Received: 4 April 2024 | Accepted: 1 October 2024

DOI: 10.1002/berj.4083

ORIGINAL ARTICLE

BERJ BERA

Sociodemographic trends in special educational needs identification in Wales

Cathryn Knight[1] | **Emily Lowthian**[2] | **Tom Crick**[2] | **Carys Jones**[3] | **Anna Rawlings**[3] | **Hoda Abbasizanjani**[4] | **Sarah Rees**[3]

[1]School of Education, University of Bristol, Bristol, UK

[2]Department of Education and Childhood Studies, Swansea University, Swansea, UK

[3]SAIL Databank, Swansea University, Swansea, UK

[4]Population Data Science, Medical School, Swansea University, Swansea, UK

Correspondence
Cathryn Knight, School of Education, University of Bristol, 35 Berkley Square, Bristol BS8 1JA, UK.
Email: cathryn.knight@bristol.ac.uk

Funding information
Nuffield Foundation

Abstract

In the context of an emerging new additional learning needs (ALN) system in Wales, this research explores who was likely to be identified with special educational needs (SEN) under the previous system. Our study reveals analysis of linked Welsh education and health data on SEN identification in learners in mainstream education settings born between 2002/3 and 2008/9. Using longitudinal multilevel modelling, we explore (i) who is likely identified with SEN and (ii) whether there is evidence of social patterning in SEN identification. We find that 48% of those born in the year 2002/3 were identified with SEN at some point during their schooling years. Furthermore, when controlling for health-related variables, those who are identified with SEN in Wales were more likely to be male, White, from a deprived background, with lower school attendance, had not experienced breastfeeding and were born later in the academic year. Taken together, the research findings suggest that SEN identification was influenced by a child's context. The study thus underscores the critical importance of examining the relationship between socioeconomic, environmental and biological factors in SEN identification, urging for a comprehensive and cross-organisation approach to enhance outcomes for learners with diverse needs. It also highlights the need for follow-up research to explore unfolding trends as the new ALN system in Wales becomes fully implemented and integrated over the coming years.

KEYWORDS
additional learning needs, administrative data, multilevel modelling, special educational needs, Wales

Key insights

What is the main issue that the paper addresses?

This paper uses national-scale administrative health and education data from Wales in order to understand who was most likely to be identified with special educational needs (SEN). It aims to shed light on the social patterning of SEN identification.

What are the main insights that the paper provides?

The study reveals a high SEN identification rate in Wales, which was influenced by socioeconomic and environmental factors. It emphasises the need for a comprehensive approach to addressing additional learning needs (ALN) and further research under the new ALN system in Wales.

INTRODUCTION

Research previously conducted in the United Kingdom (Hutchinson et al., 2021; Knight & Crick, 2021; Parsons & Platt, 2013) and internationally (King & Bearman, 2011; Liu et al., 2010) has demonstrated that sociodemographic influences, outside of biology and health, can impact who is more likely to be identified with special educational needs (SEN). Bearman (2013) questions 'what if the sequencing phenomenon is to be found not in the genome but instead in a better understanding of the social and cultural factors that shape health?' (p. 11). This research establishes a foundation for understanding how environmental factors may interact with biology and health to contribute to SEN identification in Wales. By exploring environmental and sociodemographic influences, the study aims to shed light on how individual context may shape the identification of SEN in Wales, contributing to a more comprehensive understanding of educational inequality and support needs.

This paper uses national-scale administrative health and education data from Wales, in order to understand who is most at risk for being identified with SEN. The following literature section will explore previous research which has found relationships between sociodemographic variables and SEN, before discussing why Wales offers an interesting national-scale policy context from which to explore these questions.

PREDICTORS OF SEN

Previous research has explored various predictors of SEN. Research has shown that prenatal and birth-related factors such as gestational age, weight and birth abnormalities are related to a child being identified with SEN (Alterman et al., 2021; Chen et al., 2020; Mackay et al., 2010; Schendel & Bhasin, 2008). Research has investigated how sociodemographic factors, particularly levels of disadvantage, can influence health aspects such as birthweight

(Currie & Moretti, 2007). Therefore, it is necessary to explore how these environmental aspects may also impact the identification of SEN.

Previous research outside of Wales has shown a link between levels of disadvantage and SEN identification (Hutchinson et al., 2021; Parsons & Platt, 2013). Research using administrative data in England showed that those who were identified as receiving free school meals (FSM)—used as a proxy for parental income level—and who lived in the most deprived neighbourhoods were more likely to be identified with special educational need and disability (SEND) (Hutchinson et al., 2021). Similarly, Parsons and Platt (2013) found that, in England, children with identified SEN were born into socioeconomically disadvantaged circumstances that continued throughout their early years. This impact was stronger for those with certain SEN conditions, including behaviour, learning or speech and language difficulties. Thus, providing evidence that SEN identification is socially patterned in England (Blackburn et al., 2010). Similar clustering of SEN in more disadvantaged groups has also been found globally (Hibel et al., 2010; Ismail et al., 2017; Lygnegård et al., 2013; O'Connor & Fernandez, 2006).

Yet, while research and educational statistics show a higher proportion of learners with SEN coming from more disadvantaged backgrounds across the United Kingdom, Tomlinson (2012) states that:

> a relatively undocumented theme is that much of the expansion of special education […] comes from middle class and articulate parents who […] have seized on expanding ways of defending children in need of special education and support (pp. 273–274).

Gillborn's (2015) research with black middle-class families found that it was usually the parent who identified SEN and sought assessment for the child. He stated that 'this involves drawing on both their economic capital (the financially expensive specialist assessments) and their cultural and social capital (often using friendship and professional networks to help negotiate the system)' (Gillborn, 2015, p. 280). Reay (2005) describes how middle-class parents have cultural capital in a combination of 'requisite skills and competencies, confidence in relation to the educational system, a previous history of being supported educationally in the home' (Reay, 2005, p. 111). Therefore, Gillborn (2015) argues that parents in the middle class can mobilise their economic resources to get their child a SEN diagnosis, and furthermore, they are able to use their cultural capital in the form of social networks and knowledge of the field to get the most out of the education system for their children. Given the higher level of poverty in Wales (Institute for Fiscal Studies, 2023), it is of interest to see whether these factors impact SEN identification in Wales.

Additionally, pertinent to this discussion is the link between socioeconomic status, breastfeeding and SEN. Prior studies have established a connection between breastfeeding and parent–child attachment (Gibbs et al., 2018), suggesting that breastfeeding can serve as a proxy for early parenting skills and predict later reading and school readiness (Jacobson et al., 2014). Moreover, the absence of breastfeeding has been consistently correlated with various indicators of disadvantage such as parental income, employment status and socioeconomic status (Brown, 2019; Brown & Sear, 2017; Flacking et al., 2007; Heck et al., 2006; Peregrino et al., 2018). Previous research has indicated a potential detrimental effect of not breastfeeding on cognitive processing ability and the identification of SEN (Gore et al., 2015; Horta et al., 2015). This therefore leads us to question the influence of breastfeeding on SEN identification in Wales, especially when measures of deprivation are taken into consideration.

In addition to deprivation indicators, research has also pointed towards several other predictors of SEN, unrelated to underlying health. A key predictor of interest is season of birth, relative to the learner's age in the year—that is, being born in June, July or August, when

the academic year ends in August. Research has shown that in the United Kingdom, those who are younger in the year group are more likely to be identified with SEN (Campbell, 2014; Hutchinson et al., 2021; Knight & Crick, 2021). This has been shown to vary according to the type of need identified, with 'moderate learning difficulties' being the most susceptible to age-in-year-group effects (Squires et al., 2012). This may be due to an interaction between biological and social factors, where delays in certain aspects of biological development, combined with being younger within a year group, make learning issues more visible in younger children, which might be less noticeable in older children. This also demonstrates a social patterning of SEN; Squires et al. (2012) argue that 'teachers may be labelling younger children within the year group on the basis of political aspirations of attainments to be reached by the end of the academic year' (p. 469) and therefore affirm that SEN is a socially defined construct, and that attention needs to be paid to how it is defined, and the resources allocated.

Alongside individual-level variables such as health, social class and season of birth, it is relevant to question how a learner interacts with the education system and how this may lead to SEN identification. Research has found that SEN identification can vary within and between schools. For example, in England, Hutchinson et al. (2021) found that the primary school a child attended explained more than half of the differences in SEN identification, with lower numbers of learners being identified in academy schools. This is important, as Azpitarte and Holt (2024) found large spatial inequalities and clustering in the attainment of students with SEND in England. They therefore argue that there is a 'postcode lottery' (Azpitarte & Holt, 2024, p. 416) in effective support for SEND and a failure in application of the English SEND policy framework (Department for Education & Department of Health and Social Care, 2015). In comparison, Wales has less variation in school type and funding structure (OECD, 2018); this is due to there being no academy or free schools in Wales (i.e., state-funded schools that operate independently of local authority control) and significantly fewer private and grammar schools. However, whether this has an impact on SEN identification practices between schools and local authorities in Wales is unknown.

