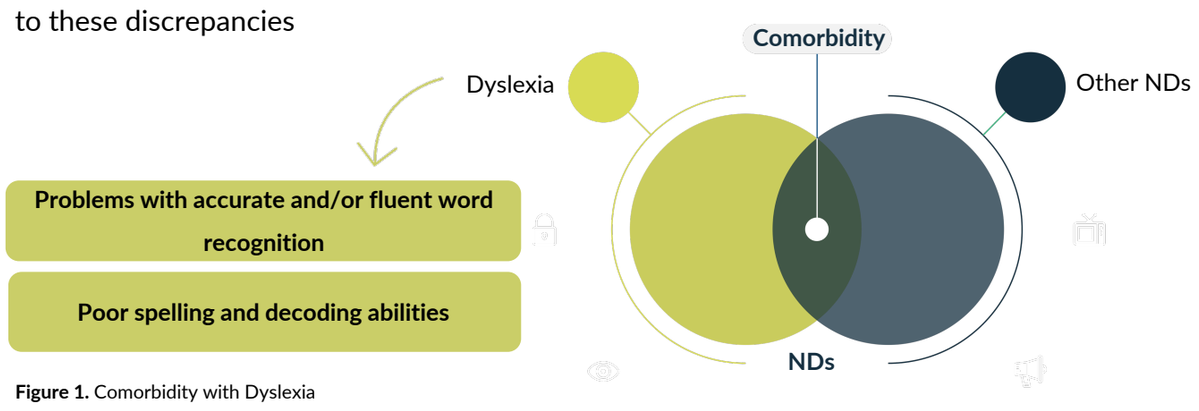

Figure 1. Comorbidity with Dyslexia

This systematic review aims to:

1. Determine the comorbidity rates between dyslexia and other neurodevelopmental disorders in elementary school children
2. Understand the criteria/tasks used to diagnose reading comorbidities

METHODS

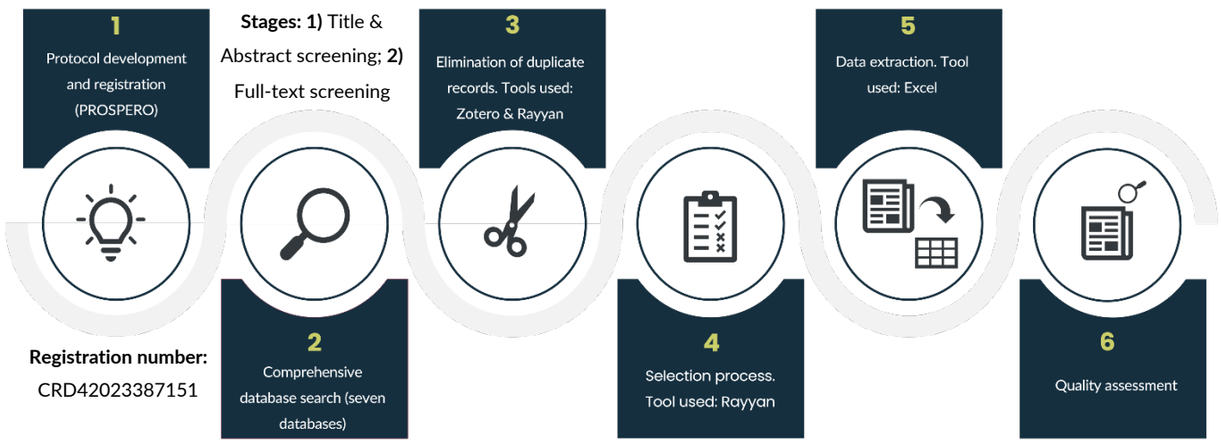

Figure 2. Stages of this systematic review

Databases

Scopus; PubMed; MEDLINE; ERIC; APA PsycArticles; Web of Science; Psychology and Behavioral Sciences

Eligibility criteria

Population: School- aged children (7 – 10 years) with developmental dyslexia and other neurodevelopmental disorders (comorbidity)

Type of studies: Primary studies (peer-reviewed) that report rates or provide data for calculating comorbidity between Dyslexia and other NDs

Publication date: Articles published between 2012 – 2022

Language restrictions: Articles published in English, French, Spanish, and Portuguese

