

FEATURE: ACADEMIC PEARL

Understanding and addressing the impact of dyslexia as a medical student: a literature review

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Introduction

Dyslexia is a type of specific learning disability (SLD) or inclusive learning disorder (ILD) characterised by variable, but often significant, difficulties with reading comprehension and writing.¹ The disorder is often associated with speech or verbal processing difficulties and memory problems. Issues with oral language communication may also occur, although these alone are not an indicator of dyslexia.²

The prevailing “phonological theory” of dyslexia posits that dyslexia develops due to failure to establish an association between word sounds or “phonemes” and their corresponding letters in childhood.³ This skill is typically acquired through word games such as alliteration or rhyming.

A competing “visuospatial attention theory” contends that dyslexia may reflect an impaired ability to visually recognize the correct order of letters, symbols, and numerals.⁴ This is otherwise referred to as a sequencing deficit and may in turn lead to difficulty processing words into working memory during active reading – a process called “orthographic encoding.”⁴

The neurobiological basis behind this theory implicates cerebral magnocellular neurons.⁵ These neurons normally facilitate rapid visual processing and the direction of eye movement via the “dorsal stream” which projects forward from the primary visual cortex to the occipital lobe. In people with dyslexia, this pathway is theorised to be either maldeveloped or functionally impaired, leading to the characteristic reading and writing deficits.

Among the various types of SLDs, dyslexia is the most common and is estimated to affect up to 15% of the general population in comparable Western countries.⁶ Although dyslexia is theoretically associated with lower educational attainment, the impediments may not impact primary or secondary school achievement due to the effective use of self-developed compensatory strategies.⁷ In such cases, dyslexia may become more apparent in tertiary education, where compensatory mechanisms falter against the increased academic requirements.

In the UK, from 2007-2008, approximately 3.2% of undergraduate students reported a confirmed diagnosis of dyslexia.¹ A similar proportion of 1.7–2.9% of UK medical school applicants had a pre-existing diagnosis of dyslexia or another SLD — rising to 6% by graduation.^{8,9} This would imply that these students experience academic difficulties precipitating further assessment and diagnosis, and that institutional compensatory measures may have been needed to prevent systematic discrimination against students with SLDs.

No standardised international or national guidelines exist for supporting tertiary students with dyslexia. However, Australian and New Zealand tertiary institutions provide non-specific student disability services.^{10,11} Despite the provision of these services and the promotion of inclusive learning environments, students with dyslexia continue to face unique challenges that can persist as they enter the workforce.

Practical difficulties for clinicians with dyslexia generally relate to clinical documentation, prescription writing, and continuing medical

education.¹² Secondary consequences of these challenges and cognisance of their dyslexia can lead to reduced self-esteem, perceived or actual discrimination by other health professionals, and a sense of alienation from a lack of support — potentially all culminating into a state of learned helplessness.^{9,13}

As the primary institutions responsible for preparing medical students to enter the healthcare workforce, medical schools can play a vital role in supporting students with dyslexia to adapt to the professional challenges imposed by their disorder.

Specific issues in dyslexic medical students

Dyslexia can substantially impact performance across various academic disciplines but can also lead to more specific issues for medical students.¹⁴ Particular issues identified in the wider literature include:¹⁵

- > Time management: Requiring longer to complete academic assessments and clinical work
- > Spatial awareness: Increased difficulty with interpreting medical imaging and orientating these images across anatomical planes
- > Coping strategies: A reduced effectiveness of pre-existing coping strategies (due to increased academic requirements); maladaptive interpretation and performance strategies for clinical work — including task avoidance
- > Emotional distress: Persistent underlying anxiety or fear in group settings due to concerns these situations may reveal their dyslexia to others
- > Career pathway decisions: Hesitancy to enter fast-paced specialties due to the challenges mentioned above
- > Disclosure of dyslexia: A fear of stigmatisation from both colleagues and employers if they disclose their dyslexia

These particular issues may lead to alienation due to a lack of support from peers and support services or as a consequence of bullying and criticism.¹⁵ Although the severity of these experiences partially depends on the socio-cultural environment, there remains a commonality in the themes of challenges faced by students with dyslexia across academic institutions.^{14–16}

Addressing the issues

For students with dyslexia, both conscious and subconscious coping strategies can falter against the increased academic demands of medical school, combined with the formal expectations to meet the same academic standards as their peers.¹⁷ Consequently, early diagnosis and intervention can be integral in preventing adverse experiences resulting from dyslexia.^{6,18}

While tertiary institutions in both Australia and New Zealand offer services for the diagnosis and support of dyslexia, access remains an issue. Apart from a reluctance to seek diagnosis due to the associated

stigma, students with dyslexia may struggle to access support services due to high demand or financial barriers.^{19–21} The psychological sequelae of dyslexia may also complicate intervention, requiring the support of multiple services or individuals already in short supply.²²

Despite the pre-existing academic achievements of medical students with dyslexia, adequately addressing the disorder remains challenging. Students who had remained undiagnosed until medical school will have missed the optimal period for intervention in childhood and may experience a delayed benefit from interventions offered in adulthood.^{6,18} Regardless, in a tertiary setting much of the extant literature has focused on supporting students through two fundamental concepts.