Furthermore, in the aftermath of the COVID-19 pandemic, school attendance is an area with increasing levels of policy scrutiny (Lowthian et al., 2023; Parentkind, 2023; Welsh Government, 2023). Attendance has fallen in Wales since the onset of the pandemic, and there is evidence from across the United Kingdom to suggest that learners with neurodevelopmental conditions had lower attendance when returning to school, especially those who experienced home learning during the pandemic (Kouroupa et al., 2023). Learner attendance is a large predictor of future educational outcomes (Gottfried, 2014), with absenteeism being found as a robust predictor of outcomes when controlling for socioeconomic indicators (Bruner et al., 2011; Gottfried, 2011, 2014; Klein et al., 2022; Ready, 2010). This highlights a negative impact of lack of instruction on academic outcomes. Other research has explored the link between attendance and SEN. Lereya et al. (2023) found that adolescents with SEN were more likely to be absent than their peers without SEN in secondary schools in England. Yet, the direction of the relationship between attendance and the identification of SEN is unclear. Sprick et al. (2020) propose that attendance should factor into identifying SEN because learning difficulties might stem from insufficient instruction. However, it is possible that learners with SEN are less inclined to attend school due to the impact of their learning needs (Hamilton, 2024; O'Hagan et al., 2022). In both the former and current SEN/ALN system in Wales, SEN/ALN is identified if a learner does not respond to intervention for their learning needs (Welsh Government, 2021b). However, if a learner is frequently absent, then the opportunity for classroom-based intervention decreases. It is unclear how this impacts the identification process. Given the policy emphasis on attendance, comprehending how it correlates with SEN is important for informing and guiding this policy direction.

As the literature demonstrates, considering both the aforementioned individual, family and school-level variables when examining the predictors of SEN is necessary to gain a comprehensive understanding of the multifaceted influences on a child's learning needs. Individual factors such as cognitive abilities, health and socioeconomic background are likely to interact with school-level and local-authority-level approaches. This research, therefore, attempts to situate and understand a learner's needs within their environment. By understanding how context may impact the identification of SEN, we aim to illuminate the social patterning of SEN, with the hope that these insights will be incorporated into approaches to support children who may have additional learning needs.

CONTEXT

This paper explores the previously defined variables and their relationship with SEN using population-level data from Wales. Wales, one of the four constituent nations of the United Kingdom, is currently undergoing major education system-level reforms and initiatives, from curriculum and qualifications to initial teacher education and significant investments in practitioner in-service training and professional learning (Evans, 2022; Harris et al., 2020; Welsh Government, 2023). Part of these changes is a transition to a new statutory support system for those aged 25 years and younger with a learning difficulty or disability (Welsh Government, 2018). The transition phase started in 2022 and has led to an overhaul of the system for learners with additional learning needs (ALN), the term that now replaces SEN. Within the new system, fewer learners are being recognised with SEN/ALN, with an emphasis placed on universal provision and inclusive education, which aims to meet the diverse needs of students within mainstream classroom settings (Knight & Crick, 2022). Under the previous system there was a fluctuating level of around 20% of learners in Wales identified with SEN (Senedd Research, 2022). This number has dropped by over 30% between 2020/21 (97,551 SEN learners, 20.8%) and 2022/23 (63,089 ALN learners, 15.8%), aligning with the implementation of the new ALN system (StatsWales, 2023a). Consequently, approximately 34,000 fewer learners are now accessing the support provided by the new ALN system. In the previous system in Wales (from which we obtained the current data), children were placed on a SEN register in one of three strands: School Action, School Action Plus and Statement. School Action provided initial support within mainstream schools for students with SEN/ALN, involving tailored interventions to meet individual requirements. School Action Plus represented a more intensive stage, with specialised support and collaboration with external specialists. The Statement system resulted in a formal assessment and the issuance of a legally binding statement outlining the child's needs and necessary provisions, which was managed by the local authority. The new system aims to provide a more integrated system, replacing the three tiers with individual development plans, which set out the personalised provision needed for each learner. Given the ongoing transition from SEN to the new ALN system, it is important to understand the patterns in who was being identified with SEN in the previous system in order to evaluate the impact of the incoming system.

These education reforms are designed to address a growing attainment issue in Wales. Wales is showing decreasing scores on the Program for International Student Assessment (PISA) tests (OECD, 2023). Children in Wales scored significantly below the Organisation for Economic Cooperation and Development (OECD) average in English, Maths and Science in 2022, and showed an overall decrease since the previous tests in 2018 (Senedd Research, 2023a). Compared to the other four nations of the United Kingdom, Wales had the lowest scores. Framed as part of a long-standing 'national mission', the focus of Welsh education reform is to promote 'high standards and aspirations for all' (Welsh Government, 2023) and 'continue our long-term programme of education reform, and

ensure educational inequalities narrow and standards rise' (Welsh Government, 2021a, p. 3). The PISA scores also highlight a significant achievement gap between the most and least-disadvantaged groups (Senedd Research, 2023a). This is particularly pertinent for Wales, given that nearly a third of its children live in poverty, and it has the highest proportion of low-paid employees in the United Kingdom (StatsWales, 2023b). Wales has consistently had a higher poverty rate than England, Scotland and Northern Ireland over the past two decades (Institute for Fiscal Studies, 2023), with the Children's Commissioner for Wales emphasising poverty as the foremost issue affecting Welsh children and addressing it as the Welsh Government's primary objective (Senedd Research, 2023a). A recent report from the Institute for Fiscal Studies reiterates the major challenges for education in Wales, proposing that lower educational outcomes are more likely to reflect differences in policy and approach (Sibieta, 2024). However, the relationship between poverty measures and SEN remains unexplored in Wales. Given the ongoing academic underperformance of learners, both with SEN and from disadvantaged backgrounds (StatsWales, 2023c), it is necessary to examine the relationship between socioeconomic status and SEN to fully understand the complex factors contributing to achievement disparities and low PISA scores in Wales.

THE PRESENT RESEARCH

Building upon prior research that has demonstrated associations between sociodemographic factors and SEN, both in the United Kingdom and globally, and considering the observed reduction in learners identified with SEN/ALN in Wales under the new ALN system, this study seeks to investigate the predictors of SEN in the former system. By doing so, it aims to establish a baseline understanding from which to evaluate the effects of policy reform on SEN/ALN identification and support mechanisms. Consequently, this research aimed to find out (i) who is likely identified with SEN and (ii) whether there is evidence of social patterning in SEN identification.

DATA AND METHOD

We procured access to relevant data from the Secure Anonymised Information Linkage (SAIL) Databank. This is a national data safe haven comprising de-identified linkable datasets primarily concerning the population of Wales, provided in anonymised format (Jones et al., 2020). Specific to this research, we accessed data from the following sources and linked them: *Annual District Birth Extract Dataset* (ADBE); *Congenital Anomaly Register and Information Service* (CARS); *Education Wales* (EDUW and EDUC); *Emergency Department Dataset* (EDDS); *Maternal Indicators Dataset* (MIDS); *National Community Child Health Database* (NCCHD); *Outpatients Patients Episode Database for Wales* (OPEDW); *Patient Episode Database for Wales* (PEDW); *Welsh Demographic Service Dataset* (WDSD); and *Welsh Longitudinal General Practice Dataset* (WLGP).

A spine of all children born in Wales between 1 September 2002 and 31 August 2008 was identified through the WDSD. This formed an electronic cohort of children whose data was tracked between 10 and 16 years, with earlier cohorts having more data. Only those born in 2002/3 had a full educational trajectory available for modelling; this is because of educational data missing in 2019/20, 2020/21 and 2021/22 due to the COVID-19 pandemic. At present, the quality of this data is unknown. Relevant outcome and cohort variables were then linked into this data from the sources outlined above. Figure 1 shows a consort diagram of those who were removed from the data during the data-building phase. This shows that learners were excluded from the dataset if they had no Anonymous Linking Field (ALF)

