

Title: Performance in candidates declaring vs not declaring dyslexia in a licensing clinical exam

Running Head: Differential OSCE performance in dyslexia

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ABSTRACT

CONTEXT

High-stakes medical examinations seek to be fair to all candidates, including an increasing proportion of trainee doctors with Specific Learning Differences. We aimed to investigate performance of doctors declaring dyslexia in the Clinical Skills Assessment (CSA), an Objective Structured Clinical Exam (OSCE) for licensing UK general practitioners.

METHODS

We employed a cross-sectional design using performance and attribute data from candidates taking the CSA between 2010 and 2017. We compared candidates who declared dyslexia ('early' before their first attempt or 'late' after failing at least once) with those who did not, using multivariable negative binomial regression investigating the effect of declaring dyslexia on passing the CSA, accounting for relevant factors previously associated with performance including number of attempts, initial score, sex, place of primary medical qualification and ethnicity.

RESULTS

Of 20879 CSA candidates, 598 (2.9%) declared dyslexia. Candidates declaring dyslexia were more likely to be male (47.3% vs 37.8%; $p < 0.001$) and to have a non-UK primary medical qualification (27.0% vs 22.4%; $p < 0.01$), but were no different in ethnicity compared with those who never declared dyslexia. Candidates who declared dyslexia late were significantly more likely to fail compared with those candidates who declared dyslexia early (40.6% vs 9.2%; $p < 0.001$) and were more likely to have a non-UK medical qualification (79.3% vs 15.6%; $p < 0.001$) or come from a minority ethnic group (84.9% vs 39.2%; $p < 0.001$). The chance of passing was lower for candidates declaring dyslexia compared to those who never declared dyslexia and lower in those declaring late (Incident Rate Ratio [IRR] 0.82, 95% Confidence Interval [CI] 0.70 to 0.96) compared with early (IRR 0.95, 95% confidence interval [CI] 0.93 to 0.97).

CONCLUSION

A small proportion of candidates declaring dyslexia were less likely to pass the CSA, particularly if dyslexia was declared late. Further investigation of potential causes and solutions is needed.

KEYWORDS: education, medical, postgraduate; assessment; general practice; dyslexia; ethnicity; gender.

INTRODUCTION

As health services internationally seek to expand the diversity of their medical workforce,¹ increasing numbers of doctors are recognised as having Specific Learning Differences (SpLDs) such as dyslexia.² In line with this, candidates, educators and regulators, all seek to ensure that examinations assessing the competence of doctors, particularly high stakes assessments taken towards the end of lengthy and costly medical and specialty training, are fair to all candidates including those with dyslexia.³

Equality legislation in the United Kingdom (UK) and United States (US) requires exam bodies to monitor performance of candidates with protected characteristics, including SpLDs, and to ensure that candidates with SpLDs are treated fairly, and without disadvantage due to their disability, through the provision of reasonable adjustments or accommodations.⁴⁻⁶

Two previous studies investigating performance of medical students in undergraduate multiple choice tests^{7 8} and a further study investigating performance of doctors in an applied knowledge test for postgraduate medical licensing of general practitioners found no significant differences in performance of candidates who declared dyslexia compared with those who did not.⁹ This latter study also showed differences in timing of declaration of dyslexia in International Medical Graduates (IMGs), i.e. those trainee doctors who had obtained their primary medical qualification outside the UK: they were more likely to declare dyslexia after failing the exam at least once and therefore had less opportunity for educational support related to the SpLD.⁹ All three studies took place in the UK.

