Risk of school exclusion among adolescents receiving social care or special educational needs services: A whole-population administrative data cohort study

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ABSTRACT

Background: Exclusion from school is associated with health, well-being and social detriments and disproportionately affects vulnerable children. No study in England has examined the total cumulative risk of exclusion across secondary school among children with a history of children's social care (CSC) or special educational needs (SEN).
Objective: To assess the risk of any secondary school exclusion among adolescents receiving CSC or SEN services compared with their peers.
Methods: An administrative data cohort study comparing children in English state schools (n = 1,031,500) with no history of CSC or SEN provision with children who had received different levels of CSC and SEN in combination. Outcomes were proportions of students with any fixed-term or permanent exclusion in years 7 to 9 (age 11 to 14) and years 10 to 11 (age 14 to 16).
Results: Overall, 13 % of children were excluded at least once across years 7 to 11. CSC exposure was associated with exclusion risk: 32 % of children in need (or formerly in need) and 40 % of current or former children looked after and those subject to child protection plans were excluded at least once across years 7 to 11, compared to 12 % of the non-exposed group. After adjusting for confounders, children with SEN history were more at risk of exclusion, regardless of CSC exposure category (except for exclusions among children looked after during years 10 to 11). Rates of exclusion varied significantly between local authorities.
Conclusions: Large inequalities in school exclusion rates between CSC-exposed and unexposed children were observed, with even higher rates observed for children with SEN history. These inequalities undermine the right to education of these vulnerable groups of children.

1. Introduction

1.1. Exclusion from school of vulnerable groups

Children exposed to adversity and who receive children's social care (CSC) are known to be at heightened risk of school exclusion both in the UK (Department for Education (UK), 2019; Jay & Mc Grath-Lone, 2019; O'Higgins et al., 2015; Sinclair et al., 2019) and internationally (Scherr, 2007). There are recognised links between adversity in childhood and mental and physical health across the

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life course (Bright et al., 2016; Nelson et al., 2020; Winter et al., 2022). Childhood adversity may lead to a toxic stress response and behavioural, emotional, psychiatric, neurobiological and physical consequences (Afifi et al., 2020; Danese et al., 2020; Nelson et al., 2020). The emotional, behavioural and psychological effects of adversity may in particular be relevant in school exclusion as adversity may lead to internalizing and exernalizing problems and behaviours such as risk taking, aggression, involvement in violence and difficulties relating to others which increase the risk of behaviours that lead to exclusion (Afifi et al., 2020; Danese et al., 2020; Nelson et al., 2020). Furthermore, exclusion from school may exacerbate existing problems through effects on mental health and factors such as social isolation and stigmatization and disengagement from school (Daniels & Cole, 2010; Ford et al., 2018). While CSC services, including foster care, are designed to prevent or mitigate these harms, the consequences of such early life adversity may be profound and long-lasting despite CSC intervention, thus resulting in higher rates of school exclusion among these groups.

Research has also found associations between adverse childhood experiences including child maltreatment, and receipt of special educational needs (SEN) provision at school (Elklit et al., 2016; Evans et al., 2020; Jonson-Reid et al., 2004). For example, in a large Welsh analysis of administrative data from over 100,000 children, Evans et al. (2020) found that children experiencing adversity were more likely to receive SEN provision at ages 6 to 7 years (Evans et al., 2020). This was observed across a range of adversities including familial mental ill-health or alcohol problems, financial deprivation, being in a single parent household, lower maternal age and maternal smoking at birth. The risk of exclusion is also higher for children with SEN compared with peers without SEN (Department for Education (UK), 2021b), which may reflect this background adversity. The strong association between adversity, CSC provision and SEN is also reflected in the high proportion of children who receive CSC services who also receive SEN provision (e.g., in a study conducted in England, approximately 80 % of children who were looked after in state care across their school career received SEN provision at some point (Jay & Gilbert, 2021)).

How schools respond to children with a history of adversity, including those who need CSC services and SEN provision may influence the extent to which these groups of children are able to engage and remain in education (Bonell et al., 2013; Bonell et al., 2019; Nelson et al., 2020). In some contexts, schools take a therapeutic approach to the additional needs of these children. This is the approach taken at a national level in Scotland where permanent exclusions (expulsions) from school have reduced almost to zero (Scottish Government, 2022). By contrast, school contexts that are rigid and do not account for the particular contexts of vulnerable children may in fact harm and lead to further exclusionary practice.

Action is needed to counter exclusionary practices and eradicate inequalities in exclusion rates between different groups of children (Nelson et al., 2020). Local authorities in England are now responsible for both CSC services and a range of public health functions as a result of changes brought about by the Health and Social Care Act 2012 (Heath, 2014). Additionally, the Children and Families Act 2014 reformed the SEN system with greater emphasis on collaboration between education, health and social care (Department for Education & Department of Health (UK), 2015). However, marked variation in exclusion rates across England highlights the great potential for reforming policy to remove barriers and ensure that all children can fully participate in education (Department for Education (UK), 2021b). Differences in exclusion rates are particularly striking between England and Scotland: in the latter, just three children (of 700,000 enrolled students) were permanently excluded in 2018/19 (Scottish Government, 2022), compared to 7894 of 8 million enrolled students (0.1 %) in England (Department for Education (UK), 2021a). Such variation suggests that local and national policy contexts influence exclusion practices and can be leveraged to reduce exclusion rates and their inequalities.

1.2. The importance of education and exclusion

Education is considered one of the most important human rights, protected by a range of international instruments including the UN Convention on the Rights of the Child (Hodgson, 1998), due to its life-long benefits in terms of health, economic, and social outcomes (Hodgson, 1998; Lynch, 2003; Montez & Friedman, 2015; Ross & Wu, 1995). The nexus between education and health is so strong and persistently observed that inequalities in education have been labelled a fundamental cause of inequalities in health (Montez & Friedman, 2015).

Yet exclusion from education is prevalent internationally. For example, in English state primary (ages 4 to 11) and secondary (ages 11 to 16) schools, in the 2018/19 academic year (the last full academic year prior to the COVID-19 pandemic), 438,265 (5.4 %) fixed-term exclusions (temporary suspension up to 45 days in total in a year) were issued. There were also 7894 (0.1 %) permanent exclusions (permanent expulsion from the school) (Department for Education (UK), 2021a). In the United States, 35 % of schools reported taking serious disciplinary action (defined as suspension lasting five or more days, removal from school with no services for the rest of the year or transfer to an alternative school) in 2019/20. Among secondary/high schools, this percentage was 74 % and among middle schools, 61 % (National Center for Education Statistics, 2022). This is in addition to other forms of non-participation including temporary absence, whether authorised due to health reasons, or unauthorised, and off-rolling/pushing out (i.e. illegal exclusion) (Jay et al., 2022).