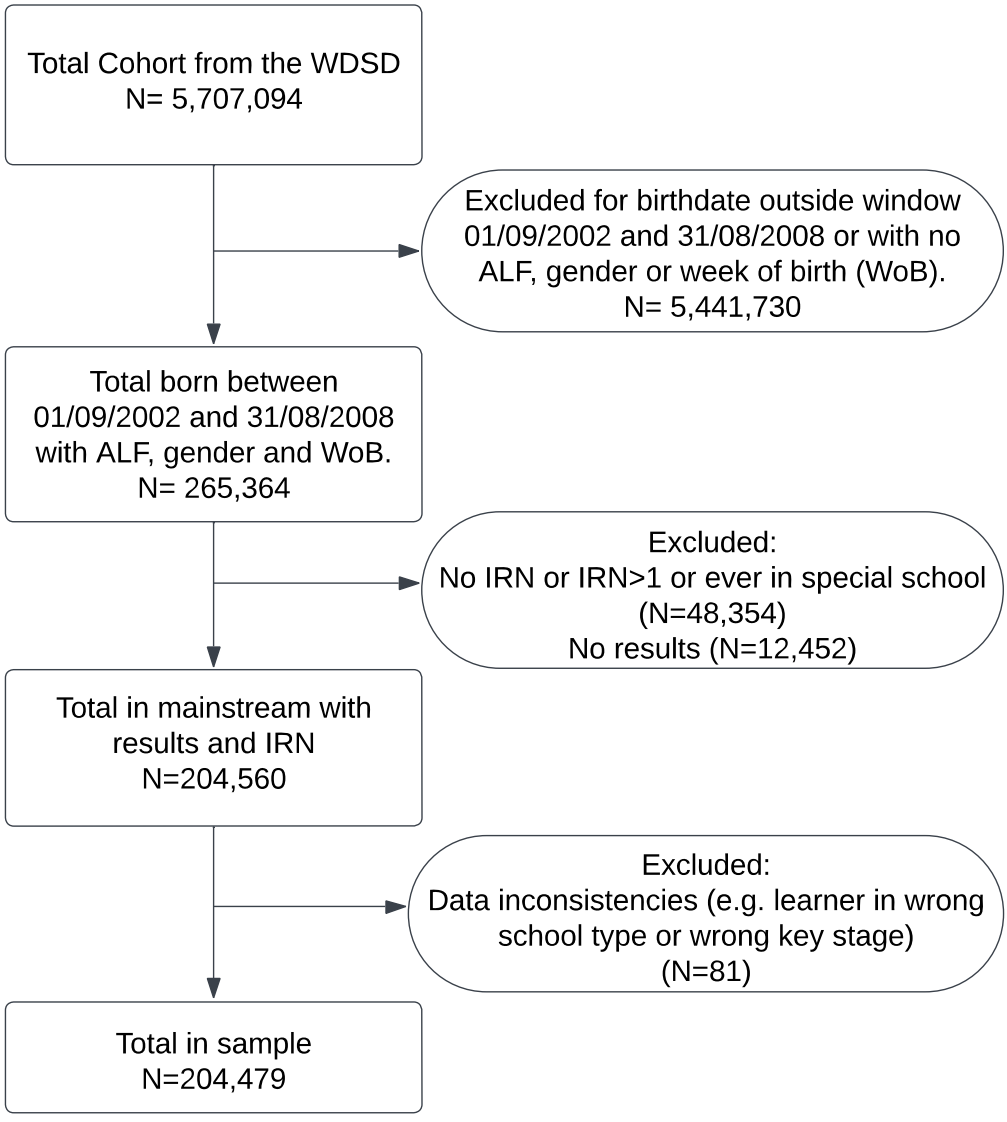

FIGURE 1 Consort diagram.

or Individual Record Number (IRN). They were also excluded if they had ever attended a special school. The decision was made to only include learners in mainstream school, as the educational experiences and academic trajectory of those in special schools meant that it was not possible to accurately track these learners longitudinally. Furthermore, it is likely that this group of learners were identified with SEN early and that their needs are more complex, making it harder to draw conclusions for the research question. Further cleaning of the data was done if a learner had missing education data or any data inconsistencies. Overall, we were left with a total of 204,479 learners in the dataset. Data was stored in the long format and were then aggregated into key stages (KS) for each learner (KS1: 5–7 years old, school years Reception, 1 and 2; KS2: 7–11 years old, school years 3–6; KS3: 11–14 years old, school years 7–9; KS4: 14–16 years old, school years 10 and 11).

Our analysis, conducted using Stata 18 SE (StataCorp, 2023) and R (R Core Team, 2021), was underpinned by an exploratory data analysis to provide an initial basis of understanding

to answer the specific research questions as outlined. Following this, longitudinal multilevel modelling was used to address the research question using the R package glmmTMB (Bolker, 2024). The data was organised as repeated measures in an unbalanced panel structure (Gelman & Hill, 2007). Multilevel models recognise the hierarchical structure inherent in the data, acknowledging that students are nested within schools, and schools are, in turn, nested within local authorities (Goldstein, 2010; Leckie et al., 2012). The longitudinal aspect of multilevel models accommodates the dynamic nature of educational data, capturing changes and trends in SEN in each key stage. Through the incorporation of random effects at different levels, the models account for variations between learners but also quantify the extent of variability attributable to differences between schools and local authorities, providing a comprehensive understanding of the complex interplay of factors influencing SEN identification. Furthermore, the model allows for learners who move between multiple schools over time (both from primary to secondary and if learners attended multiple schools). After running the model with the original data, a model with imputed data was run to compare the results and assess the impact of missing data on the model's performance and robustness. Using the packages 'mice' (van Buuren & Groothuis-Oudshoorn, 2011) and 'miceadds' (Robitzsch & Grund, 2024), we imputed the data to compare models. We were unable to adjust for the four levels of random effects in our original model due to no suitable package being available, so we adjusted for school differences to compare in a two-level imputation. We found that our coefficients were largely the same in comparison with multiple imputation, and so the model with the original data is reported.

The outcome variable, SEN identification, was represented as a binary variable (0|1) indicating whether a learner has been identified with SEN in each key stage. Fixed covariates, shown in Table 1, included sex, ethnicity (White, Asian, Black, Mixed, Other and Unknown), Welsh Index of Multiple Deprivation (WIMD) (an area-level deprivation measure divided into quintiles) (Welsh Government, 2019), birthweight (divided into six categories), gestational age (divided into four categories), season of birth, multiple births, major and minor congenital anomalies defined based on classification of European Congenital Anomalies Registries (EUROCAT, 2013; Paranjothy et al., 2018), breastfeeding (whether ever breastfed) and birth cohort. Covariates that could change in each key stage (Tables 2 and 3) included average attendance, health usage (measured by calculating the number of GP and hospital visits in each key stage) and proportion of time spent with FSM. The hierarchical structure factors in the model included the data wave and school attended nested within local authority, allowing for the consideration of temporal dependencies, school and local government-level influences.

RESULTS

The distribution of the children in the sample is shown in Table 1. The sex of the participants was equally distributed, with the ethnicity of children being largely White (92.4%). At birth, most children were in the third quintile of deprivation (28.6%), were of a typical birthweight (81.4%), born to regular term (88.1%), were breastfed (54.7%) and had no birth anomalies (97.2%). Children were equally distributed in their year and season of birth.

SEN identification over time

This section presents the proportion of learners identified with SEN in each key stage and over time. Table 4 shows the number and percentage of years learners were identified with SEN within each key stage.

TABLE 1 Fixed covariates.

Variable	Category	*n*	Valid %
Sex	Male	99,316	51.2
	Female	94,714	48.8
Ethnicity	White	179,256	92.4
	Asian	5,014	2.58
	Black	1,534	0.791
	Mixed	5,133	2.65
	Other	2,088	1.08
	Unknown	946	0.488
WIMD	1—least deprived	24,767	14.80
	2	31,138	18.60
	3	47,906	28.60
	4	41,542	24.80
	5—Most deprived	21,973	13.10
Birthweight	Normal (>2.5 kg and ≤4 kg)	147,533	81.40
	Extremely low (≤1 kg)	790	0.44
	Very low (>1 kg and ≤1.5 kg)	1,168	0.65
	Low (>1.5 kg and ≤2.5 kg)	11,041	6.09
	High (>4 kg and ≤4.5 kg)	17,450	9.63
	Very high (>4.5 kg)	3,183	1.76
Gestational age	Term (37–41 weeks)	156,437	88.10
	Extremely pre-term (≤27 weeks)	486	0.27
	Very pre-term (28–31 weeks)	1,505	0.85
	Preterm (32–36 weeks)	10,841	6.11
	Late term (42–44 weeks)	8,272	4.66
Multiple births	No	188,622	97.5
	Yes	4,767	2.5
Breastfeeding ever	No	74,488	45.3
	Yes	89,870	54.7
Birth anomalies	None	188,640	97.2
	Minor	833	0.04
	Major	4,557	2.5
Season of birth	Autumn	48,897	25.2
	Winter	46,956	24.2
	Spring	48,363	24.9
	Summer	49,820	25.7
Birth cohort	2002/3	30,556	15.7
	2003/4	31,401	16.2
	2004/5	31,985	16.5
	2005/6	32,239	16.6
	2006/7	33,151	17.1
	2008/9	34,698	17.9

TABLE 2 Longitudinal covariates by key stage.

		KS1		KS2		KS3		KS4	
		n	%	*n*	%	*n*	%	*n*	%
Health usage	None	77,951	40.2	64,596	32.5	33,269	35.7	13,397	45.0
	One or two times	55,139	28.4	54,908	27.6	24,442	26.2	7638	25.7
	Three or more times	60,940	31.4	79,127	39.8	35,441	38.0	8726	29.3

TABLE 3 Longitudinal school attendance and time with FSM by key stage.

