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British Journal of Educational Psychology (2021)

published by John Wiley & Sons Ltd on behalf of British Psychological Society.
www.wileyonlinelibrary.com

The impact of the dyslexia label on academic outlook and aspirations: An analysis using propensity score matching

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Background. There is current academic debate over the reliability of the dyslexia label. However, this argument does not consider the impact of the dyslexia label on an individual's academic outlook and aspirations.

Aims. Using data from the Millennium Cohort Study, this paper aims to objectively explore the impact of the dyslexia label on academic outlook and aspirations.

Methods. Propensity score matching was used to compare children with dyslexia with a non-dyslexic group matched on ability, socioeconomic class, parent education, income, country, gender, and age in year group.

Results. The results show that those labelled with dyslexia hold lower beliefs about their ability in English and Maths than their matched peers without this label. The children labelled with dyslexia were also significantly less likely to say that they would go to university. Furthermore, teachers and parents held lower aspirations for children labelled with dyslexia. As the children were matched, the results show that dyslexic children, their teachers and parents hold lower expectations of the child's academic ability while holding higher expectations of those with matched characteristics who do not have the dyslexia label.

Conclusions. The paper concludes that caution is needed when labelling with dyslexia and that further research is needed in order establish whether labelling with dyslexia is beneficial in the current system.

Dyslexia is a specific learning difficulty associated with the ability to decode written text. Dyslexia commonly manifests in the difficulty to perform literacy-based tasks; however, many other symptoms have also been linked with dyslexia (see Hulme & Snowling, 2016 for full review). In 2012–2013, the number of dyslexic students entering higher education institutions in the United Kingdom was 22 times higher than the number entering two decades previously (1994–1995) (Grove, 2014). However, while the number of dyslexic students is increasing, there is an ongoing academic debate over whether there is sufficient evidence to show clear distinctions between those with dyslexia and poor readers (Elliott, 2005; Elliott & Gibbs, 2008; Elliott & Grigorenko, 2014). In their book entitled 'The Dyslexia Debate', Elliot and Grigorenko (2014) use evidence from the fields

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DOI:10.1111/bjep.12408

of psychology, neuroscience, genetics, education, and social policy to systematically question the existence of dyslexia. As a result, the book calls for the label to be retired.

This 'dyslexia debate' is controversial and longstanding (Kirby, 2020). While some broadly agree with the perspective (Ramus, 2014), Snowling (2015) argues that getting rid of the label is unlikely to cause the socio-political changes that Elliot and Grigorneko (2014) base their arguments around. Yet, within these debates, little research has been conducted considering the debate from the perspective of the dyslexic individual: Should the dyslexia label be found to have a positive impact on a person's academic outlook, this would strengthen the argument of continuing to identify dyslexia. Therefore, this research adds to this debate by considering the impact of the dyslexia label on academic outlook. The research uses data from the Millennium Cohort Study (MCS) to examine how being labelled with dyslexia impacts a child's perception of their academic ability and aspirations, alongside how the label impacts parents' and teachers' aspirations for the dyslexic child. Should the label have a positive impact on academic outlook, then there is an argument that people showing dyslexic symptoms should continue to be diagnosed and labelled.

The impact of the dyslexia label

Riddick (2000) argues that there are both positive and negative effects of being labelled with dyslexia. On the one hand, labelling with dyslexia can lead to positive outcomes such as opening up additional resources and effective intervention for the child. Furthermore, research has reported how diagnosis can provide the person struggling with an explanation for their difficulties and therefore calls for early identification (Glazzard, 2010; Ingesson, 2007; Leitão et al., 2017). On the other hand, Riddick (2000) argues that labelling with dyslexia may result in the focus of the issue being within-child, causing institutions to take less responsibility for the difficulties the child is showing.