Young people who experience exclusion significantly underperform in school exams (Department for Education (UK), 2019), are more likely to not be in employment, education or training after schooling at age 19 (Department for Education (UK), 2011), are more likely to experience mental illness and self-harm (Parker et al., 2016), have disrupted peer and teacher relationships and a reinforced negative self-image (Gill et al., 2017), and an increased likelihood of criminal activity involvement (Williams et al., 2012). Given the high prevalence of exclusions and their possible effects on immediate and longer-term outcomes, it may be that exclusions from school themselves contribute to health inequalities across the life course, which would also justify action to reduce school exclusion and ensure inclusivity in education.

1.3. The present study

Despite the heightened risk of exclusion among children who get CSC and SEN being well-known, a previous systematic review found no evaluation of the cumulative risk of exclusion across school of children who receive CSC or SEN services or both (Jay & Mc Grath-Lone, 2019), either in official statistics (Department for Education (UK), 2021b) or previous studies (Department for Education (UK), 2019; Sebba et al., 2015; Sinclair et al., 2019). Cross-sectional figures, such as those provided in official government statistics, while useful for monitoring trends, do not reflect the child's history or life course. In the present study, we focus on the cumulative risk of exclusion among children in secondary school (age 11 to 16). Adolescence is a crucial phase, developmentally and educationally. The public exams that children sit at the end of secondary schooling in England—the General Certificates of Secondary Education—determine entry into further examinations (themselves determinant of higher education).

We used all-of-England administrative data as such data sources minimise selection and attrition bias inherent in surveys or traditional cohort studies. In addition, our findings will be of direct relevance to policy makers in that trends in exclusion rates by different combinations of CSC and SEN provision can be routinely monitored, including before and after possible interventions.

We aimed to determine the cumulative risk of any type of exclusion between ages 11–16 from secondary school in England for students who received CSC services or SEN support (or both) compared with peers who received neither. Given the existing cross-sectional data (Department for Education (UK), 2021b; Sebba et al., 2015; Sinclair et al., 2019), we hypothesised that children with either CSC or SEN would have higher cumulative risk of exclusion across secondary school compared to children who did not receive such services. Additionally, based on previous research on non-enrolment (Jay et al., 2022), we hypothesised that children with both CSC and SEN would have the highest risks. Finally, we conducted exploratory analyses of variation in exclusion between local authorities.

2. Methods

2.1. Study design

We used a retrospective longitudinal cohort design to determine the cumulative risk of school exclusion among students attending state school according to whether they received CSC, SEN, both or neither. To identify our study cohort, we used the spring census of the National Pupil Database—administrative records for all pupils in state schools in England (Jay et al., 2019)—which contains data on pupil characteristics, school enrolments and exclusions.

We included all children in England enrolled in year 7 of state school in 2011/12 or 2012/13 (i.e., aged 11 years in the September of each of these academic years). These children would have finished compulsory education, aged 16, in 2015/16 and 2016/17, respectively, the latter of which was the final year of data available in our extract. Our results therefore apply to the period prior to the COVID-19 pandemic and are not affected by drastic changes to education that occurred then.

In England, all children from the age of 5 until their 16th birthday must attend full-time education (Ford et al., 2016). Each year, approximately 93 % of all school-aged children are educated in state schools with the remainder either in privately-funded or home settings or illegally not receiving any education (Jay et al., 2019). The first full year of primary education, in which children are aged 5/6 years old, is designated year 1. Primary education runs to year 6 (age 10/11) and secondary education begins at year 7 (age 11/12), finishing at year 11 (age 15/16).

To be eligible for inclusion in the study, children also had to be enrolled in any state school (though they could move school) in the spring census in all of years 7 to 11. This was to ensure that we could observe school exclusions for all children (children who are not enrolled have no exclusion data). Students enrolled in special school in year 7 (1.6 % [n = 15,770] of all 1,031,500 children included in the study) were analysed separately from those attending a mainstream school. This is because students who attend special schools have more complex, additional needs and receive much more intensive educational provision and higher rates of school exclusion than those in mainstream schools. Children attending special schools, because they by definition have SEN, also required different model specifications. The small number (0.2 %) of children attending Alternative Provision and Pupil Referral Units (Department for Education (UK), 2016) were included in the mainstream school cohort if dually-enrolled with a mainstream school or only enrolled in an Alternative Provision/Pupil Referral Unit. Those dually enrolled in an Alternative Provision/Pupil Referral Unit and special school were analysed in the special school cohort.

2.2. Measures

2.2.1. School exclusions

The outcome was the occurrence of either a fixed-term or permanent school exclusion. School exclusions are administered in response to breaches of school behaviour policy and are either fixed-term (suspension) or permanent (expulsion). Although school exclusions are administered by the school in response to breaches of its own behaviour policy, exclusions should be administered by the head teacher (principal) according to law and official guidance (Department for Education (UK), 2022). A fixed-term exclusion can be administered for up to a maximum 45 days in any school year. Behaviour that may result in an exclusion would include verbal or physical violence, not conforming with uniform policy or refusing to follow a teacher's direction. There is likely a largely degree of variation in practice between schools. Permanent exclusions can only be administered in response to serious or persistent breaches of school behaviour policy. In this study, we analysed fixed-term and permanent exclusions together due to low numbers of permanent exclusions. We examined school exclusions across two periods that define secondary education in England: school years 7 to 9 (ages

11/12 to 13/14; known formally as Key Stage 3) and years 10 to 11 (ages 14/15 to 15/16; Key Stage 4). These periods are grouped together according to the structure of the school curriculum. Whether a child was excluded from school was identified from the exclusion module of the National Pupil Database.

2.2.2. Receipt of social care or SEN support

We analysed three groups of children receiving social care services: children in need (CiN, including children formerly in need), those on or formerly on child protections plans (CPPs) and children looked after (CLA, including children formerly looked after). These services are provided by local authorities through their CSC departments. Children in need are children who require additional help from CSC services to support or maintain their health and well-being and/or who are disabled. A child protection plan is a possible outcome of local authority child protection investigations, i.e., where a child is known or suspected to be suffering or at risk of suffering significant harm. The purpose of a child protection plan is to ensure the child is kept safe, to promote the child's health and development and to support the family and wider family to safeguard and promote the welfare of the child (Department for Education (UK), 2020c). Finally, children can become looked after following court intervention or under out-of-court arrangements. Reasons for becoming looked after include (but are not limited to) child maltreatment, parental incapacity or parental absence (e.g. in the case of unaccompanied asylum-seeking children).