	% school attendance		% time spent with FSM	
Key stage	Mean	Standard deviation	Mean[a]	Standard deviation[a]
KS1	93.5	5.27	20.0	37.0
KS2	94.7	4.45	19.0	35.0
KS3	94.3	6.10	17.0	35.0
KS4	93.2	8.85	13.0	34.0

[a]Exact numbers masked for data anonymisation.

TABLE 4 Number of learners with SEN in each key stage.

	No SEN		SEN	
	n	Valid %	*n*	Valid %
KS1	134,757	72.15	52,028	27.85
KS2	118,809	63.85	67,263	36.15
KS3	60,601	68.04	28,466	31.96
KS4	21,512	74.39	7,407	25.61

TABLE 5 Years with SEN for those born in 2002/3.

Years with SEN	0	1	2	3	4	5	6	7	8	9	10	11
Percent	52.09	7.54	5.66	5.09	4.81	3.59	3.8	3.83	5.2	3.89	4.3	0.2

For children born in 2002/3 ($N = 64,574$) for which we have data from all four key stages, we were able to identify patterns in SEN identification and provision over time (see Table 5). Figure 2 shows that the proportion of learners with SEN fluctuates slightly between key stages (27% in KS1, 37% in KS2, 32% in KS3 and 26% in KS4). It also shows that considerable proportions of learners (4–14%) moved in and out of the SEN category between key stages. Table 3 shows that by the time the learners were in KS4, 47.9% had been identified with SEN at some point during their education.

Predictors of SEN

This section uses multilevel modelling (Goldstein, 2010) to explore the predictors of SEN in the whole cohort. Included within the model were 153,216 learners nested within 1782

FIGURE 2 Percentage changes in SEN identification between key stages for those born in 2002/3.

schools which were in turn nested within 22 local authorities. Table 6 shows the results of a binomial multilevel model identifying the contribution of the covariates outlined in Table 1 on SEN identification over time in all four key stages.

As shown in Table 6, all covariates (except being a twin, triplet, etc.) showed a significant relationship with SEN identification. We note, however, that due to the large sample size, we have the power to detect smaller differences; from this, we place further weight on the contribution of uncertainty estimated by confidence intervals. The below discussion highlights the relationship between the variables and SEN. The results are adjusted for key confounding variables, but also for structures which contribute towards SEN identification, meaning that differences between local authorities, schools, pupils and time periods (key stages) are accounted for. This aims to ensure that the observed effects are due to the variables being studied, not influenced by unmeasured or random variations across these groups.

As expected, measures of health were strongly associated with SEN, whereby those with an extremely low birthweight, low birthweight or very low birthweight, those who were extremely pre-term, very pre-term or pre-term, and those with a minor or major birth anomaly flag were more likely to be identified with SEN. Furthermore, those who used health services more than once in each key stage were more likely to be identified with SEN than those who had not used health services. This variable is used as a proxy for overall health need.

At the individual and household level, being male was strongly associated with SEN identification, as was being White. Furthermore, those who were born in winter, spring and summer

TABLE 6 Multilevel model to predict SEN identification.

Covariate	Category	Odds ratio (OR)	Standard error	*p*-value	95% CI	
Average attendance	(continuous)	0.92	0.00	<0.01	0.92	0.92
FSM	(continuous)	1.01	0.10	<0.01	1.01	1.01
Gender	Male (ref)					
	Female	0.18	0.00	<0.01	0.17	0.18
Ethnicity	White (ref)					
	Asian	0.39	0.03	<0.01	0.34	0.46
	Black	0.55	0.08	<0.01	0.41	0.73
	Mixed	0.60	0.04	<0.01	0.52	0.68
	Other	0.52	0.07	<0.01	0.41	0.67
	Unknown	1.02	0.16	0.89	0.75	1.39
Townsend	1—least deprived (ref)					
	2	1.52	0.06	<0.01	1.41	1.64
	3	2.05	0.08	<0.01	1.91	2.21
	4	3.00	0.12	<0.01	2.78	3.25
	5—most deprived	4.60	0.21	<0.01	4.20	5.03
Health utilisation	Never (ref)					
	Once or twice	1.20	0.02	<0.01	1.16	1.24
	Three or more	1.70	0.03	<0.01	1.65	1.76
Birthweight	Normal (>2.5 kg and ≤4 kg) (ref)					
	Extremely low (≤1 kg)	2.96	0.57	<0.01	2.03	4.31
	Very low (>1 kg and ≤1.5 kg)	3.00	0.49	<0.01	2.18	4.14
	Low (>1.5 kg and ≤2.5 kg)	2.22	0.11	<0.01	2.00	2.45
	High (>4 kg and ≤4.5 kg)	0.73	0.03	<0.01	0.68	0.79
	Very high (>4.5 kg)	0.78	0.06	<0.01	0.67	0.92
Gestational age	Term (37–41 weeks) (ref)					
	Extremely pre-term (≤27 weeks)	3.32	0.85	<0.01	2.01	5.49
	Very pre-term (28–31 weeks)	1.81	0.26	<0.01	1.37	2.4
	Preterm (32–36 weeks)	1.21	0.06	<0.01	1.1	1.33
	Late term (42–44 weeks)	0.95	0.05	0.27	0.86	1.04
Multiple births	No (ref)					
	Yes	1.00	0.07	0.96	0.87	1.14
Congenital anomaly	None					
	Minor	2.58	0.38	<0.01	1.93	3.44
	Major	3.09	0.20	<0.01	2.73	3.50
Breastfeeding ever	No (ref)					
	Yes	0.56	0.01	<0.01	0.53	0.58

TABLE 6 (Continued)

Covariate	Category	Odds ratio (OR)	Standard error	*p*-value	95% CI	
Month of birth	Autumn (ref)					
	Winter	1.41	0.04	<0.01	1.33	1.49
	Spring	2.01	0.06	<0.01	1.90	2.13
	Summer	2.98	0.09	<0.01	2.82	3.16
Birth cohort	2002/3 (ref)					
	2003/4	0.90	0.03	<0.01	0.84	0.97
	2004/5	0.88	0.03	<0.01	0.82	0.94
	2005/6	0.87	0.03	<0.01	0.81	0.93
	2006/7	0.87	0.03	<0.01	0.81	0.93
	2007/8	0.85	0.03	<0.01	0.79	0.91

Random part	Variance	SD
Between-school variance within LAs	0.61	0.78
Between-LA variance	0.26	0.51
Between-pupil variance	8.20	2.87
Between-wave variance	0.09	0.30
Number of schools	1,782	
Number of LAs	22	
Number of learners	153,216	
Number of waves	4	

TABLE 7 Interclass correlation coefficients (ICCs) for model.

Group	ICC
Between-school variance within LAs	0.05
Between-LA variance	0.02
Between-pupil variance	0.66
Between-wave variance	0.01

were increasingly more likely to be identified with SEN than those born in autumn. Specifically, learners born in the summer were nearly three times more likely than those born in the autumn to be identified with SEN, and confidence intervals were narrow, suggesting strong certainty in associations. With regard to indicators of deprivation, as the deprivation score increased, so did the likelihood of being identified with SEN. This meant that those who were born in the most deprived areas were 4.6 times more likely to be identified with SEN than those in the least deprived areas, however, the uncertainty in estimates was wider in more deprived groups. Likewise, for every 1% of time spent with FSM, the odds of having SEN increased by 1%. Therefore, someone who had FSM on average 50% of the time over each key stage was 64% more likely to be identified with SEN. Someone who had FSM 100% of the time were 2.7 times more likely to be identified with SEN. If the learner had experienced breastfeeding, they were 70% less likely to be identified with SEN. School attendance also showed an association with SEN: a percentage increase in attendance decreased the odds of SEN identification by 8%.

The interclass correlation coefficients (ICCs) in Table 7 show that the amount of variation in a particular variable can be attributed to differences between groups compared to

differences within groups. If the ICC is close to 1, it means that most of the variability is between groups, indicating that the group membership has a significant impact on the variable. If the ICC is close to 0, it means that most of the variability is within groups, suggesting that individual differences within the groups are more important than the group differences (Yaremych et al., 2023). Table 7 shows that the school that the child attended within the local authority explained 5% of the variance in the model, while the local authority that the child attended only explained 2% of the variance in the model. While the fixed cohort year variable showed that those born in later cohorts were increasingly less likely to be identified with SEN than those in born in 2002/03, the wave that the child was in explained 0.07% of the variance in the model. The most variance is explained by changes within the child (65%).