Research in the area has also shown mixed findings on the impact of the dyslexia label. Two key research methods have been employed to study the impact of the dyslexia label on academic outlook: semi-structured interview studies and survey studies. First, interview studies have addressed the impact of dyslexia on academic outlook. While many studies delineated the negative consequences of dyslexia on self-perception (Doikou-Avlidou, 2015; Glazzard, 2010; Leitão et al., 2017; Lithari, 2018), interviews also revealed the positive impact of diagnosis on a person's academic outlook. For example, Ingesson (2007) called for an early diagnosis of dyslexia, due to her participants discussing the positive impact of diagnosis. She states that the label is a protective factor against the low self-esteem that her participants reported. Similar results were reported by Glazzard (2010) whose participants self-reported that their self-esteem increased after diagnosis. Glazzard suggests that this is because the diagnosis gave the participants a way to explain their difficulties. Leitão et al. (2017) also stated that participants reported feeling negative and frustrated prior to diagnosis, but after diagnosis reported feeling relief and acceptance about their difficulties. Camilleri, Chetcuti, and Falzon (2020) look at the relationship between students' experiences and the neuroscience evidence around the benefits of early diagnosis. From the interviews conducted with students, they argue that 'it is very important to diagnose students as early on as possible and also to make teachers and educators aware of the characteristics of dyslexia so that they can avoid labelling students as lazy and stupid' (p. 370). Thus, while many dyslexic participants spoke about the negative impact of dyslexic symptoms on their academic outlook, they believed that

receiving a diagnosis was a positive experience in helping them to understand why they were struggling.

In addition to interviews, questionnaires have also been used to compare those with dyslexia and a 'non-dyslexic' control group. Alesi, Rappo, and Pepi (2012) compared children who displayed dyslexic symptoms (but not necessarily with a diagnosis of dyslexia) with those who had comprehension difficulties, maths difficulties and a control group that showed no academic difficulties. Those with any of the aforementioned difficulties showed lower ratings of scholastic self-esteem than the children whose learning was typical. However, there were no significant differences between the 'dyslexic' group and the other learning difficulties, suggesting that low self-esteem may be a product of struggling academically, rather than dyslexia *per se*. Furthermore, Eissa (2010) conducted both interviews and questionnaires with adolescents who had either been diagnosed with dyslexia or had shown consistent poor reading. Their results were compared with a group of 'typical readers'. Results showed that the adolescents diagnosed with dyslexia and those with reading difficulties had lower feelings of self-esteem and well-being. However, again, these results cannot be attributed to dyslexia exclusively, but rather suggest the negative effects of struggling academically.

Therefore, in an attempt to isolate the effects of the label, it is necessary to compare groups who are labelled with dyslexia to those who are not labelled with dyslexia but who show a similar academic performance. Polychroni, Koukoura, and Anagnostou (2006) compared 32 dyslexic 10- to 12-year-olds with their peers. The non-dyslexic peers were split into low/average performance and high-performance subgroups. Results showed that the dyslexic participants displayed significantly lower academic self-concept (on the Students' Perception of Ability Scale) than both the high-performance and the low/average performance comparison participants. This suggests that there may be a negative impact of the label which is not due to low-performance alone. However, due to a shortage of low performing peers, those in the low-performance groups consisted of mostly those who were performing at an average level; therefore, low ability was not isolated and examined. Therefore, highlighting the need to match more precisely on ability in order to understand the impact of dyslexia.

In another study, Riddick, Sterling, Farmer, and Morgan (1999) attempted to match 16 dyslexic university students with 16 students in a control group. Students were matched on the subject that they were studying at university and social background (father's/mother's occupation). This design made the assumption that similar academic success is needed to study each university course. Results showed that, compared to the control group, the dyslexic group showed lower self-esteem (on the Culture-Free Self-Esteem Inventory), reported feeling more anxious (on the State-Trait Anxiety Inventory), and less competent in their written work and academic achievement (on researchers own scale). This again suggests a negative effect of the dyslexia label, as opposed to underperformance in academia more generally. However, similarly to Polychroni et al. (2006) no attempt was made to individually match on academic ability, further highlighting the need for more rigorous matching when looking at the impact of the dyslexia label.

Therefore, research in the area shows mixed findings on the impact of the dyslexia label. Research that has attempted to control for ability points towards a negative impact of the dyslexia label on measures of self-concept, however, without a more rigorous approach to matching it is difficult to conclude that this is a result of the dyslexia label alone.