The two past studies of undergraduate assessment in medical students also explored the performance of students with dyslexia in an Objective Structured Clinical Examinations (OSCE).³ Whereas one found no differences in performance of first or second year medical students in a 16-station OSCE,⁸ the other found that students with dyslexia in years 1, 2 and 3 of undergraduate medical training had lower performance in certain types of OSCE station, including those involving examination skills and data interpretation.¹⁰

Evaluation of licensing examinations is important in determining validity of licensing exams,¹¹ which are crucial for career progression, including the consequences of the assessment on different candidate groups. A previous systematic review of licensing exams focussed on the negative consequences of differential attainment for IMGs¹² but this is partly due to past research focussing on IMGs and the relative lack of research on performance of candidates with SpLDs or other protected characteristics, including the effects of providing reasonable adjustments.

There have been no previous studies into the performance in a licensing OSCE of doctors with dyslexia during postgraduate training. We aimed to investigate the performance of doctors in an OSCE, which forms part of the licensing examination for UK general practice, comparing candidates who declared dyslexia (whether this was declared 'early' before their first attempt or 'late' after failing at least once) with those who never declared dyslexia. This latter group includes trainees who did not have the condition, those who remained unaware or others who were aware they had dyslexia but did not wish to disclose it.

METHOD

Design and participants

We used a cross-sectional design using routine performance data and data on candidate attributes from a component of the UK licensing examination for general practice, the Clinical Skills Assessment (CSA). We used data obtained from all candidates taking the examination between 2010 and 2017.

Hypothesis

The null hypothesis under investigation was that the performance of doctors who declared dyslexia (whether this was declared 'early' before their first attempt or 'late' after failing at least once) did not differ from performance in those who never declared dyslexia.

The MRCGP Clinical Skills Assessment

The Membership of the Royal College of General Practitioners (MRCGP) licensing examination assesses the curriculum for specialty training for UK general practice through its three components: the Applied Knowledge Test (AKT), workplace based assessment (WBPA) and an OSCE, the clinical skills assessment (CSA).

The CSA is an integrated test of clinical and consulting skills which seeks 'to test a doctor's ability to gather information and apply learned understanding of disease processes and person-centred care appropriately in a standardised context, make evidence-based decisions, and communicate effectively with patients and colleagues' while also examining 'candidates' ability to integrate these skills effectively'.¹³

The CSA consists of 13 ten-minute cases, involving trained role-players who simulate real-life consultations, written by practising GPs and reflecting the breadth of the curriculum for general practitioner (GP) training. There is a two-minute gap between each case and a 20-minute refreshment break after seven consultations. Before the first case, candidates are given a 20 minute briefing on the content of the test and provided approximately ten minutes to read through case paperwork. This usually consists of fewer than ten lines of information per case, provided on an iPad. A printed copy of the British National Formulary (BNF) and the BNF for Children may be brought to the exam by candidates.

Candidates are assessed in each case by a trained GP examiner (who accompanies the role-player for the day) against the standard of being 'fit for independent practice as a GP in the UK', using case-specific marking schedules for three domains of data gathering, technical and assessment skills, and clinical management and interpersonal skills. Candidates are scored for each case using grade descriptors (clear pass, pass, fail, clear fail) and performance on a particular case is rated, as borderline or not, to calculate a pass mark, based on the borderline group method. Candidates are allowed four attempts at the CSA and an exceptional fifth attempt if they have successfully completed the other components of the exam, are certified by their educational supervisor as

having gained additional educational experience since their fourth examination failure, and that sufficient progress has been made to merit a further attempt.

Candidates are provided an opportunity to declare dyslexia that has been confirmed by an accredited expert (specialist teacher with a practising certificate or practising chartered or educational psychologist) on applying to the examination and when they do so they can request reasonable accommodations. Adjustments allowed for all candidates declaring dyslexia include an additional 10 minutes to read the initial paperwork which is also offered in paper form rather than via iPad.¹⁴ In some cases, other reasonable accommodations are allowed based on the expert assessment and recommendations.

Data collection

Demographic and performance data (including age, gender, year of qualification, stage of training, ethnicity, country of primary medical qualification and number of examination attempts) were anonymised and obtained with permission from the RCGP examination department, where data are routinely stored for each examination candidate. Permission was sought and given by candidates for their anonymised data to be used for the purpose of evaluation and monitoring.