DISCUSSION

The results provide a number of important insights about SEN identification in mainstream schools in Wales, which will be discussed in turn. Firstly, the results show that for those in the 2002/3 cohort, 48% were identified with SEN at some point during their education from age 4 to 16. This proportion differs widely from the 20% per year who were identified with SEN in the government statistics (StatsWales, 2023a) and the percentage per key stage identified in Table 4. The 1978 Warnock report, which provided the first comprehensive review of SEN in the United Kingdom, stated: 'we estimate that up to one child in five is likely to require special educational provision at some point during their career' (Department of Education & Science, 1978, p. 40). From looking at the yearly numbers of learners with SEN, this estimate remained a consistent and accurate predictor of the proportion of learners with SEN in Wales. However, when looking at the proportion of students who encountered the SEN designation at any stage of their educational journey, it becomes apparent that we are addressing a significantly broader population of students, which carries potentially major policy and practice ramifications. SEN—and now ALN in Wales—has traditionally been portrayed as a minority issue. However, our results (which use population-level data) indicate that almost half of all students were engaging with the SEN system. This underscores the imperative to effectively support this demographic to tackle educational achievement challenges in Wales. The fluid nature of SEN identification (Figure 2) challenges the conventional notion of static SEN identification as a specific moment in time, shedding light on the dynamic and evolving nature of students' needs over their formative years.

Conversely, this also raises the question of whether there was a potential over-identification of SEN in the previous mainstream school system, prompting an examination of the criteria and procedures used in the SEN identification process. The instability observed raises questions about the reliability and consistency of SEN identification methods, calling for a more thorough understanding of the challenges and potential systematic issues within the identification process. Research has questioned the potential negative impact of SEN identification and labelling on learner outlook and outcomes (Arishi et al., 2017; Franz et al., 2023; Knight & Crick, 2022). The issue of potential over-identification may be addressed in the new ALN system, where we are now seeing a notable drop of over 30% in the proportion of learners being identified with ALN in comparison to SEN (Senedd Research, 2023a). Most of the reduction has come from learners in the SEN provisions of School Action and School Action Plus. Specifically, by 2023 there had been a 56% decline, equivalent to 28,170 learners, among those previously on School Action, and a 46% decrease, or 15,375 learners, among those previously on School Action Plus since 2020 (Estyn, 2023). In their review on the rollout of the new ALN system, Estyn (the education and training inspectorate for Wales) suggest that in the former system: 'It was not uncommon that pupils who received short-term catch-up interventions for literacy and/or numeracy were categorised as having a general

learning difficulty and entered on the school's SEN register as school action' (Estyn, 2023, p. 18). However, they suggest that in the new system this would no longer be the case, as the category 'general learning difficulty' is no longer used and intervention support would not be considered as 'additional learning provision'. However, it is crucial to recognise that even with a reduction in the number of students identified with ALN, a significant proportion of learners may still require accommodations to support their educational needs. While it is important to address the process of ALN identification in the new system, it is also vital to consider how the support that is generally available to *all* learners is enhanced to support this larger group.

In addition to the proportion of learners with identified SEN, the findings also reveal a clustering of SEN within specific demographic groups. Notably, when accounting for birth anomalies and individual utilisation of health services, environmental variables such as FSM, levels of deprivation, experiencing breastfeeding, school attendance and season of birth emerge as influential factors shaping the identification of individuals with SEN. This underscores the nuanced interplay of socioeconomic and environmental elements in determining SEN status. The over-representation of SEN learners from more disadvantaged socioeconomic groups mirrors similar findings elsewhere in the United Kingdom (Hutchinson et al., 2021). This indicates that the assertions made by Tomlinson (2012) and Gillborn (2015), regarding the middle-class driving demand within the SEN industry, appear unsupported within the studied population encompassing those identified with SEN overall. Nonetheless, questions remain regarding whether this trend varies across different diagnoses and labels, as found by Parsons and Platt (2013). This finding raises questions about whether there is a biological basis for the higher levels of SEN identification among those with lower socioeconomic status. It also prompts consideration of whether disproportionality may arise from factors such as teachers' low expectations and the failure of schools to provide an inclusive education system for these learners (Artiles et al., 2006; Coutinho & Oswald, 2000; Skiba et al., 2008; Waitoller et al., 2010). Additionally, those who have additional learning needs may become more visible, or the needs become more impairing, due to their socioeconomic environment. Further mixed-methods research is needed to fully understand the direction of these relationships.

In addition to socioeconomic factors, as found elsewhere in the United Kingdom (Lereya et al., 2023), school attendance emerged as a highly influential predictor of SEN. While attendance and levels of deprivation have been found to be correlated (Ready, 2010), attendance remains a significant predictor of SEN when measures of deprivation are controlled for in the model. What remains unknown is whether SEN is identified in learners with lower attendance as a result of less instruction, or whether learners with SEN are less likely to attend due to an impact of their learning need. Furthermore, recent statistics from Wales have shown that learners with SEN have a higher likelihood of being excluded than learners without SEN (StatsWales, 2023d). This may offer a reason for lower attendance of those with SEN in this data. Unfortunately, due to data provisioning we were unable to include school exclusion data within this model. However, exploring the direction of the relationships between SEN, attendance and exclusions offers a fruitful area for follow-up research.

In addition, those who had experienced breastfeeding were less likely to be identified with SEN. Given that previous research has used breastfeeding as a proxy for parenting style, and that breastfeeding was significant in the model when controlling for levels of deprivation, it underscores the need for a nuanced exploration of the interplay between early caregiving practices and socioeconomic factors in influencing child development. This is particularly important when considering that when socioeconomic status (SES) is taken into account, breastfeeding emerges as a predictor of subsequent educational outcomes (Pereyra-Elías et al., 2023). Nonetheless, as shown in prior research, this association likely arises from a multifaceted interplay between biological and environmental factors. Expanding our

understanding of this interplay can provide valuable insights into the complexities underlying SEN identification and intervention strategies.

Season of birth was also a significant predictor of a learner having SEN, with those who were younger in the academic year (i.e., born in spring or summer) being significantly more likely to have SEN than those who were older in the academic year (i.e., born in autumn or winter). The observed pattern in this result aligns with findings from other research studies investigating SEN. Research by Anders et al. (2011), Zoëga et al. (2012) and Crawford et al. (2013) has similarly identified a correlation between being younger in the academic year and an increased likelihood of having SEN. One plausible explanation for the higher likelihood of SEN identification among younger individuals in the academic year is rooted in social and academic expectations. It is conceivable that being younger may lead to developmental differences that manifest as underperformance when compared to older peers. This underperformance might then trigger a closer scrutiny of the individual's learning abilities, potentially prompting educators and professionals to seek SEN identification as a means of providing additional support (Squires et al., 2012).

The multilevel model also offers information about the impact of the data being clustered within schools and, in turn, within local authorities. The results from this data differ from similar research in England (Hutchinson et al., 2021), which showed a large impact of school on the variance in SEN identification. Within the Welsh data, the school attended accounted for 5% of the variance in the data and the local authority only 2%. This suggests some consistency in how Welsh schools were identifying SEN within the previous system. The most variance was explained between individuals. It will be beneficial to examine this pattern as the new ALN system is implemented, in order to provide insights into potential continuities or changes in the identification process between and within schools.

In a broader context, this result underscores the importance of considering social determinants in education. It prompts discussions on equity and fairness within educational systems, urging stakeholders to critically examine how different factors—beyond individual health—contribute to the identification and support of students with SEN. In Wales, this also raises important questions about the emerging implementation of the new ALN system (Knight & Crick, 2022; Knight et al., 2023b), especially taking into consideration the ongoing major education system-level reforms (Evans, 2022), as well as the longer-term impact on education in Wales from the COVID-19 pandemic (Knight et al., 2022; Thomas et al., 2023). From this research it becomes evident that addressing SEN/ALN should not fall solely within the remit of SEN/ALN teams. Enhancing outcomes for this group of learners requires a comprehensive and cross-departmental approach, which also includes examination of poverty, equity and subsequent access to resources and support services.

Taken together, the findings of this research bring to light concerns regarding the former SEN identification processes in mainstream schools in Wales, especially as it transitions to the new ALN regime alongside wider education system-level reforms. It seems evident from the data that there was social patterning of SEN identification, and potentially a tendency towards identifying SEN, due to individual differences among learners (e.g., age, attendance or socioeconomic status) being conflated with SEN. Therefore, the results shed light on the importance of a move towards a more inclusive education system, where the reliance on identifying individual needs is replaced with an emphasis on creating a learning environment that can support all learners to reach their full potential. Encouraging a shift towards a more inclusive and nuanced approach to education would involve acknowledging the diverse learning styles and developmental trajectories of students, fostering an environment where adjustments are made not as exceptions due to SEN, but as inherent components of everyday teaching practices (Cerna et al., 2021; Florian & Spratt, 2013; Graham, 2019).