Whether a child received CSC services was measured across two periods. In both cases, CSC was measured in periods prior to the measurement of exclusions. First, CSC exposure was measured in primary school (with data available for years 4 to 6) for analysis of exclusions in Key Stage 3. Second, the CSC exposure was measured across years 4 to 9 for analysis of exclusions in Key Stage 4. CSC exposure was measured using four exclusive, hierarchical groups: no CSC, CiN, CPP or CLA. We used the linked child in need census (Emmott et al., 2019) and children looked after dataset (Mc Grath-Lone et al., 2016). These are administrative datasets created on an event-driven basis by all local authority CSC departments in England and include data on, respectively, all children in England who become children in need (including those allocated a child protection plan) and all children who become looked after. Using linkage to these data sources, we were able to derive a variable that indicated whether each child in the study was in need, on a child protection plan or looked after over the relevant period. Data were linked using the nationally unique anonymised Pupil Matching Reference.

Children with additional learning needs (such as those with sensory impairments, learning disabilities, autism or physical disabilities) may receive additional educational provision. Depending on the level of support required, a student may receive the lower-level "support" (formerly called School Action or Action Plus), which is organised by the school, or the more intensive Education, Health and Care Plan (formerly "Statement of SEN"), which is organised by the local authority. In this study, SEN provision was measured in two periods prior to exclusion (i.e., up to year 6 or year 9) using the SEN provision variable available in the National Pupil Database. In both, SEN provision was measured from the first year where data was available. These were year 1 (age 5/6) for children in year 7 in 2011/12 and the reception year (age 4/5) for children in year 7 in 2012/13. SEN provision was measured in mutually exclusive groups as: (1) no SEN provision; (2) receipt of Action, Action Plus or Support; or (3) a statement or Education, Health & Care Plan.

2.2.3. Covariates

We extracted data available in the National Pupil Database on: pupil gender, ethnicity, first language, the area-based income deprivation affecting children index (IDACI, (Ministry of Housing Communities & Local Government, 2015)), whether getting free school meals, available for low-income families (HM Government, 2015), and broad geographical region. We also derived a variable which combined IDACI and free school meals whereby children were classified jointly according to their IDACI decile and whether or not they were claiming free school meals. Finally, we extracted data on the local authority in which each child was living. All of these variables were measured at year 7 (with data cleaning from other years as described in Supplementary File 1). The means by which we derived the cohorts are presented in Supplementary File 1 (flow diagram in Fig. S1.1).

2.3. Analysis

We first calculated the cumulative proportions of children experiencing either a fixed-term or permanent school exclusion (i.e., whether a child received at least one fixed-term exclusion or at least one permanent exclusion) across years 7 to 9, years 10 to 11 and years 7 to 11. The numerator was the number of children with at least one exclusion within the period. The denominator was the number of children in the cohort at year 7. We also visualised variation in crude exclusion rates between local authorities and regions using caterpillar plots.

We then estimated the relative difference in the odds of school exclusion among students with different combinations of CSC and SEN history using multilevel logistic regression. To account for variation in school exclusion rates between local authorities, we specified random intercepts for local authorities (all children included in the study, and all 151 local authorities were analysed in these models). We estimated a series of models in the following order. After fitting a model with no explanatory variables (empty model, Model 1), we estimated the unadjusted difference in the odds of exclusion among children with CSC exposure compared to those without (Model 2). We then adjusted for SEN history (Model 3). We used a binary variable of ever having any SEN provision rather than the trichotomous variable (no SEN/Action, Action Plus or Support/Statement or Education, Health & Care Plan), so that the models could converge. Next, to estimate the association between different levels of CSC and SEN history combined, we entered an interaction term between CSC and SEN history (Model 4). In the fifth model, we adjusted for potential confounders: gender, ethnicity, first language, the combined IDACI/free school meals variable and whether the child had been enrolled in alternative provision (including a Pupil Referral Unit) up to year 6 (Model 5). This modelling strategy was repeated for the relative difference in odds of receiving a

Table 1

Characteristics and exclusion rates of the cohort (n = 1,015,730 children enrolled in mainstream settings in year 7 in 2011/12 or 2012/13 and enrolled in state schools to year 11).