Predictors of dyslexia and academic outlook

While the aforementioned survey research makes some attempt to control for ability, there is also evidence to suggest that other variables related to dyslexia, also correlate with academic outlook. Therefore, simply controlling for ability alone does not consider the social processes involved in who is being identified as dyslexic, and the impact of these social characteristics on academic outlook.

Research literature points towards a relationship between dyslexia and various measures of advantage (Anders et al., 2011; Blackburn, Spencer, & Read, 2010; Croll, 2002; Kirby, 2019; Parsons & Platt, 2013); being male (Arnett et al., 2017; Chiu & McBride-Chang, 2006; Hawke, Olson, Willcut, Wadsworth, & DeFries, 2009; Kirby, 2019; Machin & Pekkarinen, 2008); and being younger in the year group (Crawford, Dearden, & Greaves, 2013; Donfrancesco et al., 2010). These factors have also been shown to have an impact on academic outlook and aspirations (*Social class* – Berrington, Roberts, & Tammes, 2016; Eshelman & Rottinghaus, 2015; MacLeod, 2018; Rogers, Monte, & Coleman, 1978; Silva, 2016; Trautwein, Lüdtke, Marsh, & Nagy, 2009: *Gender* – Berrington et al., 2016; Cokley et al., 2015; Fortin, Oreopoulos, & Phipps, 2015; Marsh & Yeung, 1998; Rimkute, Torppa, Eklund, Nurmi, & Lyytinen, 2014: *Age in year group* – Marsh, 2016; Marsh et al., 2017; Parker, Marsh, Thoemmes, & Biddle, 2019).

Therefore, any research that looks for the impact of dyslexia on academic outlook and aspirations, should also take into account these other correlates of dyslexia. Failure to take these aspects into account overlooks factors that may be driving the significant relationship between dyslexia and low academic outlook. Significant results may not be due to the dyslexia label itself, but the characteristics of those identified as dyslexic. Therefore, this research makes an original contribution to the pre-existing research in the field as it aims to understand the relationship between dyslexia and academic outlook by controlling for both ability and further variables that also correlate with dyslexia.

The present study

In order to isolate the impact of the dyslexia label, the present study uses propensity score matching (PSM) with data from the MCS to match children who have been labelled with dyslexia, with children who share the same likelihood of being dyslexic (according to both ability, and the characteristics identified above) but do not have this label. As a result, the impact of having the dyslexia label and its subsequent impact on academic outlook will be examined.

Method

Data

Data for the study comes from the MCS. The MCS is a nationally representative longitudinal study of children born in the United Kingdom between September 2000 and January 2001. Households for participation were identified through cluster sampling using the Department of Work and Pensions Child Benefit system. Households were selected based on geographical wards with disproportionate sampling used to over-represent smaller countries, ethnic minorities and those in areas of deprivation. To date, six sweeps have been conducted when cohort members were aged approximately 9 months, 3, 5, 7, 11, and 14 years. At the first sweep, 18,551 households were studied with 11,726 households taking part at sweep 6 (age 14). Data are collected through

interviews and self-completion surveys. The current research looks at the outcomes from the data collection at age 11 (teacher survey) and age 14.

Variables

Independent variable – dyslexia

Either the child's parent or teacher was asked to identify whether the child had dyslexia at each sweep (age 7, $n = 239$; age 11, $n = 256$; age 14, $n = 397$). As the same person was not asked to identify dyslexia in each sweep, often the same child was not consistently labelled as dyslexic. In order to have a sufficient number of dyslexic cohort members and to avoid any child labelled as dyslexia being included in the control group, any child who had been identified as dyslexic in at least one of the three sweeps was coded as dyslexic and included in the analysis. 721 children were labelled as dyslexic at ages seven, 11, and 14.

Dependent variables – academic outlook

At age 14, cohort members were asked the following question in order to access their academic self-concept: 'How much do you agree or disagree with each of the following statements about you?' followed by 'I am good at English'; 'I am good at Maths'; 'I am good at science'. For each statement, the chid could answer on a four-point scale from 'strongly disagree' (1) to 'strongly agree' (4). Furthermore, to view how the dyslexia label may influence the child's academic aspirations, answers from the question 'how likely do you think it is that you will go to university?' were examined. In order to answer this question, children were given a slider on a scale which ranged from 0% to 100% and were told to place the pointer where they felt fitted their response best.

