

Dyslexia and allied reading difficulties and their relationship with mental health problems: A rapid review of evidence

Rapid Review

May 2020

EBPU Evidence Based
Practice Unit

A partnership of



About

This report was conducted the Evidence-based Practice Unit (UCL and the Anna Freud National Centre for Children and Families) on behalf of the Children and Families Policy Research Unit (CPRU).

Funding

This study is funded by the National Institute for Health Research (NIHR) Policy Research Programme. The views expressed are those of the author(s) and not necessarily those of the NIHR or the Department of Health and Social Care.

Authors

Professor Jessica Deighton, Anna Gilleard, Dr Melissa Cortina, Dr Jenny Woodman

Contributors

CPRU would like to thank Professor Maggie Snowling for her expert advice.

Key findings

The following key findings emerged from a rapid review of published reviews exploring the relationship between dyslexia and allied reading difficulties, and mental health:

- There is increased prevalence of mental health problems in children and young people with dyslexia and allied reading difficulties
- Three key pathways explaining this elevated prevalence:
 - A. Common risk factors predicting both reading difficulties and mental health problems. This was particularly relevant to disorders such as Autistic Spectrum Disorder (ASD) and Attention Deficit Hyperactivity Disorder (ADHD)
 - B. Reading difficulties leading to mental health problems through mechanisms such as low self-esteem, stigma and bullying. This was highlighted in particular for internalising problems such as depression and anxiety
 - C. Mental health problems exacerbating existing reading difficulties through mechanisms such as aversion to reading and expectation of failure, especially where symptoms of depression and anxiety were present.

Recommendations:

1. Early identification and support for dyslexia and allied reading difficulties should be prioritised. Detection early in primary school years is important but subsequent checks may be needed to ensure difficulties emerging later are not missed.
2. Recognition of increased likelihood of mental health problems for those with reading difficulties should be widespread, especially in teachers.
3. Support and intervention should be provided that tackles both dyslexia and mental health problems.
4. Better understanding of the long-term relationship between mental health problems and reading difficulties is needed

Background

The elevation of mental health problems in those with reading difficulties such as dyslexia is widely recognised but the reasons for this increased prevalence has been less well understood. The present review aims to address this knowledge gap, as part of DHSC's aim to better understand risks associated with dyslexia and mental health condition(s) and subsequently any specific interventions that may help to reduce a potential negative impact on an individual's mental health. The review aimed to address the following questions:

- Q1 What percentage of children have reading difficulties and how does this vary by type of disorder and child characteristic (e.g. age, deprivation, ethnicity)?
- Q2 What percentage of children with reading difficulties meet criteria for reading disorder, including dyslexia, by child characteristic?
- Q3 How far is poor reading ability a risk factor for specific MH problems, by age?
- Q4 How far is reading disorders, including dyslexia a risk factor for specific MH problems, by age?
- Q5 What are the mechanisms that explain the relationship between poor reading ability and/or reading disorders including dyslexia, and MH problems?

Methods

Initial brief searches were carried out for contextual information around prevalence and associated characteristics such as age, deprivation and ethnicity for Q1-2. Q3-5 were the primary focus of the rapid systematic review which was undertaken in two stages. The first stage sought to identify quantitative reviews to address Q3-4 and the second stage sought to identify qualitative studies (Q5). Selection criteria for both stages were developed in consultation with an expert on dyslexia (Snowling). The search strategies and inclusion criteria are detailed in the appendices (A and B) and were carried out in three relevant databases (MEDLINE, PsychINFO, and Embase). The PRISMA diagram in Appendix C details the overview of the systematic search process for both the quantitative reviews and the qualitative studies and the number of papers identified at each stage. For both stages, titles and abstracts were screened by the project team and full-text articles were reviewed. The details of the 22 included papers (19 quantitative reviews¹⁻¹⁹ and three included qualitative studies²⁰⁻²²) are in Appendix D.