Data analysis

Using chi squared, we compared characteristics of CSA candidates who declared dyslexia with those who did not, including candidates who declared dyslexia before taking their first CSA ('declared early') or after failing at least one CSA ('declared late'). We used multivariable negative binomial regression to compare performance scores in the CSA in candidates declaring dyslexia with those who did not declare the condition, taking into account other factors known to affect performance in the CSA including candidate sex, ethnicity, country of primary medical qualification and number of attempts. Data were analysed using Stata 14.

Ethics

The study received approval from University of Lincoln Ethics Committee.

RESULTS

We included results from 20879 candidates taking the CSA between 2010 and 2017, with 12896 (61.8%) female, 7958 (38.1%) male, and 25 (0.1%) candidates where data on sex was missing.

Dyslexia was declared by 598 candidates (2.9%) with 20281 (97.1%) not declaring this condition at any time.

Candidates declaring dyslexia were significantly more likely to be male, and have received their primary medical qualification outside the UK compared with those who did not declare dyslexia, but there was no significant difference in ethnicity (Table 1).

Candidates declaring dyslexia were significantly more likely to attempt the CSA more than once (Table 1) and 85.3% of these (510/598) passed the CSA overall compared with 96.4% (19542/20281) who never declared dyslexia. Passing candidates declaring dyslexia were also significantly more likely to be female and have taken the CSA more than once compared with those who did not declare dyslexia, but there were no differences in ethnicity or place of primary medical qualification (Table 2).

Those candidates who declared dyslexia after initially failing the exam ('declared late') were significantly more likely to fail compared with those candidates who declared dyslexia before their first attempt ('declared early') and they were also more likely to have gained their primary medical qualification outside the UK or be from a minority ethnic group (Table 3).

Finally, we used a multivariable negative binomial regression model (because of results skewed towards passing candidates) to show the effect of declaring dyslexia on passing the CSA, taking into account scaled mark at first attempt (Table 4), number of attempts, sex of candidate, place of primary medical qualification and ethnicity which have been found to be important covariates in previous studies (see Table 5).^{9 15} We excluded the deanery of GP training because this did not add

to the model (log pseudolikelihood without deanery = -20318.4, R²=0.005 vs log pseudolikelihood with deanery = -20317.7, R²=0.005). We included the scaled mark at the first CSA attempt (Table 4) because data for second and later attempts are known to be highly non-normal due to those taking second attempts necessarily having failed the first attempt.¹⁶ We added a Bonferroni correction to ensure our estimate of significance was conservative because of the number of comparisons included in the model (Table 5). We did not impute missing data in our analyses.

Results are expressed as incident rate ratios (IRR) for passing the examination compared to reference categories in the regression model where an IRR of 0.99 indicates that for every 100 candidates in the reference category passing there will be 99 in the comparator group that also pass. Candidates who declared dyslexia were significantly less likely to pass the CSA compared to candidates who did not declare dyslexia, whether this was declared early before sitting their first CSA (IRR 0.95, 95% confidence interval [CI] 0.93 to 0.97) or declared late after failing at least one CSA (IRR 0.82, 95% CI 0.70 to 0.96), all other factors held constant. Also of interest were the relative effects of initial medical training in the rest of the world compared to the UK or European Union (IRR 0.97, P<0.001), being male vs female (IRR 1.0, P=0.17) and the effect of being BME vs white British or Irish (IRR 1.01, P=0.001) on success, all other factors being held constant.

DISCUSSION

Main findings

This is the first published study investigating performance of doctors with dyslexia in a high-stakes medical licensing clinical examination. The small proportion of candidates (2.9%) declaring dyslexia between 2010 and 2017 had a significantly lower rate of passing the CSA compared with candidates who did not declare dyslexia. The pass rate was lower in candidates declaring dyslexia late (i.e., after an initial failure) than when dyslexia was declared early before the first CSA.