		n (%)	Excluded year 7 to 9 n (%)	Excluded years 10 to 11 n (%)	Excluded years 7 to 11 n (%)
n		1,015,730	78,780 (7.8%)	90,840 (8.9%)	131,890 (13.0%)
CSC exposure (yr 4 to 6)	None	945,590 (93.1%)	62910 (6.7%)		109000 (11.5%)
	CiN	60,560 (6.0%)	13110 (21.7%)		19060 (31.5%)
	CPP	4,660 (0.5%)	1400 (29.9%)		1900 (40.7%)
	CLA	4,930 (0.5%)	1360 (27.7%)		1930 (39.2%)
CSC exposure (yr 4 to 9)	None	906,030 (89.2%)		66070 (7.3%)	
	CiN	88,550 (8.7%)		18840 (21.3%)	
	CPP	11,600 (1.1%)		3190 (27.5%)	
	CLA	9,560 (0.9%)		2750 (28.7%)	
Ever SEN (primary school to yr 6)	No	662,280 (65.2%)	30150 (4.6%)		56470 (8.5%)
	Yes	353,450 (34.8%)	48630 (13.8%)		75420 (21.3%)
Highest ever SEN (primary school to yr 6)	None	662,280 (65.2%)	30150 (4.6%)		56470 (8.5%)
	Action or Action Plus	334,420 (32.9%)	45470 (13.6%)		71220 (21.3%)
	Statement / EHCP	19,020 (1.9%)	3160 (16.6%)		4200 (22.0%)
Ever SEN (primary school to yr 9)	No	613,320 (60.4%)		32010 (5.2%)	
	Yes	402,420 (39.6%)		58840 (14.6%)	
Highest ever SEN (primary school to yr 9)	None	613,320 (60.4%)		32010 (5.2%)	
	Action or Action Plus	376,070 (37.0%)		54650 (14.5%)	
	Statement / EHCP	26,340 (2.6%)		4190 (15.9%)	
CSC exposure (yr 4 to 6) by ever SEN (primary to yr 6)	No CSC & no SEN	636,820 (62.7%)	26580 (4.2%)		50660 (8%)
	CiN & no SEN	23,000 (2.3%)	3130 (13.6%)		5110 (22.2%)
	CPP & no SEN	1,350 (0.1%)	250 (18.9%)		380 (27.9%)
	CLA & no SEN	1,110 (0.1%)	180 (16.4%)		320 (29.1%)
	No CSC & SEN	308,760 (30.4%)	36330 (11.8%)		58340 (18.9%)
	CiN & SEN	37,560 (3.7%)	9980 (26.6%)		13950 (37.1%)
	CPP & SEN	3,310 (0.3%)	1140 (34.4%)		1520 (45.9%)
	CLA & SEN	3,810 (0.4%)	1180 (30.9%)		1610 (42.1%)
CSC exposure (yr 4 to 9) by ever SEN (primary to yr 9)	No CSC & no SEN	576,700 (56.8%)		26490 (4.6%)	
	CiN & no SEN	31,830 (3.1%)		4540 (14.3%)	
	CPP & no SEN	3,080 (0.3%)		570 (18.6%)	
	CLA & no SEN	1,710 (0.2%)		410 (23.7%)	
	No CSC & SEN	329,330 (32.4%)		39580 (12%)	
	CiN & SEN	56,720 (5.6%)		14300 (25.2%)	
	CPP & SEN	8,520 (0.8%)		2620 (30.7%)	
	CLA & SEN	7,850 (0.8%)		2340 (29.8%)	
Gender	Male	516,120 (50.8%)	55750 (10.8%)	60630 (11.7%)	89450 (17.3%)
	Female	499,620 (49.2%)	23030 (4.6%)	30210 (6%)	42430 (8.5%)
Ethnicity	White	810,160 (79.8%)	59680 (7.4%)	70680 (8.7%)	100910 (12.5%)
	Black	50,760 (5.0%)	7250 (14.3%)	7200 (14.2%)	11280 (22.2%)
	Mixed	41,940 (4.1%)	4830 (11.5%)	5440 (13%)	7820 (18.6%)
	Asian	99,240 (9.8%)	5860 (5.9%)	6310 (6.4%)	9960 (10%)
	Other	13,630 (1.3%)	1160 (8.5%)	1210 (8.9%)	1910 (14%)
Language	English	858,150 (84.5%)	66620 (7.8%)	77900 (9.1%)	111630 (13%)
	Other	157,580 (15.5%)	12160 (7.7%)	12940 (8.2%)	20250 (12.9%)
IDACI fifths	1 (most deprived)	238,210 (23.5%)	31050 (13%)	33420 (14%)	48900 (20.5%)
	2	210,090 (20.7%)	19390 (9.2%)	21970 (10.5%)	31890 (15.2%)
	3	194,050 (19.1%)	12960 (6.7%)	15610 (8%)	22520 (11.6%)
	4	188,280 (18.5%)	8980 (4.8%)	11430 (6.1%)	16410 (8.7%)
	5 (least deprived)	185,110 (18.2%)	6410 (3.5%)	8420 (4.5%)	12170 (6.6%)
Free school meals claimed	No (0)	838,270 (82.5%)	48920 (5.8%)	58830 (7%)	85780 (10.2%)
	Yes (1)	177,460 (17.5%)	29860 (16.8%)	32020 (18%)	46110 (26%)
IDACI/free school meals	1,1	88,200 (8.7%)	16330 (18.5%)	17000 (19.3%)	24790 (28.1%)
	1,0	150,010 (14.8%)	14720 (9.8%)	16420 (10.9%)	24110 (16.1%)
	2,1	45,730 (4.5%)	7540 (16.5%)	8150 (17.8%)	11680 (25.5%)
	2,0	164,360 (16.2%)	11850 (7.2%)	13830 (8.4%)	20210 (12.3%)
	3,1	24,120 (2.4%)	3630 (15%)	4140 (17.2%)	5770 (23.9%)
	3,0	169,930 (16.7%)	9330 (5.5%)	11460 (6.7%)	16750 (9.9%)
	4,1	13,160 (1.3%)	1700 (12.9%)	1960 (14.9%)	2760 (21%)
	4,0	175,120 (17.2%)	7280 (4.2%)	9470 (5.4%)	13650 (7.8%)
	5,1	6,260 (0.6%)	670 (10.6%)	770 (12.3%)	1110 (17.7%)
	5,0	178,850 (17.6%)	5740 (3.2%)	7650 (4.3%)	11060 (6.2%)
Region	East Midlands	88,970 (8.8%)	6740 (7.6%)	7860 (8.8%)	11330 (12.7%)
	East of England	116,310 (11.5%)	7690 (6.6%)	9290 (8%)	13290 (11.4%)
	London	143,200 (14.1%)	13730 (9.6%)	14220 (9.9%)	21990 (15.4%)
	North East	49,650 (4.9%)	3830 (7.7%)	4490 (9%)	6490 (13.1%)
	North West	140,800 (13.9%)	11020 (7.8%)	12990 (9.2%)	18620 (13.2%)
	South East	160,660 (15.8%)	11150 (6.9%)	12620 (7.9%)	18420 (11.5%)
	South West	97,900 (9.6%)	6310 (6.4%)	80710 (8.2%)	11130 (11.4%)
	West Midlands	114,280 (11.3%)	9680 (8.5%)	10630 (9.3%)	15870 (13.9%)
	Yorkshire & The Humber	103,970 (10.2%)	8640 (8.3%)	10680 (10.3%)	14750 (14.2%)
Alternative provision (year 0 to 6)	No	1,015,090 (99.9%)	78470 (7.7%)		131530 (13%)
	Yes	640 (0.1%)	310 (48.1%)		350 (54.9%)
Alternative provision (year 0 to 9)	No	1,015,650 (99.5%)		89120 (8.8%)	
	Yes	5,080 (0.5%)		1720 (33.9%)	

CiN child in need; CLA child looked after; CPP child protection plan; CSC children's social care; EHCP Education, Health & Care Plan; IDACI income deprivation affecting children index; SEN special educational needs; yr year.

school exclusion across years 10 to 11, except that CSC exposure, SEN provision and alternative provision history were measured to year 9.

We finally used these models to calculate and plot the predicted probabilities of school exclusion across years 7 to 9 and across years 10 to 11 according to different levels of CSC and SEN history. These plots also provide a visual representation of the impact of the interaction terms between CSC and SEN history on the predicted probability of school exclusion.