Findings

Prevalence and associated characteristics

Dyslexia is regarded as one of two major reading disorders. Whilst dyslexia affects the speed and accuracy of word decoding, reading comprehension impairment affects understanding of text.²³ Both are dimensional reading disorders and may present alongside a range of other reading difficulties.²⁴ For example, some individuals with dyslexia will have additional problems with reading comprehension, reading fluency or

visual word recognition. Modern classifications of dyslexia define the reading disorder along these lines of processing behaviours.²⁵ Consequently, the prevalence rates of dyslexia typically vary from 4-10% depending on the definition employed^{26,27} and males are at least twice as likely to have the disorder as females.²⁸ Dyslexia occurs across ethnicity, IQ and SES but the effects may persist for longer over the life course for some groups and different definitions can lead to different conclusions about social patterning.^{8,29} Similarly, prevalence is relatively constant across ages. Variations that do exist are potentially accounted for by discrepancy definitions or lack of early identification.³⁰ For example, many children who fail to meet a set of diagnostic criteria at pre-school age may do so later in adolescence³¹ and so a higher prevalence of dyslexia is sometimes reported in the later school years.²³ On the whole, there is little evidence that reading ability changes much after Year 5 (10/11 years old) for either children with reading disorders or typically developing children.³²

The relationship between dyslexia and mental health problems

It is estimated that 1 in 8 children and young people experience mental health problems, with prevalence starting low and increasing into later adolescence.³³ The most common mental disorders¹ are emotional disorders (8.1% of the population) followed by behavioural disorders (4.5%). Hyperactivity disorders and autistic spectrum disorders (ASD) are less common (prevalence: 1.3% and 1.2% respectively). Mental health problems are more common in children with dyslexia and allied reading difficulties. Specific mental health disorders are more frequently associated (e.g. ADHD, internalizing symptoms, anxiety disorders, depressive disorders and conduct disorders)^{1,2,4-6,16,17} and the relationship between dyslexia and mental health varies by age.³⁴⁻³⁶ It has been reported that as many as 40-60% of young people with dyslexia have some kind of psychological difficulties, including anxiety, depression and attention deficit.⁴ Though there is some evidence that the academic demands present in later adolescence can cause increased anxiety around reading aloud and uncertainty about their future,³⁴ the primary school period is when most difficulties regarding wellbeing & self-esteem surface for young people with dyslexia.^{22,35,37} Whilst the initial response to diagnosis can sometimes involve shock, dejection and stress, with time the diagnosis may provide a sense of legitimising the young person's difficulties by offering a sense of relief and understanding²², such that, on the whole, many young people feel more successful and well-adjusted in secondary school as they come to assimilate their diagnosis.

Explaining the relationship

There are several possible explanations for the relationship between reading difficulties (including dyslexia) and mental health problems. Three possible explanatory pathways were identified in the literature; (A) Common risk factors for mental health problems and reading difficulties; (B) Reading difficulties leading to

¹ WHO Mental disorders comprise a broad range of problems, with different symptoms. However, they are generally characterized by some combination of abnormal thoughts, emotions, behaviour and relationships with others. https://www.who.int/mental_health/management/en/

mental health problems; and (C) Mental health problems exacerbating reading difficulties.

A. Common risk factors for mental health problems and reading difficulties

Evidence suggests a high rate of co-occurrence between reading difficulties and mental health problems that are considered neurodevelopmental in origin such as Attention Deficit Hyperactivity Disorder (ADHD) and ASD. This is most likely due to the existence of common risk factors which make some children more susceptible to both reading difficulties and diagnoses like ADHD and ASD. These include genetic factors and environmental factors, both of which may result in common neurological features and common functional impairments.