It was also possible to look at the impact of the dyslexia label on how the parent and teacher of the child viewed their academic prospects. The child's teacher at age 11, and the main- and partner parent at age 14 were asked about their aspirations for the child. Both the teachers and parents were asked 'How likely or unlikely do you think it is that [child's name] will go to university?' They were required to choose from the options 'very likely (4); fairly likely; not very likely; not likely at all (1)'. As both parents were asked this question, the highest of both their responses was taken.

Matching variables

Ability. As the dependent variables include questions about English and Maths ability, it was necessary to match on indicators of English and Maths skills to ensure that a poorer outlook in the dyslexic group did not occur due to genuine poorer levels of English and maths. Therefore, in order to control for English ability, the children were matched on their word reading level at age seven derived using the British Ability Scales (BAS). These tests are widely validated age appropriate tests that have been shown to be predictive of later child cognitive performance (Hill, 2005). This is demonstrated by Table 1 which shows a strong, positive correlation between the child's word reading score at age seven and their Key Stage One (KS1) level for reading and writing. Similarly, the children were also matched on their maths ability. This was derived from a measure adapted from the National Foundation for Educational Research (NFER) 'Progress in Maths' test. The strong correlation between maths ability and KS1 maths outcomes is also demonstrated in

Table 1. Correlation between ability measures and KS1 levels

	Word Reading age 7		Maths ability age 7	
	r	*n*	*r*	*n*
Reading KS1	.84	2,853	.62	2,856
Writing KS1	.83	1,993	.65	1,995
Maths KS1	.74	2,264	.72	2,266

Table 1. While information of the child's academic outcomes was available from the national pupil database (NPD), it was not possible to match the cohort members using this information as it reduced the dyslexic sample too greatly.

Sociodemographic variables. As indicated above, the literature has suggested that a number of social demographic factors may also be related to dyslexia. As the dyslexic group contained those who were identified as dyslexic at ages 7, 11, and 14, demographic variables were recoded to summarize the household status over these three sweeps. For continuous variables (e.g., income), the average from the three sweeps was taken, while for categorical variables (e.g., socioeconomic class) the mode, and where not possible, the median, was taken. The following variables were used to match the participants.

Gender. Participants were matched on their gender reported in the initial sweep of data collection.

Age in year group. An 'age in year group' variable was created by allocating those who would be the oldest in the year '12', and the youngest in the year '1'. These figures were allocated by country due to the differing time of year that students start school in the different countries of the United Kingdom. Those that started school younger than 4 years (47 months) and older than 5 years (60 months) were excluded from the analysis.

Parents' highest social class. Social economic class (SEC) of each parent is derived from occupation and categorized using 38 categories provided by the Office of National Statistics (ONS). For reasons of parsimony, these can then be further collapsed into five main categories: 'Managerial and professional'; 'Intermediate'; 'Small employer and self-employed'; 'Low supervisors and technical'; and, 'Semi-routine and routine'. Using this information, the five-class structure was reverse coded and the highest SEC for the main parent and partner parent was derived. This provided a household SEC level, using the highest SEC household member's status.

Income. The MCS collected information on the main and partner parents' gross earnings at each sweep. From this information, the MCS calculated the OECD equivelized weekly family earnings. This is done by 'dividing the total net household income, with the number of household members, according to their weight on the OECD equivelized income scale

(equivelized household size) to give net disposable income' (Agalioti-Sgompou et al., 2017, p. 49). The current research matched cohort members using the continuous equivelized income scale.

Parents' highest education level. The parents' highest academic or vocational qualification level was calculated. The qualifications are aggregated into a five-point scale from National Vocational Qualification (NVQ) level one (no qualifications at GCSE level) to NVQ level five (higher degree and postgraduate qualification).

Country. All data were collected from the United Kingdom. However, in order to control for the effect of either living in different countries of the United Kingdom where education is devolved, cohort members were matched on country.

