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Educational Achievement to age 11 in Children Born at Late Preterm and Early Term Gestations

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Author Statement

Contributor and Guarantor Information: Clare Copper devised the initial overall plan, obtained the data, wrote the statistical analysis plan, cleaned and analysed the data and drafted and revised the paper. She is guarantor. Amanda Waterman supervised the data analysis, drafting of the paper and revisions to the paper. Cheti Nicoletti supervised the data analysis, drafting of the paper and revisions to the paper. Katherine Pettinger provided guidance on the design, assisted with drafting the paper and revisions. Lee Sanders provided guidance on the design, assisted with drafting the paper and revisions. Liam Hill supervised the development of the initial overall plan, the data analysis, drafting of the paper and revisions.

The corresponding author attests that all listed authors meet authorship criteria and that no others meeting the criteria have been omitted.

T*he lead author (the manuscript's guarantor) affirms that the manuscript is an honest, accurate, and transparent account of the study being reported; that no important aspects of the study have been omitted; and that any discrepancies from the study as planned (and, if relevant, registered) have been explained.*

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Abstract

Objective: To investigate the effects of being born late preterm (LPT, 34-36 weeks' gestation) or early term (37-38 weeks) on children's educational achievement between 5 and 11 years-old.

Design: A series of observational studies of longitudinal linked health and education data.

Setting: The Born-in-Bradford (BiB) birth cohort study, which recruited mothers during pregnancy between 2007 and 2011.

Participants: The participants are children born between 2007 and 2011. Children with missing data, looked-after-children, multiple births, and births post-term were excluded. The sample size varies by age according to amount of missing data, from 7860 children at age 5 to 2386 at age 11 (8031 at age 6, and 5560 at age 7).

Main Outcome Measures: Binary variables of whether a child reached the 'expected' level of overall educational achievement across subjects at the ages of 5, 6, 7 and 11 years. The achievement levels are measured using standardized teacher assessments and national tests.

Results: Compared to full-term births (39-41 weeks), there were significantly increased adjusted odds of children born LPT, but not early term, of failing to achieve expected levels of overall educational achievement at ages 5 (aOR:1.72,95% CI:1.34 to 2.21) and 7 (aOR:1.46,95% CI:1.08 to 1.97) but not at age 11 (aOR:1.51,95% CI:0.99 to 2.30). Being born LPT still had statistically significant effects on writing and mathematics at age 11.

Conclusions: There is a strong association between LPT and education at age 5, which remains strong and statistically significant through age 11 for maths but not for other key subjects.

Key words: Born-in-Bradford, preterm, premature, early-term, school, educational achievement.

Abbreviations Used:

AOR: Adjusted Odds Ratio

BiB: Born-in-Bradford Cohort

LPT: late preterm

EGPS: English Grammar, Punctuation and Spelling

EYFSP: Early Years Foundation Stage Profile

KS2: Key Stage Two

KS1: Key Stage One

OR: Odds Ratio

VMPT: Very & moderately preterm

Article Summary:

What is already known about this topic: Children born at late preterm gestations are more likely than those born at full term to show signs of not being "school ready" at age 5, but it is less clear whether this gap persists through formal schooling, and whether it exists for children born early term.

What this study adds: Children born late preterm, but not early term, are less likely than their full term peers to be school ready at age 5 and less likely to go on to achieve expected levels of educational achievement throughout their primary education (up to age 11), particularly in writing and mathematics. These inequalities exist even after controlling for a comprehensive range of relevant demographic characteristics.

How this study might affect research, practice or policy: Children born at late preterm gestations may warrant closer monitoring, and support through intervention, prior to and during their primary education because this degree of prematurity can have detrimental impacts on their early educational progress.

Introduction

Amongst children born preterm (<37 weeks gestation), those that are very premature (<32 weeks gestation) are particularly vulnerable to experiencing developmental difficulties [1] and have an elevated risk of poor educational attainment compared to their full-term peers [2]. However, the specific effects of late preterm (LPT) birth (34-36 weeks) on educational outcomes have been much less frequently studied [3,4] and are less well understood. Studying the effect of LPT on education is important given that 72% of all preterm births are LPT [5] and that educational attainment has long term effects on health [6–8] and later socioeconomic status [8–11].

Some studies [12–14] have found that children born LPT are less likely than their term-born peers to exhibit 'school-readiness' or a 'good level of development'[15] early in their schooling. However, these studies do not show whether these early disadvantages persist and affect later educational attainment. To our knowledge, in the past decade only three [14,16,17] studies have directly investigated the specific effects of LPT birth on later educational performance. Two of these studies had contradictory findings with regards to the effects of LPT on educational achievement. The third (most recent) study [14] suggested that, after controlling for covariates, no statistically significant deficits in attainment remained for children born LPT by the age of 7.