We chose to analyse school exclusion rates across years 7 to 9 separately from years 10 and 11 because differences in the school curriculum may have manifested in differences in exclusion risks. For example, at the end of year 11, children sit their final school exams (the General Certificates of Secondary Education), which determine entry into further education. This period is therefore characterised by higher levels of academic pressure, which may result in increased risk of exclusion either for all children or for specific groups of children.

To assess whether the strength of the association between CSC/SEN and exclusion varied between local authorities, we attempted to fit models with random slopes for CSC and SEN. However, these models did not converge and so are not presented.

All analyses were conducted using R 3.6.2 with the following packages: *data.table* (Dowle & Srinivasan, 2021), *plyr* (Wickham, 2011), *tidyR* (Wickham & Henry, 2021), *reshape2* (Wickham, 2007), *tableone* (Kazuki et al., 2020), *ggplot2* (Wickham & Chang, 2021), *gridExtra* (Auguie, 2017) *lme4* (Bates et al., 2015) and *lmtest* (Zeiles, 2020).

2.4. Ethics and data protection

Initially, the University College London research ethics committee chair confirmed that ethical approval was not required as we were working with de-identified data. We registered this project with the University College London Institute of Child Health & Great Ormond Street Hospital Joint Research & Development Office (17PE25) and data protection officer (Z6364106 2020 07 51). Following a change in university policy on data relating to children, we also applied for and received ethical approval from the University College London research ethics committee (11483/001). Data, shared by the Department for Education, were initially stored in the University College London Data Safe Haven and later transferred to the Office for National Statistics Secure Research Service (Department for Education (UK), 2020a). All outputs were independently checked to ensure compliance with statistical disclosure controls, including a threshold of 10, below which cell counts are suppressed, and that most numbers be rounded to the nearest 10.

3. Results

3.1. Cohort selection

There were 1,081,780 children enrolled in year 7 in academic years 2011/12 or 2012/13. Of these, 5470 (0.5 %) had missing data on gender, ethnicity, language or IDACI (no other variables had missing data) and were excluded from the cohort, leaving 1,076,310 children. Of these, 44,810 (4.2 %) had at least one spring census in which they were not enrolled between years 8 and 11 and were excluded (their characteristics are given in Supplementary File 2). Children excluded were: more likely to have received CSC (e.g., 1.3 % were CLA to year 6, compared to 0.5 %), more likely to be of ethnic minority status and have English as a second language, were more likely to be living in deprived areas and getting free school meals, were more likely to have attended alternative provision and were more likely to have received SEN provision.

In total, there were 1,031,500 children in the study, 1,015,730 (98.5 %) in the mainstream schools cohort and 15,770 (1.5 %) in special schools.

3.2. Characteristics, social care and SEN history

The characteristics of the children in the mainstream schools cohort are given in Table 1. Six per cent of children were designated as a CiN (but not subject to a CPP or CLA) between years 4 and 6. Half a percent were subject to a CPP and another 0.5 % were CLA. Between years 4 and 9, 8.7 % were CiN, 1.1 % were subject to a CPP and 0.9 % were CLA. Up to year 6 (age 10/11), 34.8 % of children had some form of SEN provision. Of all children, 32.9 % received Action, Action Plus or Support and 1.9 % received a Statement or Education, Health & Care Plan. To year 9 (age 13/14), 39.6 % received some form of provision: 37.0 % Action, Action Plus or Support and 2.6 % Statement or Education, Health & Care Plan. Table 1 also provides the combinations of CSC and SEN history.

3.3. Risk of exclusion

Exclusion rates are given in Table 1. Overall, 13 % of all children in the cohort were excluded at least once across years 7 to 11. Those with a history of CSC exposure were substantially more likely to be excluded across years 7 to 9, years 10 to 11 and years 7 to 11 than children without. For example, 32 % of children in the CiN group were excluded at least once across years 7 to 11, and 40 % of those subject to CPPs and CLA, compared to 12 % of the non-exposed group.

Fig. 1 shows variation in crude exclusion rates by local authority and region. Whereas there was limited variation between regions (ranging from 8 % to 10 %), there was substantially more variation between local authorities, with average cumulative exclusion for students resident in each local authority ranging from 5 % to 18 %.

3.4. Association between children's social care and exclusion

Multilevel logistic regression results are presented in Table 2 (full results in Supplementary File 3). Results were broadly similar for exclusions in years 7 to 9 as in years 10 and 11. For exclusions in years 7 to 9, Model 2 shows that the odds of exclusion were 5.31 (95 % CI 5.01, 5.63) times higher among the CLA group than the non-exposed group; this factor for the CPP group was 5.93 (95 % CI 5.59, 6.29) times and for the CIN group, 3.86 (95 % CI 3.78, 3.93) times. These odds ratios were reduced when adjusted for SEN but remained statistically significant (Model 3).