Propensity score matching

This paper follows Rosenbaum and Rubin (1983, 1985) by performing PSM to pair dyslexic children in the MCS with children who are similar but are not dyslexic. To do this, the probability of being dyslexic (as a function of word reading, maths ability, gender, parents' highest education level, parents' highest SEC, gross household income, age in year and country) is estimated. Dyslexic and non-dyslexic children are then ranked by this probability (or propensity score) and are matched with non-dyslexic children with similar propensity scores. Finally, the average difference between the dyslexic and the non-dyslexic matched group is calculated.

A critical feature of this methodology is that propensity scores have to satisfy a 'balancing property'. This means that observations with the same value of propensity score must have the same distribution of the matching characteristics, regardless of whether or not they are dyslexic. This allows the use of the propensity score as a one-dimensional summary of all defined variables. In order to generate the propensity scores, a logistic regression model was used. Table 2 presents the binary logit regression used to estimate the propensity scores for all cohort members. In this model, the specified predictors of dyslexia are consistent with the aforementioned literature which suggests a relationship between these sociodemographic factors and dyslexia.

Further consideration needs to be given to how the dyslexic and non-dyslexic children are matched. As propensity scores are continuous, the probability of two children having the same propensity score is highly unlikely. Various methods have been devised in order to address this issue. In this paper, nearest neighbourhood matching and kernel weighting are used. During nearest neighbourhood matching, the child from the non-dyslexic group is chosen as a comparison as their propensity score is closest to the dyslexic child's propensity score. To make these matches, the statistical software sorts all records by the estimated propensity score and then searches forward and backward for the closest non-dyslexic control; if the forward and backward matches happen to be equally good, the programme will randomly draw either the forward or backward match. The second technique used is Kernel weighting. This uses weighted averages of individuals in the control group to construct the counterfactual outcome. Weights depend on the distance between the dyslexic and non-dyslexic control groups. The weights place a higher weight on a child closer to the dyslexic child and a lower weight on those who are more distant.

Table 2. Binary logistic regression analysis to predict whether child is labelled as dyslexic

Variable	Category	Odds ratio	Standard error	95% confidence interval	
Word reading	(continuous)	0.42***	0.02	0.38	0.45
Maths ability	(continuous)	1.08	0.05	0.98	1.18
Income	(continuous)	1.00***	0.00	1.00	1.00
Age in year	(continuous)	0.93***	0.01	0.90	0.96
Gender	Male (ref)				
	Female	0.80*	0.09	0.64	0.99
Parents highest social class	Semi-routine and routine (ref)				
	Low supervisors and technical (ref)	0.93	0.28	0.52	1.67
	Small employer and self-employed	1.28	0.29	0.82	2.01
	Intermediate	1.41	0.30	0.93	2.12
	Managerial and professional	1.66**	0.32	1.14	2.42
Parents highest NVQ level	NVQ Level 1 (ref)				
	NVQ Level 2	1.39	0.53	0.66	2.94
	NVQ Level 3	2.34**	0.89	1.11	4.94
	NVQ Level 4	2.39**	0.90	1.15	5.00
	NVQ Level 5	2.64**	1.04	1.21	5.73
Country	England (ref)				
	Wales	0.50***	0.08	0.36	0.69
	Scotland	0.82	0.13	0.59	1.13
	Northern Ireland	0.37***	0.08	0.24	0.57
Constant		1.62	0.67	0.72	3.62
Number of observations		9,801			
Adjusted R^2		.19			

Notes. *$p < .05$; **$p < .01$; ***$p < .001$.

Results from both analyses are presented to show consistency in results when different matching methods are used.

Table 3 shows the bias reduction in each variable, for each matching method for the question 'I am good at English'. The table also includes Rubin's B and R. Rubin's B is the 'absolute standardised difference of the means of the linear index of the propensity score in the treated and non-treated group' (Rubin, 2001) it is suggested that this should be less than 25. Rubin's R is 'the ratio of the treated to non-treated variances of the propensity score index' (Rubin, 2001), this should be between 0.5 and 2 for the samples to be considered balanced. Table 3 shows a significant bias reduction under each matching method. Both matching methods meet the necessary criteria for Rubin's B and R. Therefore, the matching can be considered successful for both methods employed.