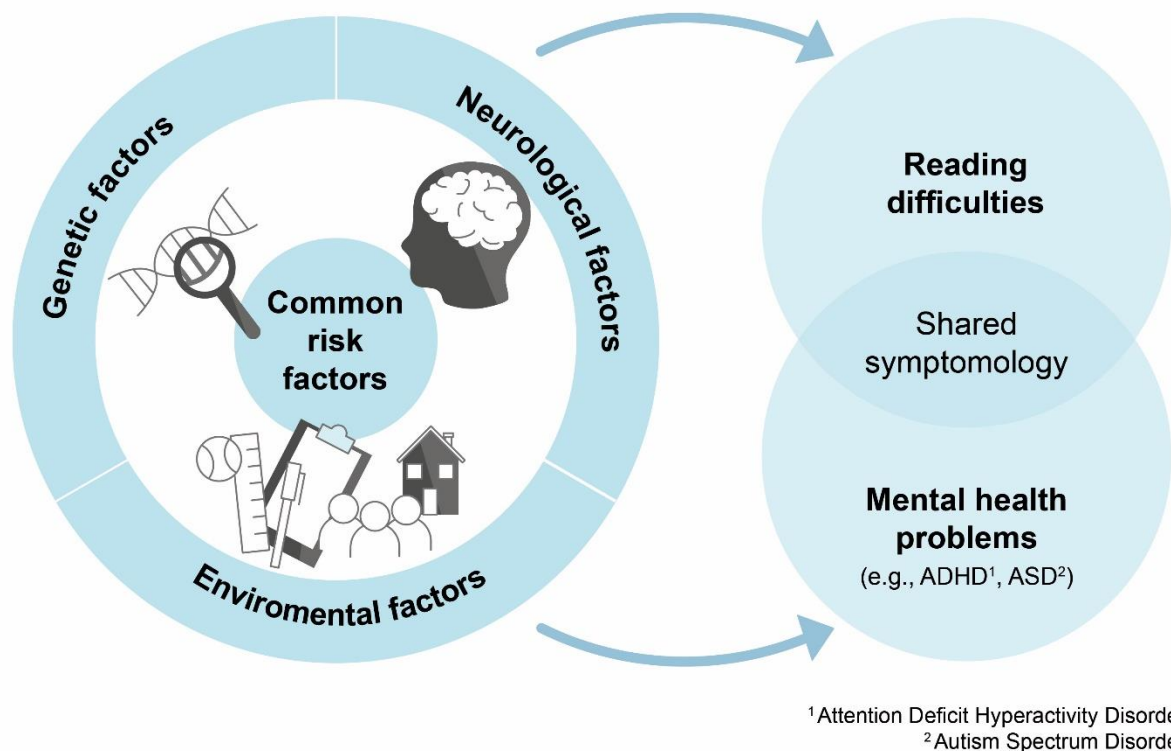


Figure 1. Common risk factors for reading difficulties and mental health problems (Pathway A).

Research documents the heritability of both ADHD and reading disorders but also notes that children from families with a reading disorder or ADHD are at two to three times higher risk for either disorder compared with those from families with neither diagnosis.⁶ Evidence indicates that similar genetic risk factors may play a role in both ADHD and dyslexia⁹ and this relationship holds with other reading disorders more widely.^{18,38} It appears that the co-occurrence of reading difficulties and ADHD is at least partially explained by common genes with pleiotropic effects.¹⁰ However, environmental factors are also shown to play an important role. In one twin study, genes explained 45% of the covariance between reading difficulties and ADHD inattention symptoms. However, Palovelis et. al 2010 found child-specific environmental factors explained 21%.⁶ These environmental factors are likely to operate across family and school environments and include academic achievement, teaching style and parental engagement.³⁹ Other research pointing to common

genetic and environmental risk explored links between ASD and reading comprehension impairment. On the whole, findings suggest significant genetic and environmental influences, though genetic factors appear to explain a higher proportion of the variance than the environment.³

There are a subset of studies giving evidence for common risk factors which explore the neurological functional similarities between some mental health problems and reading difficulties. These commonalities may be a result of either genetic or environmental influences, or an interaction of the two. For example, studies note similar cerebral structures involved in ASD and reading comprehension impairment, but language ability is likely to influence that link.^{3,18} One review also noted similar neural structures involved in both ADHD and reading difficulties but children and young people with a dual diagnosis appear to have additional 'reading regions' affected.⁶