LIMITATIONS

Despite the population-level data used for this analysis, we acknowledge a number of limitations within the research which are important to consider when interpreting the results. Firstly, due to the impact of COVID-19 on data collection, we only had full education history for those born in 2002/3. Therefore, it is not possible to know whether a similar proportion of learners would have been identified in later cohorts; however, our models adjusted for this unbalanced nature. Furthermore, while the data can reveal patterns and trends, it is challenging to determine the directions of these relationships. Identifying whether one factor directly influences SEN identification or if the observed relationships are due to underlying unmeasured variables requires more in-depth, multi-method analysis. Thus, while we can explore possible reasons for the relationships found, we cannot conclude why these patterns exist within the data. Furthermore, the data presented excludes learners who attended special schools. This is due to inconsistencies in the way that data is recorded for this group of learners, which meant that it was not possible to include them within the dataset (e.g., grouping was not done consistently in key stages or academic years). Separate analysis should be carried out for this group of learners to understand if similar trends are observed in those who attend special school. Finally, some data was missing and a small number of the cohort had to be excluded due to inconsistencies in the data. We were able to conclude that the missing data was likely missing at random and therefore, it was appropriate to use imputation to handle the missing values without introducing significant bias into our analysis.

CONCLUSION

The insights from this study offer a multifaceted understanding of SEN identification in mainstream schools in Wales under the former SEN system, providing insight into both its complexities and implications. Firstly, the findings underscore a notable prevalence of SEN identification among learners, with nearly half experiencing the designation at some point during their educational journey. This challenges conventional perceptions of SEN as a minority issue. The observed clustering of SEN within specific demographic groups, particularly among those from more disadvantaged socioeconomic backgrounds, underscores the intricate interplay of social determinants in shaping educational outcomes. Under the new ALN system in Wales, the definition of ALN/SEN remains unchanged yet there is currently a reduction in the number of those being identified with SEN. Therefore, whether the new system will lead to changes in this area is unclear, as well as to what extent the financial and budgetary constraints of schools and local authorities will have an impact (Estyn, 2023).

As Wales continues its implementation of the new ALN system, it is imperative to adopt a comprehensive, cross-departmental and inclusive multi-disciplinary approach that goes beyond traditional notions of SEN support. This involves addressing broader issues of poverty, equity and access to resources, while fostering an inclusive education environment where adjustments are made as inherent components of everyday teaching practices. In essence, the findings underscore the necessity of moving towards a more inclusive education system that prioritises individualised support, regardless of identified need, and therefore accommodates the diverse needs of all learners. By embracing this paradigm shift, policymakers and educators can strive towards creating an environment where every student has the opportunity to thrive, irrespective of their background or identified learning needs.

Finally, the research highlights several areas that warrant further investigation in future studies. Firstly, this research should be repeated following the full implementation of the new ALN system in Wales (from September 2021 to August 2025) to better understand its impact on ALN identification. In addition, the research should be replicated across all the

four nations of the United Kingdom—as well as other comparable jurisdictions embarking on major education reform journeys—in order to see how differing policy initiatives impact the trends seen, as well as providing the foundation for future national-level comparability (Knight, Conn, Crick & Brooks, 2023a). Qualitative research should also be conducted to further understand and explain the patterns observed within the data. In particular, qualitative research can provide a more thorough understanding of the challenges and potential systematic issues with identification of SEN, as well as shedding further light on the direction of the relationships found.

ACKNOWLEDGEMENTS

This study makes use of anonymised data held in the Secure Anonymised Information Linkage (SAIL) Databank. This work uses data provided by patients and collected by the NHS as part of their care and support. We would also like to acknowledge all data providers who make anonymised data available for research.

FUNDING INFORMATION

The Nuffield Foundation is an independent charitable trust with a mission to advance social wellbeing. It funds research that informs social policy, primarily in Education, Welfare and Justice. The Nuffield Foundation is the founder and co-funder of the Nuffield Council on Bioethics, the Ada Lovelace Institute and the Nuffield Family Justice Observatory. The Nuffield Foundation has funded this project, but the views expressed are those of the research team and not necessarily the Foundation. Grant Number: FR-000023790.

CONFLICT OF INTEREST STATEMENT

The authors declare that there is no conflict of interest.

DATA AVAILABILITY STATEMENT

The data used in this study is available in the SAIL Databank at Swansea University, Swansea, UK, but as restrictions apply it is not publicly available. All proposals to use SAIL data are subject to review by an independent Information Governance Review Panel (IGRP). SAIL has established an application process to be followed by anyone who would like to access data via SAIL at https://www.saildatabank.com/application-process.

ORCID

Emily Lowthian https://orcid.org/0000-0001-9362-0046
Tom Crick https://orcid.org/0000-0001-5196-9389
Carys Jones https://orcid.org/0009-0000-0549-3578
Anna Rawlings https://orcid.org/0000-0003-3929-474X
Hoda Abbasizanjani https://orcid.org/0000-0002-9575-4758
Sarah Rees https://orcid.org/0000-0002-1939-0120

TWITTER

Cathryn Knight Cathryn_Knight

REFERENCES

Alterman, N., Johnson, S., Carson, C., Petrou, S., Rivero-Arias, O., Kurinczuk, J. J., et al. (2021). Gestational age at birth and child special educational needs: A UK representative birth cohort study. *Archives of Disease in Childhood*, *106*(9), 842–848. https://doi.org/10.1136/archdischild-2020-320213

Anders, Y., Sammons, P., Taggart, B., Sylva, K., Melhuish, E., & Siraj-Blatchford, I. (2011). The influence of child, family, home factors and pre-school education on the identification of special educational needs at age 10. *British Educational Research Journal*, *37*(3), 421–441. https://doi.org/10.1080/01411921003725338

Arishi, A., Boyle, C., & Lauchlan, F. (2017). Inclusive education and the politics of difference: Considering the effectiveness of labelling in special education. *British Psychological Society*, *34*, 9–19. https://ore.exeter.ac.uk/repository/handle/10871/29377.

Artiles, A. J., Klingner, J. K., & Tate, W. F. (2006). Representation of minority students in special education: Complicating traditional explanations: Editors' introduction. *Educational Researcher*, *35*(6), 3–5. https://doi.org/10.3102/0013189X035006003

Azpitarte, F., & Holt, L. (2024). Failing children with Special Educational Needs and Disabilities in England: New evidence of poor outcomes and a postcode lottery at the Local Authority level at Key Stage 1. *British Educational Research Journal*, *50*(1), 414–437. https://doi.org/10.1002/berj.3930

Bearman, P. S. (2013). Genes can point to environments that matter to advance public health. *American Journal of Public Health*, *103*(S1), S11–S13. https://doi.org/10.2105/ajph.2013.301550

Blackburn, C. M., Spencer, N. J., & Read, J. M. (2010). Prevalence of childhood disability and the characteristics and circumstances of disabled children in the UK: Secondary analysis of the family resources survey. *BMC Pediatrics*, *10*(1), 21. https://doi.org/10.1186/1471-2431-10-21

Bolker, B. (2024). *Getting started with the glmmTMB package*. https://cran.r-project.org/web/packages/glmmTMB/vignettes/glmmTMB.pdf.

Brown, L. J. (2019). *Understanding socioeconomic disparities in breastfeeding in the UK: Exploring the role of environmental quality*. PhD thesis, London School of Hygiene & Tropical Medicine. https://doi.org/10.17037/PUBS.04656020

Brown, L. J., & Sear, R. (2017). Local environmental quality positively predicts breastfeeding in the UK's Millennium Cohort Study. *Evolution, Medicine, and Public Health*, *2017*(1), 120–135. https://doi.org/10.1093/emph/eox011

Bruner, C., Discher, A., & Chang, H. (2011). *Chronic elementary absenteeism: A problem hidden in plain sight*. https://www.attendanceworks.org/wp-content/uploads/2017/04/Chronic-Elementary-Absenteeism-A-Problem-Hidden-in-Plain-Sight.pdf.

Campbell, T. (2014). Stratified at seven: In-class ability grouping and the relative age effect. *British Educational Research Journal*, *40*(5), 749–771. https://doi.org/10.1002/berj.3127

Cerna, L., Mezzanotte, C., Rutigliano, A., Brussino, O., Santiago, P., Borgonovi, F., & Guthrie, C. (2021). *Promoting inclusive education for diverse societies: A conceptual framework*. OECD Education Working Paper 260 https://doi.org/10.1787/94ab68c6-en

Chen, R., Tedroff, K., Villamor, E., Lu, D., & Cnattingius, S. (2020). Risk of intellectual disability in children born appropriate-for-gestational-age at term or post-term: Impact of birth weight for gestational age and gestational age. *European Journal of Epidemiology*, *35*(3), 273–282. https://doi.org/10.1007/s10654-019-00590-7

Coutinho, M. J., & Oswald, D. P. (2000). Disproportionate representation in special education: A synthesis and recommendations. *Journal of Child and Family Studies*, *9*(2), 135–156. https://doi.org/10.1023/a:1009462820157

Crawford, C., Dearden, L., & Greaves, E. (2013). *The impact of age within academic year on adult outcomes*. IFS Working Paper W13/07 https://doi.org/10.1920/wp.ifs.2013.1307

Currie, J., & Moretti, E. (2007). Biology as destiny? Short- and long-run determinants of intergenerational transmission of birth weight. *Journal of Labor Economics*, *25*(2), 231–264. https://doi.org/10.1086/511377

Department for Education & Department of Health and Social Care. (2015). *SEND code of practice: 0 to 25 years*. https://www.gov.uk/government/publications/send-code-of-practice-0-to-25.