Abadie and Imbens (2006, 2008, 2011) suggest that when using nearest neighbour matching methods, the standard error does not take into account the level of uncertainty from the PSM estimate. Therefore, if this is ignored, it makes standard errors for the average effect of being dyslexic either more conservative of more generous. In order to counter for this, they suggest at a bias-corrected estimator that is consistent. This is applied to the calculations to adjust the standard errors.

As well as comparing how dyslexia may affect the cohort member's own academic self-concept and aspirations, the study also investigated the aspirations that cohort members' teachers and parents held for the child. As the teachers were not questioned at age 14, it

Table 3. PSM bias reduction for each matching method

	Un-matched	Nearest neighbour	Kernel weighting
Bias reduction (%)			
Word reading	–	97.6	81.7
Maths ability	–	80.0	63.4
Income	–	49.0	99.0
Age in year	–	82.5	95.2
Gender	–	74.7	86.1
Parents highest social class	–	78.1	75.2
Parents highest education level	–	62.5	99.2
Country	–	77.1	32.4
Mean bias	27.7	3.7	5.6
Median bias	11.7	2.7	2.8
Rubin's B (%)	140.1	11.3	24.1
Rubin's R	0.67	0.89	0.63

would not be correct to use the above propensity scores as they included information from the age 14 sweep. Therefore, variables only using data from age seven and age 11 were generated. These variables were then used to generate the children's propensity scores using the same method as described above.

Results

Perceived English ability

Prior to matching, in the whole sample there was a significant difference between those who were labelled as dyslexic and those who were not in how they responded to the question 'I am good at English' (Table 4). Those that had been labelled with dyslexia were less likely to agree that they were good at English at age 14 compared to those who were not labelled. After matching the groups using both nearest neighbourhood matching and kernel weighting there remained a significant difference between the dyslexic group and the non-dyslexic control group. The results from this analysis show that the dyslexic group held a significantly lower opinion on their ability in English than their matched peers that did not hold this label, but who shared the same likelihood of being labelled with dyslexia.

Perceived Maths ability

Prior to matching, there was a significant difference between those that were labelled dyslexic, and those that were not, in their response to the statement 'I am good at maths' (Table 4). While this was a smaller effect than for the statement 'I am good at English', it was still a significant difference. After matching, while the difference decreased, there remained a significant difference between those who had been labelled dyslexic and their matched peers.

Perceived Science ability

Table 4 shows that there was a significant difference between those labelled dyslexic and those without the dyslexia label in their response to the statement 'I am good at science'. However, this difference was not significant once the groups were matched.

Table 4. Mean score prior to and following propensity score matching

	Dyslexic average		Non-dyslexic average				
	Mean	*n*	Mean	*n*	Difference	Standard error	*T*-stat
I am good at English[a]							
Unmatched	2.61	373	3.07	7,871	−0.46	0.04	−12.37*
Nearest Neighbour matching	2.61		2.96		−0.35	0.05[d]	−6.87*
Kernel weighting	2.61		2.94		−0.34	0.04	−8.36*
I am good at maths[a]							
Unmatched	2.86	373	3.08	7,496	−0.23	0.04	−5.52*
Nearest Neighbour matching	2.86		3.09		−0.24	0.06[d]	−4.21*
Kernel weighting	2.86		3.04		−0.18	0.04	−4.18*
I am good at science[a]							
Unmatched	2.96	372	3.04	7,494	−0.08	0.04	−2.03*
Nearest Neighbour matching	2.96		3.01		−0.05	0.05[d]	−0.93
Kernel weighting	2.96		2.99		−0.03	0.04	−0.79
How likely do you think it is that you will go to university?[b]							
Unmatched	63.7	349	73.29	7,235	−9.59	1.5	−6.58*
Nearest Neighbour matching	63.7		68.5		−4.84	2.18[d]	−2.22*
Kernel weighting	63.7		67.67		−4.0	1.72	−2.30*
How likely is it that [child] will go to university? (Parent)[c]							
Unmatched	2.99	375	3.41	7,573	−0.42	0.04	−10.12*
Nearest Neighbour matching	2.99		3.14		−0.16	0.07[d]	−2.41*
Kernel weighting	2.99		3.18		−0.19	0.05	−4.00*
How likely is it that [child] will go to university? (Teacher)[c]							
Unmatched	2.36	261	3.09	5,410	−0.74	0.06	−12.72*
Nearest Neighbour matching	2.36		2.52		−0.16	0.08[d]	−2.01*
Kernel weighting	2.36		2.62		−0.26	0.06	−4.11*