Neurocognitive processes such as information processing speed has been identified as a shared predictor in the development of ADHD and reading difficulties. Processing speed is an integral part of the reading process and is often impaired in reading disorders like dyslexia.⁴⁰ This is similar to ADHD in which difficulties with modulating and regulating the speed of information processing have been reported, particularly in the inattentive subtype.^{18,41} Similarly, children with ADHD have shown difficulties with error monitoring when reading text. Difficulties in both processing speed and error monitoring are present in both disorders separately but are even more pronounced when they co-occur.⁶ Reading comprehension impairment has also been noted in ASD; high-functioning children with ASD often struggle to make connections in text, have difficulty learning in social settings, and may need support and prompts to stimulate executive processes. Multiple cognitive functions, such as executive functions appear to play a common role in ADHD and also in reading difficulties more widely.^{9,16} Some suggest that ADHD symptoms may lead to stagnation in the process of learning to read. This is further supported by the fact that both ADHD and reading disorders respond similarly to stimulant medication that targets executive functioning.¹⁷ Other research seems to show that treatment improves reading only in young people with a dual diagnosis, but not in 'ADHD only' or 'dyslexia only' groups, suggesting somewhat distinct developmental aetiologies.⁹ It is likely that the similar neurocognitive processes may be involved in reading difficulties and mental health problems like ADHD separately but that these processes are particularly prominent when both conditions present concurrently.

B. Reading difficulties leading to mental health problems

Seven of the included reviews suggest dyslexia and allied reading difficulties are a risk factor for the development of mental disorders such as anxiety, social phobias, depression and broadband internalising symptoms (Figure 2). Anxiety disorders and reading difficulties were reported to be three to four times more common in dyslexia than in same-age peers¹⁵ independent of year group or sex.^{5,15} Mechanisms through which this is likely to occur include poor self-esteem, stigma and bullying, social comparison with peers, poor self-concept and stress. In turn these mechanisms can increase the risk of depression or anxiety.^{4,18} Notably, many of these mechanisms relate to school-specific experiences. High levels of social comparison with peers

observed in teachers, parents and young people themselves, who report the emotional toll of “struggling to read and write like their peers”²⁰ and feeling distinctly different from their peers,^{21,22} may account for the experience of internalising symptoms such as stress, sadness and disappointment nearly exclusively in the school environment.²¹ Actual or anticipated stigma and bullying can make navigating the school environment a daunting daily experience²¹ and lead to concealing of one’s diagnosis as a coping mechanism.²² Conversely, a sense of school-connectedness, positive school climate and awareness around dyslexia can moderate the development of mental health difficulties.⁵

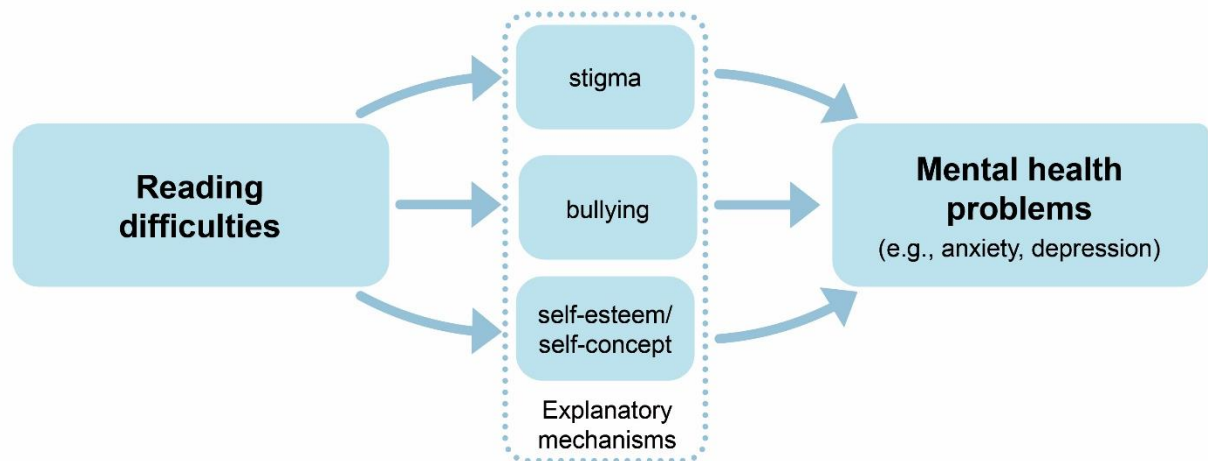


Figure 2. Reading difficulties leading to mental health problems (Pathway B)