Inclusive learning environments

Fostering an inclusive learning environment remains one of the key strategies employed by academic institutions for students with dyslexia or other ILDs. This is in line with best practice recommendations for medical education which stipulate accommodations should be made to allow students to perform and succeed.²³ A common strategy to accomplish this involves the allotment of additional time to complete multiple-choice assessments involving reading or writing. As the most used assessment format in medical schools, the provision of extra time would best allow students with ILDs to demonstrate their academic progress without significant disadvantages.^{6,8}

While formal research has variously demonstrated an improved performance or non-significant disadvantage for dyslexic students, there are two significant caveats.^{6,8,24} Firstly, the implementation of additional time is not standardised or consistent between medical schools.^{6,25} Secondly, it is often combined with other assessment modifications that may be of variable benefit to dyslexic students.⁶

Assistive learning technologies

The manipulation of font size or typeface is one assessment and learning modification that may also be considered an assistive learning technology. Utilising larger font or fonts designed to improve readability may offset the challenges dyslexic students experience with reading and comprehension. To this end, specific fonts such as the OpenDyslexic and Dyslexie typeface were developed.²⁶

There is currently inconclusive evidence on the utility of these typefaces in primary and secondary school students. Compared to pre-existing and commonly used typefaces such as Arial and Times New Roman, there is mixed evidence of a significant improvement in objective measures such as reading speed and accuracy.^{26–28} However, in some studies, adolescents and adults reported a subjective improvement in readability or a preference for the typeface.^{22–25}

A variety of other open-access and purchasable typefaces such as EasyReading make similar claims about enhancing readability for dyslexic students.³⁰ The efficacy of these typefaces have been similarly contested and remain controversial.^{31,32} Findings are similarly mixed with standard typefaces and their associated font styles including sans-serif, monospaced and roman derivatives.^{26,31,33,34}

Confounding factors not always addressed in these studies include a lack of controls for varying dyslexia severity in participants, non-standardisation in reading material used for assessments (where longer sentences may adversely impact readability), and a focus on comparing typefaces as opposed to individual components of typefaces such as letterform and spacing.^{32,35}

In fact it has been suggested that greater spacing between letters and words may have a more significant impact than letterform when comparing typefaces — although this effect may not be practically meaningful.^{31,32} This may reflect emerging theories that reading difficulties in dyslexia are a consequence of visuospatial processing abnormalities as opposed to impairments in the ability to link words to phonemes.^{36,37}

Much of the literature on typeface also has a focus on interventions introduced at a primary or secondary school level with supporting quantitative data. At a tertiary level, interventions are more non-specific and focus on qualitative reports on student experiences.

This discrepancy in data may reflect a preference in academia and among SLD organizations to address dyslexia in adolescence rather than adulthood.³⁸

Other assistive technologies may be provided to varying success. This includes the use of text-to-speech software and voice recognition software. Again, extant literature is principally focussed on adolescent students. However, it has generally been concluded that such technologies may at least facilitate better learning of verbal or written content in academic contexts.³⁹ While evidence is scarce at a tertiary level, qualitative studies have indicated health professionals with dyslexia do utilize these technologies to augment their work in clinical environments.¹²

Conclusion

In the absence of a substantial evidence base there remains no definitive strategy tailored towards medical students with dyslexia. However, there remains a legal imperative for medical schools to facilitate an inclusive learning environment for all students.⁴⁰ In the University of Auckland this is facilitated through “Student Disability Services.” In the University of Otago this is provided through “Disability Information and Support.”

These services offer a variety of options to both enhance learning and prepare inclusive approaches to academic assessments. This provision of choices is a longstanding, mainstay strategy in facilitating inclusive learning.⁴¹ However the choices offered have remained largely unchanged in the wider literature, reflecting a lack of momentum in advancing the practice of inclusive education. Depending on the tertiary institution or discipline, there also remains some resistance to fostering inclusive learning environments.⁴²

Despite these limitations, the promotion of inclusive education services, ongoing research on new interventions for dyslexia, and advances in neurobiology all hold promise in furthering understanding of dyslexia and other ILDs. New Zealand medical students with a confirmed or possible diagnosis of dyslexia can therefore still benefit from engaging with inclusive learning services.

Although access to more comprehensive individual support may be delayed or financially prohibitive, existing tertiary services offer medical students with dyslexia an avenue to reduce disadvantages in academic assessments. Going forward, these experiences can also provide practical insights and strategies around living and working with dyslexia as a clinician.

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