One earlier study [18] explored LPT birth's impact on educational attainment up to age 11 years, finding that children born LPT were more likely to be behind their term-born peers in teacher assessment but not on objective standardised test scores. Given that this study is more than 20 years old and is the only one to observe negative long-term effects of LPT on educational performance, it is hard to unequivocally conclude that LPT children are at higher risk of adverse educational outcomes without further research.

In this paper we provide new insights on how LPT effect education by using a more recent longitudinal birth cohort [19]. The strengths of our study include using objective measures of educational achievement (standardized school assessments) throughout children's primary education (at ages 5, 7 and 11 years), controlling for a set of relevant background characteristics that are more comprehensive than the previous study (18), and exploring the impact of early-term (37-38 weeks) birth. Children born early-term have been found to be at elevated risk of lower attainment, at least up to the age of 9 years [20,21], whilst evidence is

more conflicting on whether early-term birth does [22] or does not [23] increase the likelihood of a child not being 'school-ready'.

Methods

The Born in Bradford Cohort Study

The Born-in-Bradford (BiB) birth cohort (borninbradford.nhs.uk) comprises 13,858 children born between 2007 and 2011[19]. Mothers were recruited at Bradford Royal Infirmary at around 26 weeks' gestation, providing demographic information and consenting to data linkage of their own and their child's health and educational records. Ethical approval for the BiB study was obtained from the Bradford Research Ethics Committee (Ref 07/H1302/112), with details of the recruitment protocol published in Raynor et al.[24]. The University of Leeds, School of Psychology Ethics Committee (approval number PSYC-249) provided ethical approval for the analyses presented here.

Gestational Variable

We measured gestation with a set of categorical variables to allow the relationship between school test scores and gestation to be non-linear. Gestation was measured in completed weeks and then grouped into the categories: very/moderately preterm (VMPT, ≤33 weeks), late-preterm (LPT, 34-36 weeks) early-term (37-38 weeks) and full-term (39-41 weeks).

Education Outcomes

Primary education in England (age 4-11 years) divides into three stages (Early Years Foundation Stage [EYFS]; Key Stage 1 [KS1]; Key Stage 2 [KS2]). At the end of each stage statutory assessment occurs against national standards [25–27]. At approximately age 5, the class teacher assesses pupils against age-related learning goals, including literacy and mathematics, using the EYFS Profile [25]. There is a statutory phonics reading assessment at age 6 [28]. At age 7, the end of KS1, reading, writing, and mathematics are assessed using nationally standardised Statutory Assessment Tests (SATs) [29]. At the end of KS2, at age 11, SATs are used to assess reading, mathematics and "English Grammar, Punctuation and Spelling" (EGPS), plus a teacher assessment for writing [27]. Within this study, the results for each assessment were dichotomised to indicate whether the child met or did not meet the expected-for-age standard, reflecting national scoring that has been used in similar analyses [16,30,31]. At time-points involving more than one assessment, an overall attainment measure was derived as the primary outcome, which indicated whether a child met the

expected-for-age standard threshold for reading, writing and mathematics assessments combined [27].

To maximize the sample size at each age and to investigate the impact on the most recent curricula, we considered all observations available at each time-point. 79.5% of the children in the last assessment at age 11 were also observed at age 5 (see supplementary online table 1).

Control Variables

Child-related covariates were gender and month of birth [15,16,30], the latter transformed into an ordinal variable ranking months from start to end of the school year (i.e. September=1 to August=12). Maternal covariates included: ethnicity (defined as: Pakistani, White British or "Other" (due to low numbers outside of Pakistani and White-British ethnicities)[31], parity [15,16,30,31], mother's education [15,23,30], mother's age at child's birth [15,16,23,31,32], cohabitation status [15,31], smoking during pregnancy [16,31,32], and receiving means-tested benefits [14,30]. Index of Multiple Deprivation (IMD) [33] for residency area [32,34] was transformed to compare living in category 1 (most deprived) to categories 2-10, due to small numbers in the higher categories. Mother's education was categorised in 4 groups: fewer than 5 GCSEs (General Certificate of Secondary Education) (≤11 years of education), 5 GCSEs or equivalent (11 years of education), A-level or equivalent (13 years of education), higher than A-level (>13 years education) which was used as the comparator, and "other" (formed of 'other', 'don't know', 'foreign unknown' responses). See Appendix A for descriptive statistics, reporting the distribution of these control variables.