The allied challenges associated with dyslexia may also partially explain the elevated risk of psychological problems such as anxiety in children. Reading difficulties associated with dyslexia often lead to poor academic performance, increasing the likelihood of increased absenteeism and truancy, and changing schools, which all lead to elevated levels of stress and subsequently a higher risk for depressive disorders and anxiety^{2,5,18}

C. Mental health problems exacerbating reading difficulties

In some cases, mental health problems may exacerbate existing reading difficulties in young people. Over time, chronic and acute psychological difficulties may make it harder for the young person to compensate for reading difficulties⁵, for example through diminished motivation to read, and a gap in print exposure to reading.¹¹

² Additional follow up of international studies exploring this relationship indicate that the odds of school dropout increase by a factor of 7 for those with reading difficulties compared to those without.⁴⁶ In a UK study looking at overall higher education completion rates, within the subset of the sample with dyslexia, it was less common for students to complete their studies (1,381 students) than it was for them not to complete them (5,666 students). This was true even after demographic factors were taken into account (age gender ethnicity, entrance qualifications).⁴⁷

Conditions such as depression are known to cause reduced attention and memory function in young people;⁴² neurocognitive processes that are already compromised in reading difficulties and may lead to further difficulties in the classroom. Reduced help-seeking behaviour in adolescents with depression is likely to amplify the cycle,⁵ particularly as teachers are more likely to only notice internalising symptoms as they culminate into externalising behaviours (aggression, hyperactivity, delinquency).²¹ Subsequently, there is the worry that appropriate identification of the multiple difficulties may come too late for those affected. Parents may be the first to notice cognitive-behavioural patterns such as low confidence in one's academic abilities, expecting failure at school, and diminished motivation to try new things.²¹ These may compromise one's responsiveness to reading interventions at school. This supports other work illustrating that low print exposure is actually a consequence of poor reading.⁴³ Rather than the mental health problems causing the low print exposure it is the existing reading ability that determines how much a young person chooses to read, but this is likely exacerbated by secondary mental health difficulties.