Notes. [a]4- Strongly agree, 1- Strongly disagree; [b]Scale from 0 (unlikely) to 100 (likely); [c]1-very likely, 5- not likely at all; [d]Adjusted using Abadie and Imbens (2006); *$p < .05$.

Likelihood of going to university

Children

Before matching the groups, there was a significant difference in how those labelled dyslexic rated their likelihood of going to university at age 14 compared to non-dyslexic peers. This remained significant once matching the cohort members (Table 4).

Parents

There was also a significant effect of the dyslexia label on how the parents rated the child's likelihood of going to university at age 14. Before matching the groups, there was a large difference between the dyslexic and non-dyslexic group in the average likelihood that their parents gave them on going to university. This remained significant when the groups were matched (Table 4).

Teachers

The child's teacher was also asked about the likelihood that the child will go to university. As the teachers were not questioned during the age 14 survey, these results came from

data up to age 11 only. The results showed that there was a significant difference for the matched groups, whereby, on average, the teachers believed that the dyslexic children would be less likely to go to university than their non-dyslexic matched peers (Table 4).

Discussion

Propensity score matching showed that those with dyslexia were significantly less likely to agree that they were good at English and maths than their matched peers at age 14. Furthermore, results showed that the child and child's parent at age 14 and the child's teacher at age 11 were significantly less likely to believe that a dyslexic child would go to university, in comparison with their matched peers. These significant differences were found despite both ability and sociodemographic correlates of dyslexia being taken into account. Therefore, the results suggest a negative impact of the dyslexia label on academic outlook and aspirations for both the dyslexic child, and their parent and teacher.

Results showed that prior to matching the participants there was a large difference between the two groups on all measures. Once the participants were matched, although the size of the differences fell, they remained significant in all cases except for the child's view of their science ability. This suggests that while the matching characteristics (word reading, maths ability, gender, parents' education level, parents' highest socioeconomic class, income, country, and age in year group) accounted for some of the difference between the groups, the difference of being dyslexic still had a significant influence on the outcome.

The most common trait endorsed by those who diagnose dyslexia, is that it is associated with 'current literacy skills difficulties' (Ryder & Norwich, 2018), and therefore, it may be expected that those with dyslexia rate themselves less positively in English. However, interestingly maths was also significantly negatively affected by the dyslexia label. This is despite maths skills not being directly associated with dyslexia. This suggests that dyslexia does not just impact an individual's attitude towards their literacy ability, but also their maths ability. This points towards a negative effect of the dyslexia label on academic outlook in the children in this dataset. Interestingly, while the matched group still showed higher ratings of their science ability, the difference was not significant. This highlights an interesting question for future research on why the dyslexia label may have a negative impact on perceived English and Maths ability, but not science.

The results also revealed how the dyslexia label impacted whether the children in this data set believed that they would go to university. Not only did those labelled as dyslexic hold lower expectations about their likelihood of going to university, the parents and teachers of the labelled individuals also held significantly lower expectations for this group. Theories and research into teacher expectancy show that a teacher's expectations may shape the outcomes of the child (Babad, Inbar, & Rosenthal, 1982; Brophy, 1983; Friedrich, Flunger, Nagengast, Jonkmann, & Trautwein, 2015; Hornstra, Denessen, Bakker, van den Bergh, & Voeten, 2010; Merton, 1948; Rosental & Jacobson, 1968; Urhahne, Chao, Florineth, Luttenberger, & Paechter, 2011; Zhu, Urhahne, & Rubie-Davies, 2017). Furthermore, parent expectations have been shown to predict their children's educational outcomes (Davis-Kean, 2005; Doren, Gau, & Lindstrom, 2012; Khattab, 2015; Wentzel, Russell, & Baker, 2016). As the children were matched on aspects such as parent education, socioeconomic class, and income, these aspects were not driving the parents and teachers' expectations. Therefore, the current results suggest that the teachers and parents included in this analysis held lower expectations of the dyslexic child's academic future while holding higher expectations of those with matched

characteristics who do not have the dyslexia label. Therefore, suggesting that the label is contributing to these expectations.