RESULTS

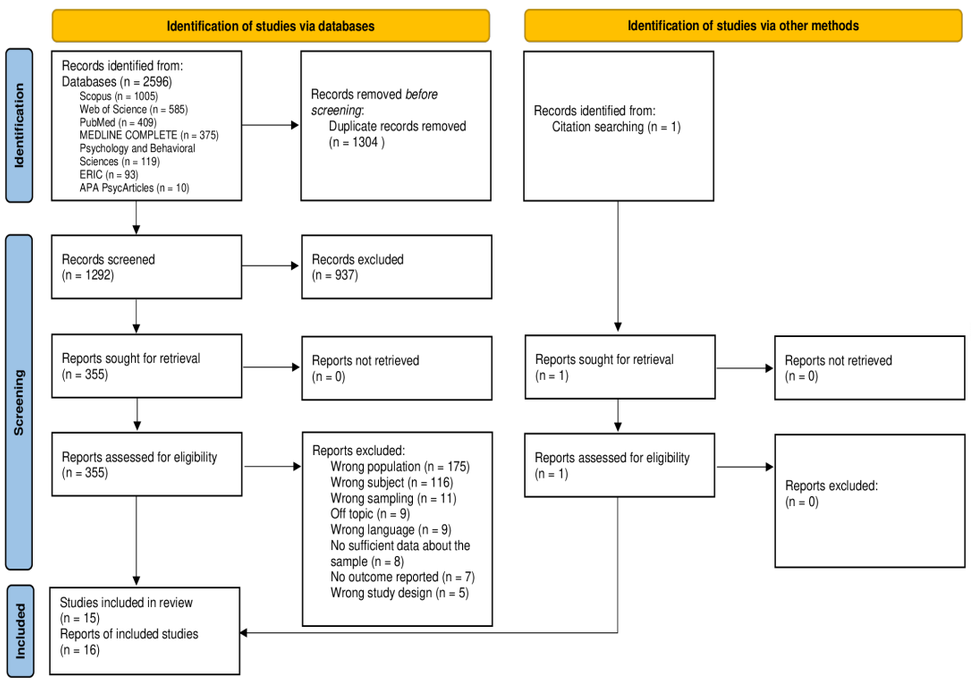

Figure 3. PRISMA 2020 Flow Diagram

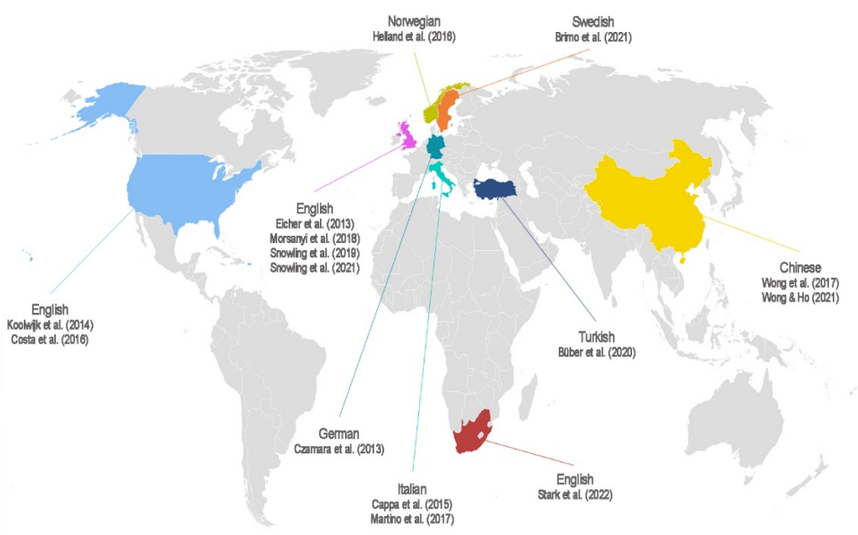

Figure 4. Studies included – Language

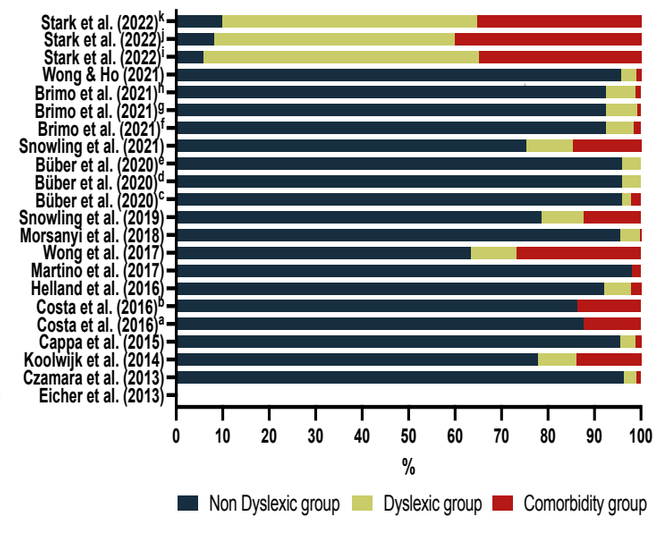

Figure 5. Proportion of children in each study (Non-Dyslexic, Dyslexic, and comorbid cases)

Table 1. Comorbidity rates between Dyslexia and other NDs (mean and range)

	Reading Disorder + NDs N total (Mean; Range)	Dyslexia + NDs N total (Mean; Range)
ADHD	14.78%; 0.97% – 40.10%	21.33%; 1.60% – 40.10%
Writing Disability	13.03%; 12.41% – 13.64%	N/A
Developmental Language Disorder	9.94%; 4.44% – 13.00%	12.70%; 12.39% – 13.00%
	26.83%*	26.83%*
Mathematics Disorder + Developmental Language Disorder	10.31%	10.31%
Mathematical Disability/Dyscalculia/Mathematics Disorder	7.57%; 0.33% – 14.80%	7.57%; 0.33% – 14.80%
	1.09%*	N/A*
ADHD + Developmental Language Disorder	1.73%	N/A
Specific Spelling Disorder/Dysorthography	1.31%	1.31%
Developmental Coordination Disorder	1.12%	1.12%
Autism Spectrum Disorder	0.89%	0.89%
Impairment in Written Expression + Impairment in Mathematics	0.52%	0.52%
Communication Disorder	0.13%	0.13%