Candidates who had gained a primary medical qualification outside the UK were less likely to pass compared with UK trained doctors. Male candidates were no less likely to pass than female

candidates. Candidates from a minority ethnic background were slightly more likely to pass compared with white British or Irish once other factors were taken into account. Our findings differ from previous research,^{17 18} suggesting that the differences according to candidate sex and ethnicity were small in magnitude once other relevant factors are taken into account.

Strengths and limitations

We included data from almost 21000 candidates over eight years. There were high recording rates for candidate attributes and we accounted for these in the analysis.

Limitations included lack of data on severity of dyslexia, additional disabilities, the detail of individual reasonable adjustments and unknown or unmeasured confounders such as educational experience which were therefore not included in our analysis. We were also unable to identify candidates who had dyslexia but who did not declare this at any time.

The study was limited to a single OSCE in general practice in one developed country so our results therefore may not be generalisable to OSCEs conducted in other specialties or countries. Rates of declared dyslexia in CSA candidates are increasing² which may also affect future results.

Comparison with other studies

There have been no previous published studies to date investigating the performance of doctors with dyslexia in OSCEs for high-stakes licensing purposes. A recently published study exploring performance of doctors with dyslexia in the Applied Knowledge Test of the MRCGP found no significant differences in performance for candidates who, having declared dyslexia, were offered reasonable accommodations for their disability.⁹

As in this previous study, we found that doctors from minority ethnic backgrounds and International Medical Graduates who had received their primary medical qualification outside the UK were more likely to declare dyslexia after initially failing the assessment. International Medical Graduates may be less likely to have been screened for dyslexia during their school or university education because

of lack of testing and they and others may not disclose dyslexia because of stigma or perception of a negative impact on career progress.^{19 20} This is an example where the intersection of race and disability may particularly affect doctors who are affected by both.²¹ A delay in diagnosis (reducing the possibility of additional preparation strategies) or declaration (decreasing access to reasonable adjustments) will likely disadvantage these candidates.⁹

Over-representation of International Medical Graduates among doctors declaring dyslexia after initial failure may be confounded by difficulties in diagnostic assessment of dyslexia among those where English is a second language.²² Standard assessments in English are not validated or directly applicable to those people who do not speak English as their first language,²³ and although there are forms of dyslexia assessment for adults which accommodate English language learners, it is not known how widely they are being used.²⁴

Why candidates declaring dyslexia were less likely to pass the CSA, whereas a similar difference in pass rate was not seen in the AKT, needs further explanation. Although dyslexia is considered to be a disorder that primarily affects skills involved in accurate and fluent word reading and spelling,²⁵ it is well known that the condition has a range of other effects which could influence performance. Performance in an OSCE for candidates with dyslexia may also be impaired by difficulties with attention and concentration,²⁰ sequencing, organisation and time management and prioritisation of tasks,²⁶ reading under pressure,²⁰ memory and recall,^{27 28} or lack of supportive measures.²⁹

It is also possible that candidates have greater familiarity with written exams compared to OSCEs, and more opportunities to develop strategies and workarounds to address difficulties, because of increased exposure to the former throughout their educational career.

A key difference in the two assessments are differences in the reasonable adjustments allowed. Whereas additional time is allowed in the (written) AKT for candidates with dyslexia, in the CSA, which is predominantly an oral exam, the extra time (10 minutes) allowable is solely to read the initial paperwork which is also offered in paper form rather than via iPad.¹⁴

Implications for research, practice and policy

Further research is needed on which aspects of the CSA candidates with dyslexia find more difficult compared to those without the condition, and how these difficulties might be addressed in terms of differential performance, either through educational input, coping strategies, test accommodations or test design. A review of CSA cases and reading required beforehand, underpinned by qualitative research involving candidates with dyslexia, may help pinpoint difficulties and solutions, such as modifying specific cases or simplifying the reading required. The effect of introducing interventions on differential performance will be an important test of how well they explain this. A wider evaluation of performance of candidates with dyslexia in other medical licensing exams is also needed.