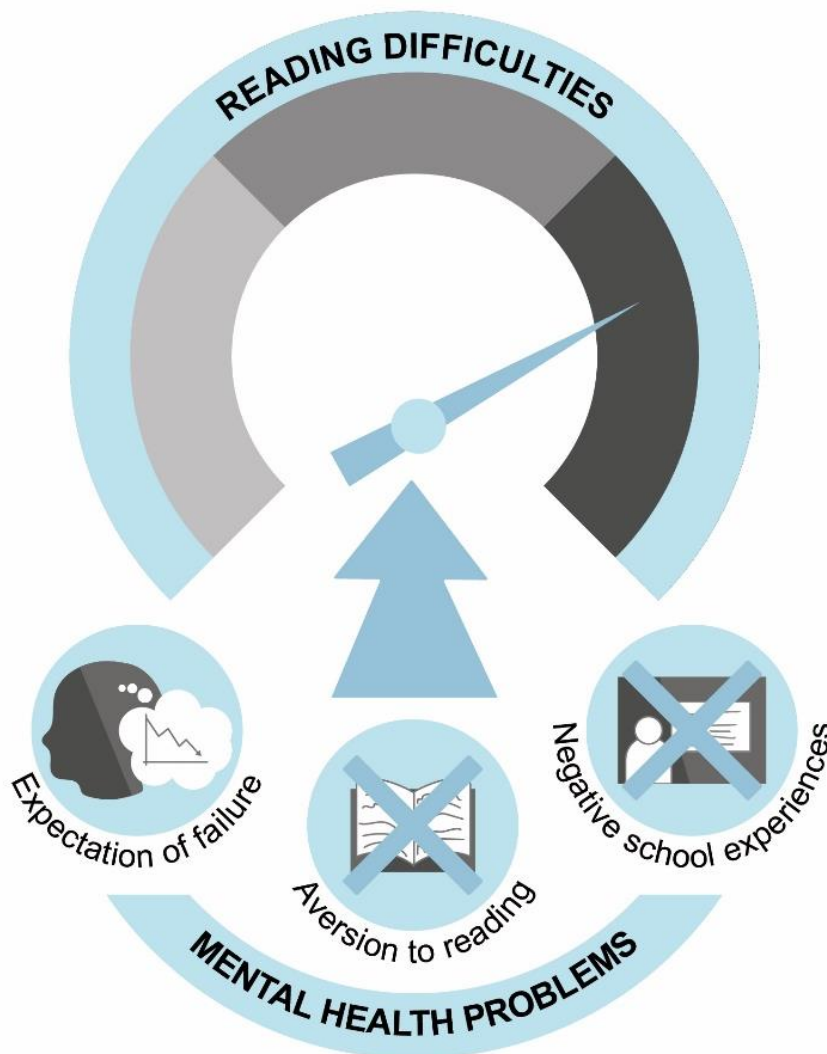


Figure 3. Mental health problems exacerbating reading difficulties (Pathway C).

Limitations and considerations

A rapid review was undertaken, focusing primarily on published reviews due to time constraints of the current work. In light of this, the review was not able to assess the quality of studies reported in the reviews identified or search the grey literature, possibly meaning that findings incorporated may be subject to publications bias. Furthermore, it is likely that some studies relevant to the current review may not have been included in the published reviews drawn upon, which may have had a different focus than our own. This may have resulted in some omissions in our review of relevant studies. A more extensive review of more wide-ranging studies may have yielded a more detailed account of the mechanisms linking dyslexia and allied reading difficulties to mental health problems. Heterogeneity of definitions and approaches to diagnosis for dyslexia and of the conceptualisation of reading difficulties more generally was also a challenge to drawing together consistent findings. Many reviews focused on comorbidity rather than causality or explanatory pathways, which sometimes meant there was limited evidence with which to unpack the underlying mechanisms. There also appeared to be limitations in terms of the population studies within the reviews. The lack of particularly vulnerable groups (e.g. Looked after children and young offenders) in the studied populations of this review is particularly noteworthy given the large body of evidence suggesting a higher incidence of reading difficulties in incarcerated youth³¹ and mental health problems are widely reported in this population.^{44,45} Finally, there was a distinct lack of longitudinal data included in the reviews which would allow for elucidation of whether mental health difficulties and related mechanisms such as anxiety around reading translate through higher education and into adulthood, or if they are specific to the school experience.

Implications and recommendations

This rapid review revealed a sizable body of evidence that describes three distinct but interrelated pathways through which reading difficulties relate to mental health problems. These pathways operate through various mechanisms involved in a young person's individual and social world and so have implications for delivering appropriate support for young people with reading difficulties.

The following recommendations were collated from the research literature:

1) Early identification and support for dyslexia and allied reading difficulties

The elevated risk of mental health difficulties in younger children coupled with the importance of self-acceptance and understanding around what it means to have dyslexia emphasises the need for early identification (i.e., in the primary school years) and support, particularly around the initial diagnostic period.^{22,36} However, checking and monitoring for reading difficulties at later intervals may also be necessary because for some children and young people, reading difficulties will not emerge until later in childhood.³¹

2) Recognition of increased likelihood of mental health problems for those with reading difficulties

Identification and support should include consideration of potential co-existing mental health problems ¹⁵ and should take into account any co-existing mental health problems. This relies on supporting teachers' understanding of reading difficulties and awareness of potential co-occurring issues, perhaps through advanced and extended training.^{4,7}

3) Support and intervention that tackles both dyslexia and mental health problems

An integrated and systematic approach to supporting young people with dyslexia (and allied reading difficulties) and mental health difficulties is necessary. Concurrent support for mental health problems and reading difficulties throughout education stages will enable young people to maximise their learning potential and promote positive long-term mental health outcomes.¹⁵ Such support might involve multi-component interventions that incorporate both evidence-based interventions to tackle reading difficulties and evidence-based interventions for the identified mental health problems. This research group notes that there are few (if any) robust trials testing the effectiveness of these multicomponent interventions and further research is needed here. Support might additionally focus on potentially addressing potential mechanisms identified in pathway B such as stigma and bullying.

4) Better understanding of the long-term relationship between mental health problems and reading difficulties is needed

We note the lack of longitudinal studies identified in this review, which limits the understanding of the interaction between mental health problems and reading difficulties over the longer term. Further longitudinal research, particularly following up into higher/further education would be welcome.