*Logographic system

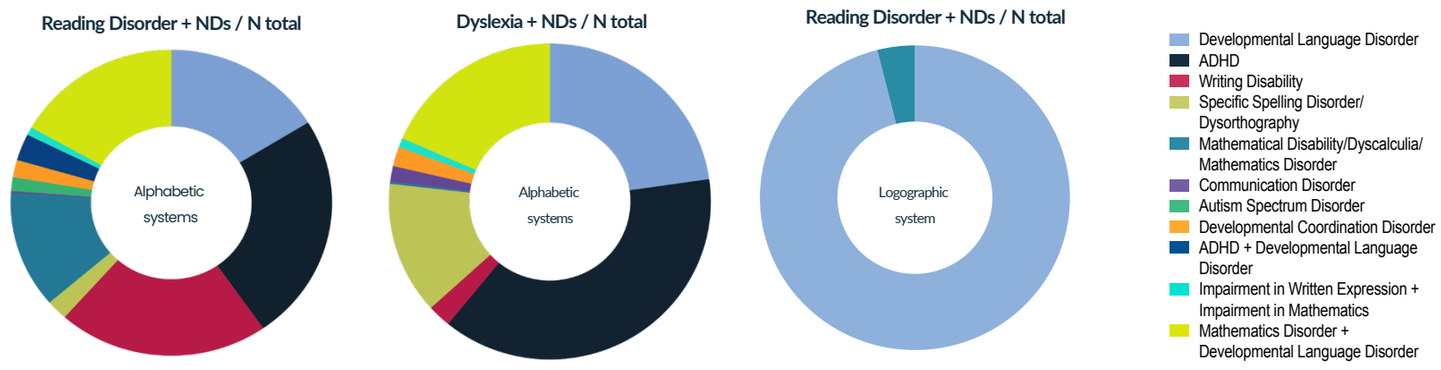

Figure 6. Comorbidity rates (%) for Reading Disorder and Dyslexia (according to the writing system)

Diagnostic criteria

Different cut-offs/z-scores employed

Different assessment procedures and tool types used to diagnose Dyslexia (including parents' and teacher reports)

Different measures utilized

DISCUSSION/CONCLUSION

Studies characteristics

Fifteen articles were included. Thirteen discuss comorbidity in alphabetic systems, while the remaining two focus on a logographic system (Chinese). Among these 13 studies, most (*n* = 7) are based on opaque orthography (English) (6)

Terminology

Found a lack of uniformity in diagnostic terminologies adopted; Several articles report data on reading disorders without specifying whether it constitutes a diagnosis of Dyslexia

Diagnostic criteria

Variability in diagnostic criteria and diagnostic measures used, with comorbidity rates based on reports from teachers/parents or limited assessement protocols

Comorbidity rates

High comorbidity rates between Dyslexia and other NDs (more than 21%), with ADHD exhibiting the highest co-occurrence rate (on average); Multiple calculation methods were observed, contributing to the variation of the rates reported in the literature

This systematic review highlights the importance of considering possible comorbidities between Dyslexia and other NDs, the standardization of diagnostic terminologies/criteria, and increasing clarity in the methods used to calculate comorbidity rates

REFERENCES

1. Pennington BF, Santerre-Lemmon L, Rosenberg J, MacDonald B, Boada R, Friend A, et al. Individual prediction of dyslexia by single versus multiple deficit models. J Abnorm Psychol. 2012 Feb;121(1):212–24
2. Hendren RL, Haft SL, Black JM, White NC, Hoeft F. Recognizing Psychiatric Comorbidity With Reading Disorders. Front Psychiatry. 2018 Mar 27;9:101
3. McGrath LM, Peterson RL, Pennington BF. The Multiple Deficit Model: Progress, Problems, and Prospects. Sci Stud Read. 2020 Jan 2;24(1):7–13
4. Moll K, Kunze S, Neuhoff N, Bruder J, Schulte-Körne G. Specific Learning Disorder: Prevalence and Gender Differences. Kroesbergen E, editor. PLoS ONE. 2014 Jul 29;9(7):e103537
5. Pennington B. From single to multiple deficit models of developmental disorders. Cognition. 2006 Sep;101(2):385–413
6. Seymour PHK, Aro M, Erskine JM, collaboration with COST Action A8 network. Foundation literacy acquisition in European orthographies. Br J Psychol. 2003 May;94(2):143–74

PROTOCOL

Funding: This review is supported by the Fundação para a Ciência e a Tecnologia (FCT, Portugal) and the Centre for Interdisciplinary Research in Health (CIIS, Portugal). PhD Grants for Soraia Saramago (2022.11965.BD) and for Jorge Amorim (2020.6336.BD) provided by FCT