A review of current and proposed information, support and provision of reasonable adjustments for candidates with dyslexia taking the CSA, informed by candidate and expert views and the available evidence would provide assurance that steps are being taken to address the disparity in pass rates in this group of candidates.

It has previously been considered that OSCEs are less problematic as an assessment format for candidates with dyslexia but this may not be the case in the context of a high stakes licensing exam in light of our findings. Dyslexia has various impacts on those affected by the condition, which can also coexist with other SpLDs such as dyspraxia, dyscalculia or attention deficit disorder.³⁰

The range of reasonable adjustments or access arrangements for candidates with dyslexia will vary from one person to another, so the recommendation of accommodations by an expert assessment is important, as is the range of access arrangements provided by other similar assessments and examinations.¹⁴ Whether a test accommodation is deemed reasonable will depend on the needs of the candidate, the effectiveness of the adjustment in overcoming any disadvantage, its resource implications, and unintended consequences which might put the candidate at further disadvantage or adversely affect other candidates.¹⁴

Identifying dyslexia, enabling doctors to disclose the condition early, providing educational strategies to support those affected and challenging negative assumptions are important for an 'enabling' environment.^{26 31} Screening doctors for dyslexia earlier during training, particularly in trainees with features of the condition who may not have been diagnosed earlier in their educational career, may be helpful. Features of dyslexia in adults include uneven skills and deficiencies, poor self-confidence, anxiety or frustration, deterioration in educational progress or portfolio, and exam failure.²

Conclusion

A small proportion of candidates taking the CSA between 2010 and 2017 were less likely to pass the CSA compared with candidates who did not declare dyslexia, particularly if dyslexia was declared late. This has implications for educational support, exam preparation, test design, and reasonable accommodations. Further research on the causes and solutions underpinning these differences is needed.

Contributors: ANS led the study, was responsible for the initial design and supervised the analysis carried out by ZA. The initial draft of the paper was written by ANS and ZA. All other authors contributed to the conception and design of the study, revision and final approval of the paper. All authors agree to be accountable for all aspects of the accuracy and integrity of the study.

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Competing interests: All the authors except Dr Zahid Asghar are current or past members of the panel of examiners of the MRCGP.

Ethical approval: Ethical approval was granted by the Research Ethics Committee of the University of Lincoln School of Health and Social Care.

Table 1 Characteristics of CSA candidates declaring dyslexia compared with those not declaring dyslexia

Candidate characteristics	Dyslexia declared		Dyslexia not declared		χ^2
	N=598	(%)	N=20281	(%)	
Sex					
Female	315	(52.7)	12,581	(62.0)	p<0.001
Male	283	(47.3)	7,675	(37.8)	
Missing	0	(0)	25	(0.1)	
Country of primary medical qualification					
UK	437	(73.10)	15740	(77.60)	
EU/EEA	27	(4.50)	644	(3.20)	p<0.01
Rest of the world	134	(22.40)	3897	(19.20)	
Ethnicity					
White British	283	(47.3)	8976	(44.3)	p=0.08
Black and Minority Ethnic	297	(49.7)	10897	(53.7)	
Missing	18	(3.0)	408	(2.0)	
Number of attempts					
First	388	(64.9)	16357	(80.7)	p<0.001
Second	78	(13.0)	2327	(11.5)	
Third	64	(10.7)	814	(4.0)	
Fourth	45	(7.5)	561	(2.8)	
>=5	23	(3.8)	222	(1.1)	

EU/EEA: Other European Union/European Economic Area countries

Table 2 Characteristics of candidates passing the CSA declaring dyslexia compared with those not declaring dyslexia