Strengths and limitations

Propensity score matching allows clear comparisons to be drawn between the dyslexic and non-dyslexic group. Using criteria that have previously found to be correlated with dyslexia allows the dyslexia label to be isolated as much as possible within the confines of the data set. This means that the groups were matched as closely as possible on key indicators of dyslexia.

However, while the variables used to match the groups had been found in previous research to correlate with dyslexia, other variables that are unmeasured in this data set may also correlate with dyslexia. This limitation is highlighted by the low R^2 value. Therefore, while caution has been taken to the fullest extent possible to isolate the label, it is difficult to conclude that the significant differences between the dyslexic and non-dyslexic children are due to a labelling effect alone. Other variables that may correlate with dyslexia, that could not be controlled for in PSM could be causing these differences. In particular, while word reading and maths ability are controlled for, academic outcomes are not. This was due to the lack of dyslexic cohort members who allowed their data to be paired with the National Pupil Database. Therefore, as the MCS progresses, future research should use academic achievement to match the dyslexic and non-dyslexic groups.

A limitation of the research is that those identified as dyslexic at age seven or 11, were not necessarily labelled as dyslexic at age 14. It is likely that the difference in identification is due to different people being asked to identify dyslexia in different sweeps. However, comparisons with the NPD show validity in the reporting of dyslexia as 263 of the 375 (73.3%) identified as dyslexic were also on the SEN register in England at KS2. As this study is interested in how the label of dyslexia impacts outlook, it is likely that as the teacher or parent labelled the child with dyslexia, the child is aware of this label. The strong correlation with the SEN register strengthens the assumption that they are aware of the label.

Furthermore, although the number of participants who provided data in response to these questions is relatively large, the number of items addressing academic outlook and aspirations is fairly limited. In order to draw stronger conclusions about how the dyslexia label impacts academic outlook and aspirations, it is necessary to replicate the study with further large-scale databases. Further rigorous investigation into the area will allow the reliability of these outcomes to be confirmed and will shed more light on the impact of the dyslexia label.

Finally, while the analysis reported in this paper has shed light on relationships between the dyslexia label and academic outlook, what remains unclear from the data are what drives how the children answered these key questions. Therefore, in order to gain further insight into the results follow-up research to understand these patterns should be conducted.

Conclusions

The current study suggests a negative impact of the dyslexia label on academic outlook and future academic aspirations for the children in this data set. The negative impact on future academic aspirations was not only found in the dyslexic child, but also their parent

and teacher. Therefore, this research initially calls for caution when diagnosing dyslexia. Furthermore, additional rigorous research is needed in this area in order to shed light further light on the 'dyslexia debate'. Should similar results be found, the debate over the reliability of the dyslexia label, alongside these results, suggests that careful consideration is needed as to whether labelling with dyslexia is beneficial in the current system.

Acknowledgements

The author would like to thank the ESRC for funding this project.

Conflicts of interest

All authors declare no conflict of interest.

Data availability statement

The data that support the findings of this study are openly available in UK data service at: http://doi.org/10.5255/UKDA-SN-5350-5, reference number [5350-5]; http://doi.org/10.5255/UKDA-SN-5795-5, reference number [5795-5]; http://doi.org/10.5255/UKDA-SN-6411-8, reference number [6411-8]; http://doi.org/10.5255/UKDA-SN-7464-5, reference number [7464-5]; http://doi.org/10.5255/UKDA-SN-8156-7, reference number [8156-7].

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Received 14 April 2020; revised version received 30 December 2020