Department of Education & Science. (1978). *Special Educational Needs: Report of the Committee of Enquiry into the Education of Handicapped Children and Young People*. Her Majesty's Stationery Office.

Estyn. (2023). *The new Additional Learning Needs system*. https://www.estyn.gov.wales/thematic-report/new-additional-learning-needs-system.

EUROCAT. (2013). *EUROCAT guide 1.4: Instruction for the registration of congenital anomalies*. https://eu-rd-platform.jrc.ec.europa.eu/system/files/public/JRC-EUROCAT-Full-Guide-1.4-version-07-Oct-2021.pdf.

Evans, G. (2022). Back to the future? Reflections on three phases of education policy reform in Wales and their implications for teachers. *Journal of Educational Change*, *23*, 371–396. https://doi.org/10.1007/s10833-021-09422-6

Flacking, R., Nyqvist, K. H., & Ewald, U. (2007). Effects of socioeconomic status on breastfeeding duration in mothers of preterm and term infants. *European Journal of Public Health*, *17*(6), 579–584. https://doi.org/10.1093/eurpub/ckm019

Florian, L., & Spratt, J. (2013). Enacting inclusion: A framework for interrogating inclusive practice. *European Journal of Special Needs Education*, *28*(2), 119–135. https://doi.org/10.1080/08856257.2013.778111

Franz, D. J., Richter, T., Lenhard, W., Marx, P., Stein, R., & Ratz, C. (2023). The influence of diagnostic labels on the evaluation of students: A multilevel meta-analysis. *Educational Psychology Review*, *35*(1),1-41. https://doi.org/10.1007/s10648-023-09716-6

Gibbs, B. G., Forste, R., & Lybbert, E. (2018). Breastfeeding, parenting, and infant attachment behaviors. *Maternal and Child Health Journal*, *22*(4), 579–588. https://doi.org/10.1007/s10995-018-2427-z

Gillborn, D. (2015). Intersectionality, critical race theory, and the primacy of racism: Race, class, gender, and disability in education. *Qualitative Inquiry*, *21*(3), 277–287. https://doi.org/10.1177/1077800414557827
Goldstein, H. (2010). *Multilevel statistical models* (4th ed.). Wiley.
Gore, N., Emerson, E., & Brady, S. (2015). Rates of breastfeeding and exposure to socio-economic adversity amongst children with intellectual disability. *Research in Developmental Disabilities*, *39*, 12–19. https://doi.org/10.1016/j.ridd.2014.12.028
Gottfried, M. A. (2011). The detrimental effects of missing school: Evidence from urban siblings. *American Journal of Education*, *117*(2), 147–182. https://doi.org/10.1086/657886
Gottfried, M. A. (2014). Chronic absenteeism and its effects on students' academic and socioemotional outcomes. *Journal of Education for Students Placed at Risk (JESPAR)*, *19*(2), 53–75. https://doi.org/10.1080/10824669.2014.962696
Graham, L. J. (2019). *Inclusive education in the 21st century*. Routledge.
Hamilton, L. G. (2024). Emotionally based school avoidance in the aftermath of the COVID-19 pandemic: Neurodiversity, agency and belonging in school. *Educational Sciences*, *14*(2), 156. https://doi.org/10.3390/educsci14020156
Harris, A., Jones, M., & Crick, T. (2020). Curriculum leadership: A critical contributor to school and system improvement. *School Leadership & Management*, *40*(1), 1–4. https://doi.org/10.1080/13632434.2020.1704470
Heck, K. E., Braveman, P., Cubbin, C., Chávez, G. F., & Kiely, J. L. (2006). Socioeconomic status and breastfeeding initiation among California mothers. *Public Health Reports*, *121*(1), 51–59. https://doi.org/10.1177/003335490612100111
Hibel, J., Farkas, G., & Morgan, P. L. (2010). Who is placed into special education? *Sociology of Education*, *83*(4), 312–332. https://doi.org/10.1177/0038040710383518
Horta, B. L., Loret De Mola, C., & Victora, C. G. (2015). Breastfeeding and intelligence: A systematic review and meta-analysis. *Acta Paediatrica*, *104*(S467), 14–19. https://doi.org/10.1111/apa.13139
Hutchinson, J., Timimi, S., & McKay, N. (2021). Trends in SEN identification: Contexts, causes and consequences. *Journal of Research in Special Educational Needs*, *21*(1), 19–38. https://doi.org/10.1111/1471-3802.12496
Institute for Fiscal Studies. (2023). *Major challenges for education in Wales*. https://ifs.org.uk/sites/default/files/2024-03/Major-challenges-for-education-in-Wales-IFS-REPORT_0.pdf.
Ismail, M. F., Ishak, I., Che Din, N., Husin Lubis, S., Mohd Saat, N. Z., & Isa, S. N. I. (2017). The association of parent education and family monthly income on Intelligence Quotient (IQ) among students with special needs in Kelantan, Malaysia. *Journal Sains Kesihatan Malaysia*, *15*(1), 105–112. https://doi.org/10.17576/jskm-2017-1501-13
Jacobson, S. W., Carter, R. C., & Jacobson, J. L. (2014). Breastfeeding as a Proxy for Benefits of Parenting Skills for Later Reading Readiness and Cognitive Competence. *The Journal of Pediatrics*, *164*(3), 440–442. https://doi.org/10.1016/j.jpeds.2013.11.041
Jones, K. H., Ford, D. V., Thompson, S., & Lyons, R. (2020). A profile of the SAIL Databank on the UK secure research platform. *International Journal of Population Data Science*, *4*(2), 1-12. https://doi.org/10.23889/ijpds.v4i2.1134
King, M. D., & Bearman, P. S. (2011). Socioeconomic status and the increased prevalence of autism in California. *American Sociological Review*, *76*(2), 320–346. https://doi.org/10.1177/0003122411399389
Klein, M., Sosu, E. M., & Dare, S. (2022). School absenteeism and academic achievement: Does the reason for absence matter? *AERA Open*, *8*, 233285842110711. https://doi.org/10.1177/23328584211071115
Knight, C., Clegg, Z., Conn, C., Hutt, M., & Crick, T. (2022). Aspiring to include versus implicit 'othering': teachers' perceptions of inclusive education in Wales. *British Journal of Special Education*, *49*(1), 6–23. https://doi.org/10.1111/1467-8578.12394
Knight, C., Conn, C., Crick, T., & Brooks, S. (2023a). Divergences in the framing of inclusive education across the UK: A four nations critical policy analysis. *Educational Review*. 1-17 https://doi.org/10.1080/00131911.2023.2222235
Knight, C., & Crick, T. (2021). The assignment and distribution of the dyslexia label: Using the UK Millennium Cohort Study to investigate the socio-demographic predictors of the dyslexia label in England and Wales. *PLoS One*, *16*(8), e0256114. https://doi.org/10.1371/journal.pone.0256114
Knight, C., & Crick, T. (2022). Inclusive education in Wales: Interpreting discourses of values and practice using critical policy analysis. *ECNU Review of Education*, *5*(2), 258–283. https://doi.org/10.1177/2096531121039858
Knight, C., Tyrie, J., Crick, T., & Borras Batalla, M. (2023b). A Delphi study to identify strategies to mitigate the adverse impact of COVID-19 on children under the age of five in Wales. *Wales Journal of Education*, *25*(2), 8-35. https://doi.org/10.16922/wje.25.2.2
Kouroupa, A., Allard, A., Gray, K., Hastings, R. P., Heyne, D., Melvin, G. A., et al. (2023). The association between home learning during COVID-19 lockdowns and subsequent school attendance among children with

neurodevelopmental conditions. *Child: Care, Health and Development*, *49*(5), 846–851. https://doi.org/10.1111/cch.13113

Leckie, G., Pillinger, R., Jones, K., & Goldstein, H. (2012). Multilevel modeling of social segregation. *Journal of Educational and Behavioral Statistics*, *37*(1), 3–30. https://doi.org/10.3102/1076998610394367

Lereya, T. S., Cattan, S., Yoon, Y., Gilbert, R., & Deighton, J. (2023). How does the association between special education need and absence vary overtime and across special education need types? *European Journal of Special Needs Education*, *38*(2), 245–259. https://doi.org/10.1080/08856257.2022.2059631

Liu, K., King, M., & Bearman, P. (2010). Social influence and the autism epidemic. *American Journal of Sociology*, *115*(5), 1387–1434. https://doi.org/10.1086/651448

Lowthian, E., Abbasizanjani, H., Bedston, S., Akbari, A., Cowley, L., Fry, R., et al. (2023). Trends in SARS-CoV-2 infection and vaccination in school staff, students and their household members from 2020 to 2022 in Wales, UK: An electronic cohort study. *Journal of the Royal Society of Medicine*, *116*(12), 413–424. https://doi.org/10.1177/01410768231181268