Candidate characteristics	Dyslexia declared		Dyslexia not declared		χ^2
	N=510	(%)	N=19542	(%)	
Sex					
Female	285	(55.9)	12342	(63.2)	p<0.01
Male	225	(44.1)	7179	(36.7)	
Missing	0	(0)	21	(0.1)	
Country of primary medical qualification					
UK	423	(82.9)	15615	(79.9)	p<0.05
EU/EEA	13	(2.5)	596	(3.0)	
Rest of the world	74	(14.5)	3331	(17.0)	
Ethnicity					
White British	208	(40.8)	8324	(42.6)	p=0.57
BME	285	(55.9)	10828	(55.4)	
Missing	17	(3.3)	390	(2.0)	
Number of attempts					
First	371	(72.7)	16199	(82.9)	p<0.0001
Second	64	(12.5)	2210	(11.3)	
Third	44	(8.6)	702	(3.6)	
Fourth	19	(3.7)	333	(1.7)	
>=5	12	(2.4)	98	(0.5)	

EU/EEA: Other European Union/European Economic Area countries

Table 3 Characteristics of candidates declaring dyslexia early versus those declaring dyslexia late

Candidate characteristics	Dyslexia declared early		Dyslexia declared late		χ^2
	492 (82.3)	(%)	106 (17.7)	(%)	
CSA outcome					
Pass	447	(90.9)	63	(59.4)	p<0.001
Fail	45	(9.2)	43	(40.6)	
Ethnicity					
White British	283	(57.5)	14	(13.2)	p<0.001
BME	193	(39.2)	90	(84.9)	
Unknown/missing	16	(3.3)	2	(1.9)	
Country of primary medical qualification					
UK	415	(84.4)	22	(20.8)	p<0.001
EU/EEA	12	(2.4)	15	(14.2)	
Rest of the world	65	(13.2)	69	(65.1)	

EU/EEA: Other European Union/European Economic Area countries

Table 4 Scaled mark at first CSA attempt in candidates declaring or not declaring dyslexia

Scaled mark at first attempt†	N=20879	Mean	Standard deviation	Minimum	Maximum
Dyslexia never declared	20,281	9.17	11.83	-39	39
Dyslexia declared early	492	7.33	12.23	-35	37
Dyslexia declared late	106	-13.28	8.08	-37	-1

† Scaled mark ≥ 0 for pass

Table 5 Multivariable negative binomial regression model showing factors associated with passing the CSA

Candidates passing CSA	Incident Rate Ratio	95% confidence interval	P value	Bonferroni adjusted P value
All non-declarers of dyslexia	Reference			
Early declaration of dyslexia	0.95	(0.93 to 0.97)	<0.0001	<0.001
Late declaration of dyslexia	0.82	(0.70 to 0.96)	<0.02	0.1
<i>First attempt</i>	<i>Reference</i>			
Second attempt	1.06	(1.05 to 1.08)	<0.0001	<0.001
Third attempt	0.98	(0.95 to 1.01)	0.245	--
Fourth attempt	0.68	(0.64 to 0.73)	<0.0001	<0.001
Five or more attempts	0.53	(0.46 to 0.61)	<0.0001	<0.001
<i>UK</i>	<i>Reference</i>			
EU/EEA	0.97	(0.95 to 0.99)	0.09	0.85
Rest of the World	0.97	(0.96 to 0.98)	<0.0001	<0.001
<i>White British</i>	<i>Reference</i>			
Black and Minority Ethnic	1.01	(1.00 to 1.01)	<0.001	<0.01
<i>Female</i>	<i>Reference</i>			
Male	1.0	(0.99 to 1.00)	0.17	--
<i>Scaled mark at first attempt</i>	1.01	(1.00 to 1.01)	<0.001	<0.01

Values of IRR<1 indicate less likely to pass compared with the reference group.

EU/EEA: Other European Union/European Economic Area countries.

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