There was evidence from Model 4 (Table 2) that SEN provision interacted with being exposed to CSC. The relative difference between the CSC-exposed and unexposed children was diminished in the presence of SEN provision history compared to an absence of SEN provision history. However, it was still the case that children with a history of SEN provision history were more at risk of exclusion
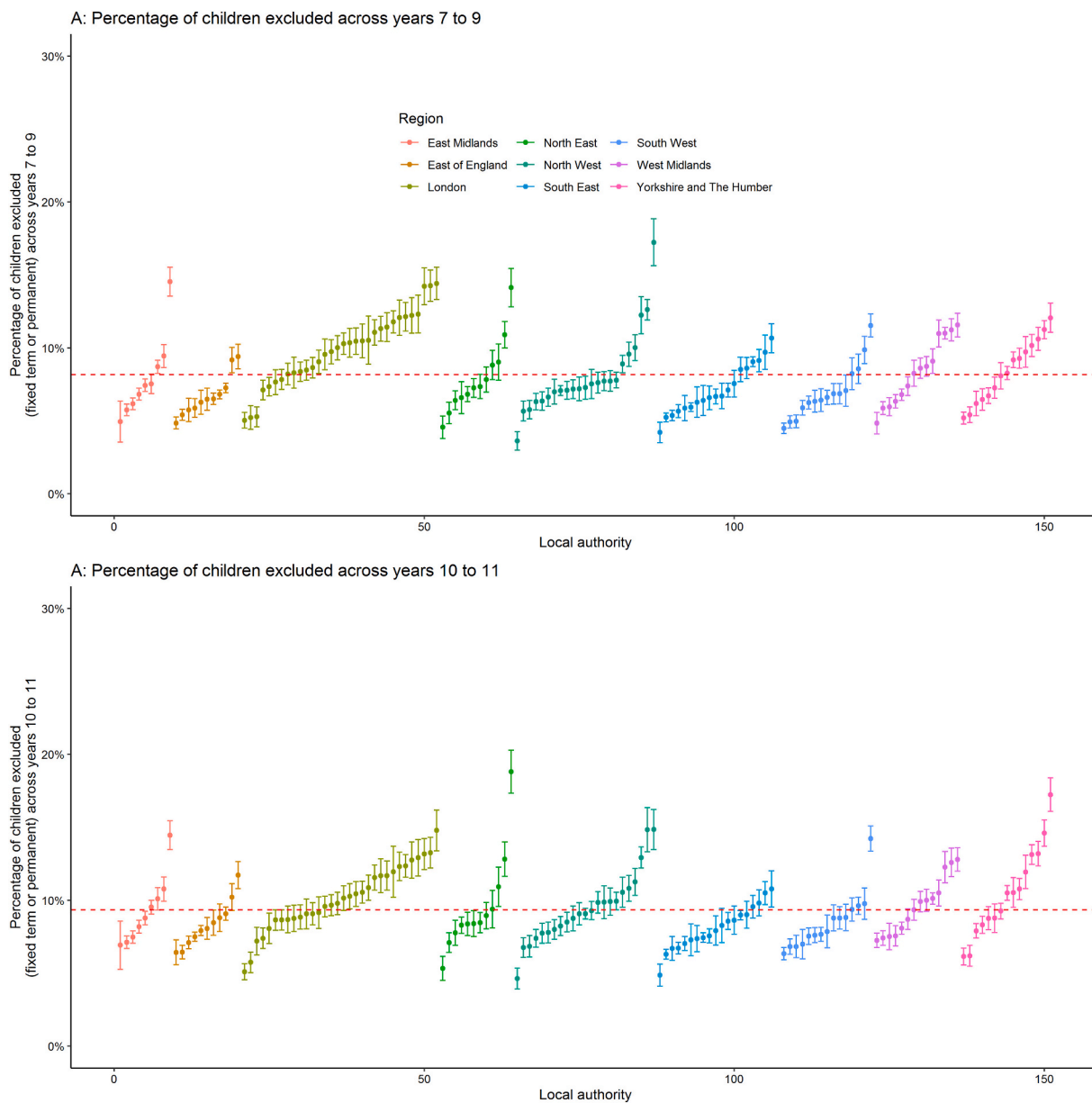
Fig. 1. Variation in unadjusted proportion of students attending mainstream school who had one or more exclusion during years 7 to 9 and years 10 to 11 in each of 152 local authorities and 7 regions (n = 1,031,500).
Each dot represents one local authority. Local authorities with <10 outcome events are not plotted. Dashed red lines are the national averages of the plotted local authorities. Error bars are 95 % confidence intervals. Analogous results for children in special schools are in Supplementary File 4, Fig. S4.1. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

Table 2
Odds ratios (OR) and 95 % confidence intervals (CI) from hierarchical logistic regression models of exclusions of children in the mainstream cohort.

		1 (null)	2 OR (95% CI)	3 OR (95% CI)	4 OR (95% CI)	5 OR (95% CI)
Exclusions at Key Stage 3 (yr 7-9)						
CSC exposure (yr 4 to 6)	None	-	Reference	Reference	Reference	Reference
	CiN		3.86 (3.78, 3.93)	2.97 (2.92, 3.03)	3.56 (3.42, 3.70)	3.16 (3.04, 3.28)
	CPP		5.93 (5.59, 6.29)	4.22 (3.98, 4.48)	5.21 (4.81, 5.63)	4.57 (4.15, 5.04)
	CLA		5.31 (5.01, 5.63)	3.56 (3.36, 3.78)	4.35 (4.02, 4.70)	4.22 (3.75, 4.75)
SEN to yr 6				2.92 (2.86, 2.97)	3.00 (2.95, 3.06)	2.39 (2.34, 2.43)
Interaction	CiN & SEN				0.77 (0.74, 0.80)	0.80 (0.77, 0.83)
	CPP & SEN				0.76 (0.71, 0.83)	0.79 (0.70, 0.88)
	CLA & SEN				0.78 (0.72, 0.84)	0.84 (0.74, 0.97)
Variance components						
Level 2 (LA) SD		0.31	0.31	0.29	0.29	0.23
% explained		-	0.0%	6.5%	6.5%	25.8%
Model summaries						
AIC		548,310	531,861	531,051	512,928	493,120
LRT p value*		-	<0.001	<0.001	<0.001	<0.001
Exclusions at Key Stage 4 (yr 10/11)						
CSC exposure (yr 4 to 9)	None	-	Reference	Reference	Reference	Reference
	CiN		3.42 (3.35, 3.49)	2.72 (2.67, 2.77)	3.46 (3.32, 3.59)	3.19 (3.07, 3.32)
	CPP		4.76 (4.58, 4.95)	3.53 (3.39, 3.67)	4.62 (4.35, 4.90)	4.22 (3.90, 4.56)
	CLA		5.10 (4.91, 5.31)	3.49 (3.36, 3.63)	6.36 (5.88, 6.88)	5.99 (5.43, 6.61)
SEN to yr 9				2.64 (2.59, 2.69)	2.80 (2.75, 2.86)	2.34 (2.29, 2.39)
Interaction	CiN & SEN				0.72 (0.69, 0.75)	0.71 (0.68, 0.74)
	CPP & SEN				0.70 (0.65, 0.75)	0.68 (0.62, 0.75)
	CLA & SEN				0.49 (0.45, 0.54)	0.50 (0.45, 0.55)
Variance components						
Level 2 (LA) SD		0.27	0.26	0.25	0.25	0.23
% explained		-	3.7%	7.4%	7.4%	14.8%
Model summaries						
AIC		607,565	568,864	568,864	568,491	553,070
LRT p value*		-	<0.001	<0.001	<0.001	<0.001
All models						
n children = 1,015,730;	n LAs = 151					

See Supplementary File 3 for full model results. Model 1: empty. Model 2: CSC exposure. Model 3: CSC adjusted for SEN. Model 4: CSC interaction with SEN. Model 5: CSC interaction with SEN and adjusted for gender, ethnicity, first language, IDACI fifths, in alternative provision to year 6/9.