Lygnegård, F., Donohue, D., Bornman, J., Granlund, M., & Huus, K. (2013). A systematic review of generic and special needs of children with disabilities living in poverty settings in low- and middle-income countries. *Journal of Policy Practice*, *12*(4), 296–315. https://doi.org/10.1080/15588742.2013.827141

Mackay, D. F., Smith, G. C. S., Dobbie, R., & Pell, J. P. (2010). Gestational age at delivery and special educational need: Retrospective cohort study of 407,503 schoolchildren. *PLoS Medicine*, *7*(6), e1000289. https://doi.org/10.1371/journal.pmed.1000289

O'Connor, C., & Fernandez, S. D. (2006). Race, class, and disproportionality: Reevaluating the relationship between poverty and special education placement. *Educational Researcher*, *35*(6), 6–11. https://doi.org/10.3102/0013189X035006006

OECD. (2018). *Developing schools and learning organisations in Wales*. OECD. https://doi.org/10.1787/9789264307193-en

OECD. (2023). *PISA 2022 results (Volume I): The state of learning and equity in education*. OECD. https://doi.org/10.1787/53f23881-en

O'Hagan, S., Bond, C., & Hebron, J. (2022). Autistic girls and emotionally based school avoidance: Supportive factors for successful re-engagement in mainstream high school. *International Journal of Inclusive Education*, *28*, 1919–1935. https://doi.org/10.1080/13603116.2022.2049378

Paranjothy, S., Evans, A., Bandyopadhyay, A., Fone, D., Schofield, B., John, A., et al. (2018). Risk of emergency hospital admission in children associated with mental disorders and alcohol misuse in the household: An electronic birth cohort study. *The Lancet Public Health*, *3*(6), e279–e288. https://doi.org/10.1016/s2468-2667(18)30069-0

Parentkind (2023). *Understanding pupil absence in schools in Wales: A report by Parentkind for the Welsh Government*. Welsh Governement. https://www.parentkind.org.uk/assets/resources/20230706-WG-attendance-report-final.pdf.

Parsons, S., & Platt, L. (2013). *Disability among young children: Prevalence, heterogeneity and socio-economic disadvantage*. Centre for Longitudinal Studies, Institute of Education, University of London. https://discovery.ucl.ac.uk/id/eprint/10134253/.

Peregrino, A. B., Watt, R. G., Heilmann, A., & Jivraj, S. (2018). Breastfeeding practices in the United Kingdom: Is the neighbourhood context important? *Maternal & Child Nutrition*, *14*(4), e12626. https://doi.org/10.1111/mcn.12626

Pereyra-Elías, R., Carson, C., & Quigley, M. A. (2023). Association between breastfeeding duration and educational achievement in England: results from the Millennium Cohort Study. *Archives of Disease in Childhood*, *108*(8), 665-672. https://doi.org/10.1136/archdischild-2022-325148

R Core Team. (2021). *R: A language and environment for statistical computing*. R Foundation for Statistical Computing. https://www.R-project.org/.

Ready, D. D. (2010). Socioeconomic disadvantage, school attendance, and early cognitive development: The differential effects of school exposure. *Sociology of Education*, *83*(4), 271–286. https://doi.org/10.1177/0038040710383520

Reay, D. (2005). Doing the dirty work of social class? Mothers' work in support of their children's schooling. *The Sociological Review*, *53*(2), 104–115. https://doi.org/10.1111/j.1467-954X.2005.00575.x

Robitzsch, A., & Grund, S. (2024). *Miceadds: Some additional multiple imputation functions, especially for 'mice'*. R Package Version 3.17–44. https://CRAN.R-project.org/package=miceadds.

Schendel, D., & Bhasin, T. K. (2008). Birth weight and gestational age characteristics of children with autism, including a comparison with other developmental disabilities. *Pediatrics*, *121*(6), 1155–1164. https://doi.org/10.1542/peds.2007-1049

Senedd Research. (2022). *Identifying Additional Learning Needs: Has the bar been raised or was it previously too low?* https://research.senedd.wales/research-articles/identifying-additional-learning-needs-has-the-bar-been-raised-or-was-it-previously-too-low/.

Senedd Research. (2023a). *How did Wales perform in PISA 2022?* https://research.senedd.wales/research-articles/how-did-wales-perform-in-pisa-2022/.
Sibieta, L. (2024). *Major challenges for education in Wales*. https://ifs.org.uk/publications/major-challenges-education-wales
Skiba, R. J., Simmons, A. B., Ritter, S., Gibb, A. C., Rausch, M. K., Cuadrado, J., & Chung, C. G. (2008). Achieving equity in special education: History, status, and current challenges. *Exceptional Children*, *74*(3), 264–288. https://doi.org/10.1177/001440290807400301
Sprick, J. T., Bouck, E. C., Berg, T. R., & Coughlin, C. (2020). Attendance and specific learning disability identification: A survey of practicing school psychologists. *Learning Disabilities Research & Practice*, *35*(3), 139–149. https://doi.org/10.1111/ldrp.12229
Squires, G., Humphrey, N., Barlow, A., & Wigelsworth, M. (2012). The identification of special educational needs and the month of birth: Differential effects of category of need and level of assessment. *European Journal of Special Needs Education*, *27*(4), 469–481. https://doi.org/10.1080/08856257.2012.711961
StataCorp. (2023). *Stata statistical software: Release 18*. StataCorp LLC.
StatsWales. (2023a). *Additional learning and special educational needs*. https://statswales.gov.wales/Catalogue/Education-and-Skills/Schools-and-Teachers/Schools-Census/Pupil-Level-Annual-School-Census/Special-Educational-Needs.
StatsWales. (2023b). *Poverty*. https://statswales.gov.wales/Catalogue/Community-Safety-and-Social-Inclusion/Poverty.
StatsWales. (2023c). *Education and skills—examinations and assessments*. https://statswales.gov.wales/Catalogue/Education-and-Skills/Schools-and-Teachers/Examinations-and-Assessments.
StatsWales. (2023d). *Exclusions from maintained schools: September 2021 to August 2022*. https://www.gov.wales/exclusions-maintained-schools-september-2021-august-2022-html.
Thomas, E., Crick, T., & Beauchamp, G. (2023). Envisioning the post-COVID "new normal" for education in Wales. *Wales Journal of Education*, *25*(2),1-7. https://doi.org/10.16922/wje.25.2.1
Tomlinson, S. (2012). The irresistible rise of the SEN industry. *Oxford Review of Education*, *38*(3), 267–286. https://doi.org/10.1080/03054985.2012.692055
van Buuren, S., & Groothuis-Oudshoorn, K. (2011). Mice: Multivariate imputation by chained equations in R. *Journal of Statistical Software*, *45*(3), 1–67. https://doi.org/10.18637/jss.v045.i03
Waitoller, F. R., Artiles, A. J., & Cheney, D. A. (2010). The miner's canary: A review of overrepresentation research and explanations. *The Journal of Special Education*, *44*(1), 29–49. https://doi.org/10.1177/0022466908329226
Welsh Government. (2018). *Additional Learning Needs and Education Tribunal (Wales) Act*. https://www.legislation.gov.uk/anaw/2018/2/contents/enacted.
Welsh Government. (2019). *Welsh Index of Multiple Deprivation (full index update with ranks): 2019*. https://www.gov.wales/welsh-index-multiple-deprivation-full-index-update-ranks-2019.
Welsh Government. (2021a). *Well-being statement*. https://www.gov.wales/sites/default/files/publications/2021-06/programme-for-government-2021-to-2026-well-being-statement.pdf.
Welsh Government. (2021b). *The Additional Learning Needs code for Wales 2021*. https://www.gov.wales/sites/default/files/publications/2024-04/220622-the-additional-learning-needs-code-for-wales-2021%20%282%29.pdf.
Welsh Government. (2023). *Our national mission: High standards and aspirations for all*. https://www.gov.wales/sites/default/files/pdf-versions/2023/3/2/1679399634/our-national-mission-high-standards-and-aspirations-all.pdf.
Yaremych, H. E., Preacher, K. J., & Hedeker, D. (2023). Centering categorical predictors in multilevel models: Best practices and interpretation. *Psychological Methods*, *28*(3), 613–630. https://doi.org/10.1037/met0000434
Zoëga, H., Valdimarsdóttir, U. A., & Hernández-Díaz, S. (2012). Age, academic performance, and stimulant prescribing for ADHD: A nationwide cohort study. *Pediatrics*, *130*(6), 1012–1018. https://doi.org/10.1542/peds.2012-0689

How to cite this article: Knight, C., Lowthian, E., Crick, T., Jones, C., Rawlings, A., Abbasizanjani, H. & Rees, S. (2024). Sociodemographic trends in special educational needs identification in Wales. *British Educational Research Journal*, *00*, 1–22. https://doi.org/10.1002/berj.4083