See Fig. 2 for the predicted probabilities of school exclusion obtained from Model 5, which also contains a graphical representation of the impact of the interaction terms. The interaction terms in Models 4 and 5 are to be interpreted with care. For example, in Model 5 the estimated odds ratio of school exclusion at Key Stage 3 for a child who was a CiN with SEN history relative to a child who was CiN but without SEN history is 0.80. Combining this estimate with the estimated baseline odds ratio of being CiN, we infer that the odds ratio of being CiN is reduced from an OR of 3.16 (relative to no social care involvement) to an odds ratio of $3.16 \times 0.80 = 2.53$ in the presence of SEN history. * LRTs were conducted against the previous model. AIC Akaike Information Criterion; CI confidence interval; CiN child in need; CLA child looked after; CPP child protection plan; LA local authority; LRT likelihood ratio test; OR odds ratio; SD standard deviation; SEN special educational needs; yr year.

than children without SEN history, regardless of CSC exposure category (except for CLA and their odds of exclusion at years 10 to 11). These interactions remained statistically significant after adjusting for confounders (Model 5). The interactions can be seen clearly in Fig. 2, which shows the predicted probabilities of exclusion by CSC and SEN groups, based on Model 5. Note that as panel A (years 7 to 9) covers three years, the cumulative predicted probability is higher than in panel B (years 10 and 11) which covers only two years.

The variables included in the fully adjusted model (Model 5) explained 26 % of the between- local authority variation in exclusion rates in years 7 to 9, and 15 % of the variation in years 10 to 11. The residual variation remained unexplained.

3.5. Children in special schools

The analyses for the cohort of 15,770 children who were enrolled in special schools in year 7 are presented in Supplementary File 4. In these analyses, exclusions were examined across years 7 to 11 only due to smaller numbers. Overall, 15 % of children in special schools in year 7 were excluded across years 7 to 11 (slightly higher than the 13 % observed in the mainstream cohort). Of children with no CSC exposure across years 4 to 6, 12 % were excluded, compared to 14 % of CiN, 33 % of those subject to a CPP and 33 % of CLA. The adjusted odds ratio for exclusion across years 7 to 11, comparing CLA with non-exposed children, was 3.82 (95 % CI 3.14, 4.65, Table S4.2); for children subject to a CPP, it was 2.77 (95 % CI 2.19, 3.51) and for CiN, 1.13 (95 % CI 1.02, 1.24). Therefore, as with those in mainstream settings, children with a history of CSC exposure were more likely to be excluded, though the relative difference was not as great.

4. Discussion

4.1. Higher risk of exclusion among children with CSC/SEN

Consistent with our hypotheses, children with a history of CSC exposure prior to joining secondary school were at substantially increased risk of exclusion across years 7 to 11. Whereas 12 % of children without CSC exposure in years 4 to 6 were excluded from secondary school at some point, 32 % of those who were CiN and 40 % who were subject to a CPP or were CLA were excluded. SEN history was associated with an even higher risk of exclusion in all groups (with and without CSC history). The only exception to this was that children who were CLA and who had SEN history up to year 9 were not more likely to be excluded in years 10 to 11 than children who were CLA without SEN history. These findings persisted after adjusting for confounding variables. Higher risk of exclusion among children with CSC history was also observed for children in special schools.

We found that children who were looked after up to year 9 with SEN history were not more likely to be excluded in years 10 and 11 than those without SEN history. Additionally, although the overall odds of school exclusion were higher in each social care group
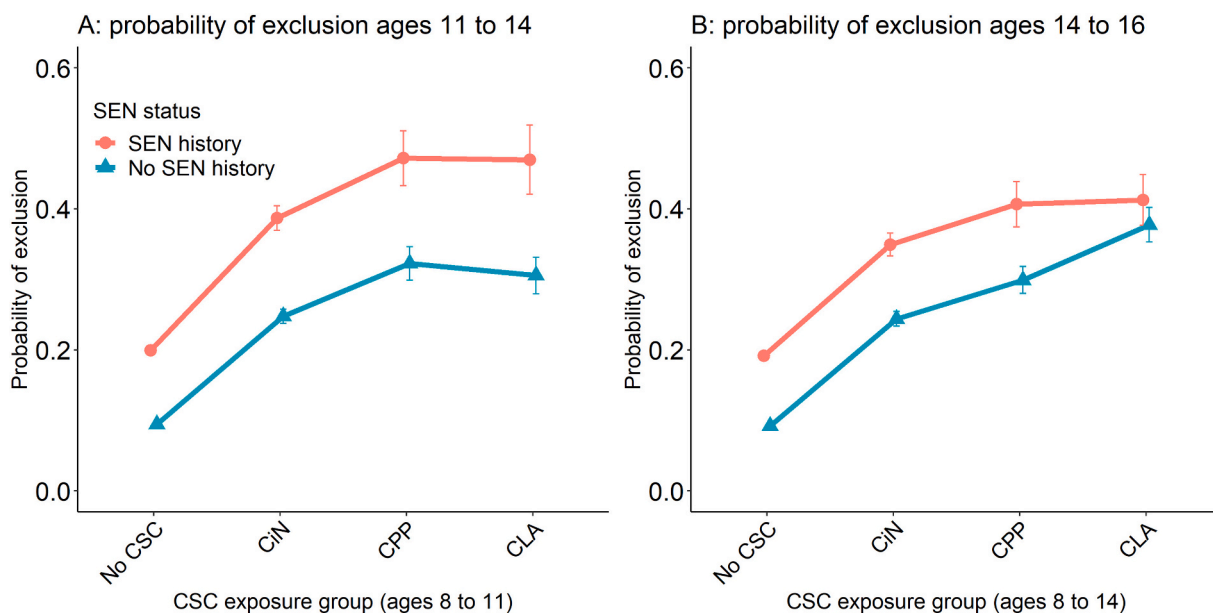
Fig. 2. Predicted probabilities of exclusion among students receiving social care services, special educational needs support of both derived from model 5 (Table 2).
Dots represent the predicted probability of exclusion as calculated from the coefficients in Model 5 (Table 2 and Supplementary File 3). This model was adjusted for gender, ethnicity, first language, IDACI, and alternative provision enrolment. Error bars are 95 % confidence intervals. Values for other variables in the model were set to their reference categories. CiN children in need; CLA children looked after; CPP child protection plan; IDACI income deprivation affecting children index; SEN special educational needs.

compared to those without social care, and the odds were higher still in the presence of SEN history, their relative size when comparing CSC-exposed and unexposed children with SEN history was lower than when comparing CSC-exposed and unexposed children without SEN history (Table 2). Specific conclusions for these findings cannot be drawn. However, for example, it may be that children who are or have been looked after (or who receive other CSC services) and who have provision for SEN are more protected through their additional learning needs being met, than children looked after (or receiving other CSC services) without SEN provision.

4.2. Local authority variation

We found that exclusion rates varied greatly by local authority (Fig. 1), which should be further explored. Twenty-six per cent of the variation in exclusion rates in years 7 to 9 between local authorities, and 15 % of the variation in years 10 to 11, was explained by the individual-level variables included in our models (CSC, SEN, gender, ethnicity, first language, IDACI, alternative provision history). The remainder of the variation was unexplained. Possible targets for study include the complex set of ecological, school- and area-level factors and overall educational policy (Cole, 2015; Gill et al., 2017; Graham et al., 2019; Kulz, 2015; Officer of the Children's Commissioner, 2013; Wijedasa et al., 2018). For example, zero tolerance behaviour policies have been implicated in increased exclusion rates, particularly among more disadvantaged groups and those of ethnic minority status (Hoffman, 2012; Skiba, 2000). Systemic change is therefore likely required in order to create a genuinely inclusive school environment.

4.3. Comparison with previous research

Our results generally agree with previous research in observing higher rates of exclusion among children with CSC exposure though direct comparison is difficult as few studies conducted longitudinal analyses and exposure measurement differed (Department for Education (UK), 2019, 2020b; Jay & Mc Grath-Lone, 2019; Sebba et al., 2015; Sinclair et al., 2019). Our results are broadly consistent with the Timpson Review of exclusions (Department for Education (UK), 2019) which, in a longitudinal analysis, found higher odds of exclusion in the subsequent school term among those with CSC exposure in previous terms.

The Department for Education official statistics (Department for Education (UK), 2020b) also show a higher risk of fixed-term exclusion among children who are looked after for a continuous period of at least 12 months; likewise, they show a higher risk among CiN. The official statistics (Department for Education (UK), 2020b), however, which are cross-sectional, suggest that, in more recent years at least, children who are looked after for at least a year are at no higher risk of permanent exclusion than all children. While we did not separately examine permanent exclusions, as these account for only 1 % of all exclusions (Department for Education (UK), 2021b), the official statistics should be interpreted with caution as they only include children looked after for a continuous period of at least 12 months. As Mc Grath-Lone et al. showed, over half of all children ever looked after are only looked after for short periods of time (median of four months) (Mc Grath-Lone et al., 2020).

4.4. Other risk factors

Although not the focus of our study, we also observed significant degrees of variation in exclusion rates by other factors, such as deprivation. For example, we found that 28 % of children getting free school and who lived in the most deprived neighbourhoods were excluded across years 7 to 11. This compared to 6 % of children living in the least deprived areas not getting free school meals (Table 1). It is likely that these and other sociodemographic factors are relevant in driving exclusion rates among children with and without CSC and SEN history.

4.5. Strengths and limitations

This study has several strengths, principally in our use of whole-population administrative data, which enabled us to explore the interaction between CSC and SEN. Examining the CSC-exclusion association longitudinally also means that our findings are policy relevant, in particular concerning interventions that might be put in place at the start of secondary school to prevent exclusion across school and in the years leading up to final school exams at year 11.

By including only children who were fully enrolled across years 7 to 11, we may have introduced selection bias into the study. This was a necessary exigent as observing whether a child was excluded was contingent on their being enrolled in a school. However, we have previously demonstrated that children with a history of CSC exposure and SEN are at significantly heightened risk of becoming unenrolled from school before age 16 (Jay et al., 2022). As those who experience unenrolment are likely at higher risk of formal exclusion, our odds ratios were likely biased downwards towards the null. The true odds ratios between CSC exposed and non-exposed children are therefore likely higher than those reported here. In a similar vein, there are no data on illegal, temporary exclusions (Office of the Children's Commissioner, 2011) which also means the true incidence of exclusion is underestimated in any analyses using the National Pupil Database. Another important limitation lies in the fact that we treated covariates as fixed in time rather than time-varying. There may, for example, be stronger associations with exclusion where children have spent more time living in poverty (Bright et al., 2016). It was beyond the scope of this study to investigate these factors. Finally, there was some misclassification of exposure as we only partially observed CSC exposure across childhood. The result of this is that there were children in the unexposed group who in fact had an early history of CSC exposure. This also may have biased the observed odds ratios to the null.

4.6. Policy implications and conclusions

The observed links between exposure to CSC, SEN provision and school exclusion have implications for the commissioning of CSC services and services for children with SEN. This is particularly so as local authorities have public health responsibilities and duties to integrate health and social care services, including through joint funding (Heath, 2014). Research is needed to understand how local authorities have responded to these duties, which likely varies greatly across the country.

The large variation in exclusions between local authorities suggest that school policies, staff training and resources to deal with challenging behaviour could influence exclusion rates. Anecdotal evidence from Scotland suggests that training of teachers in trauma-informed approaches to behaviour may be partly responsible for reductions in permanent exclusions (Scottish Government, 2018). An evaluation of the HeadStart initiative of interventions to promote mental health resilience in schools found a transient reduction in exclusions in the two years after the start of the HeadStart programme, which may reflect access to alternative support or scrutiny of exclusionary practices (Cattan et al., 2022). Further research needs to evaluate the extent to which improved capacity to address behaviour problems, staff training, monitoring and review of exclusion rates, including through school inspections, and government policy could potentially reduce school exclusions.

The use of exclusion against children looked after, those on child protection plans, and other children with a social worker, as well as those with SEN provision could additionally be limited in law to situations where it is absolutely necessary to protect the safety of that child or people around them, not simply as a disciplinary measure, and then only used for the shortest duration possible. Consideration could also be given to banning permanent exclusion altogether for these groups of children. Additionally, protection should be given to children who have formerly held these statuses given that educational deficits continue after a period in care (Berridge et al., 2020). Limiting the use of exclusion should be accompanied with additional resources to ensure that schools can meet the needs of the children who would otherwise be excluded.

Very large inequalities in the risk of school exclusion between CSC-exposed and unexposed children were observed. These inequalities may give rise to educational and health inequalities across life and represent a failure by the state to protect the right to education of these groups of children. Interventions should address national and local policy related to exclusion and other systemic causes of school exclusions and their inequalities.

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CRediT authorship contribution statement

MJ designed the study, to which all authors contributed. MJ carried out all data management and analyses. MJ, LMcGL and RG conducted the application to the Department for Education for access to the data. MJ drafted this manuscript to which all authors critically contributed.

Declaration of competing interest

None.

Data availability

Data can be accessed on application to the Department for Education

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