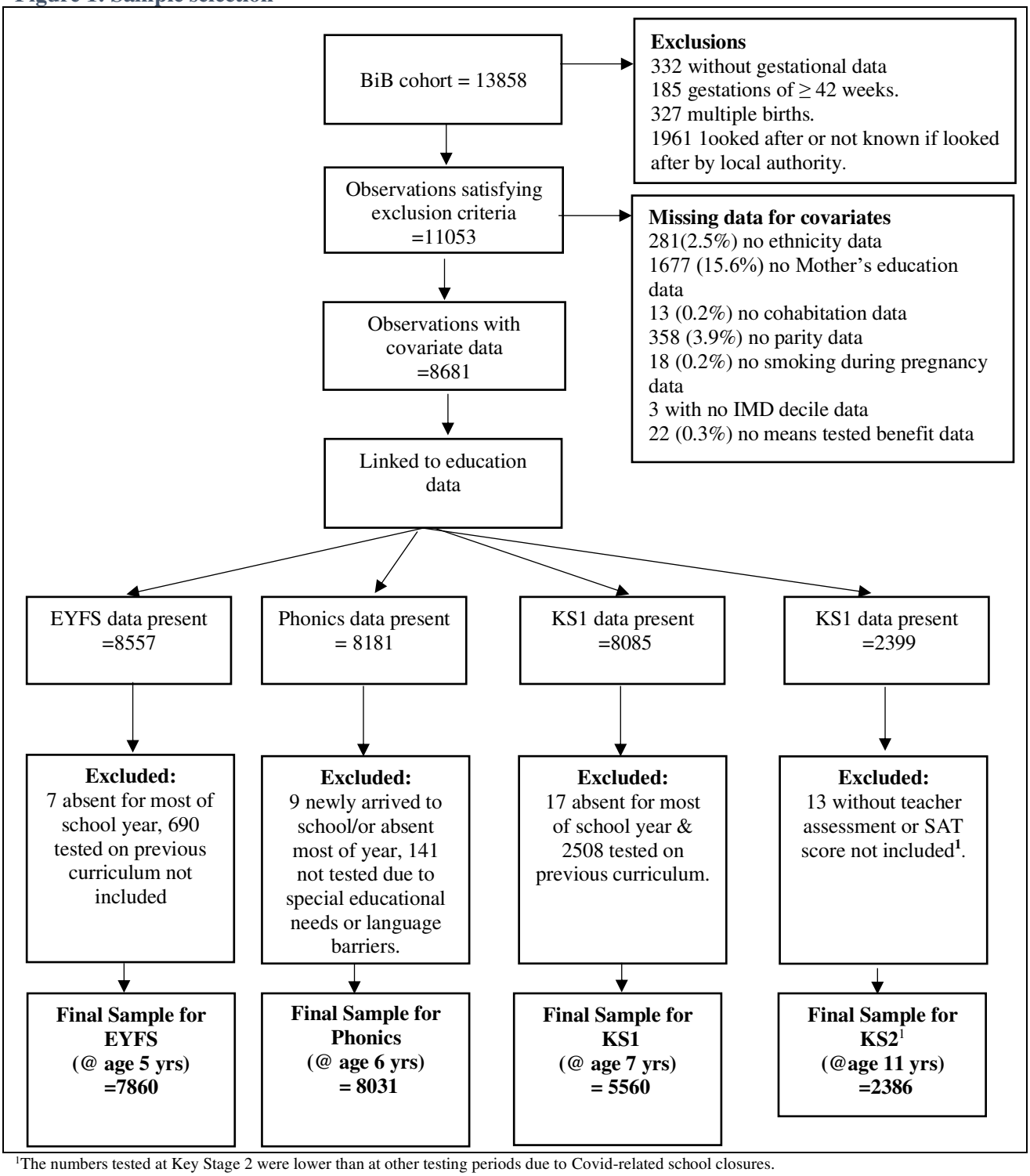
Exclusions and missing data

Children from multiple births, looked-after by the local authority, gestations over 41 weeks, and with missing covariates were excluded from an initial dataset of 13,526 observations. This sample selection process (see in Figure 1) resulted in 8681 participants with gestational and control variable data.

Educational data was then linked at each time-point for children who had completed assessments consistent with the current national curricula. Therefore, the final sub-samples consisted of 7860 children with EYFS data; 8031 with phonics data; 5560 with KS1 data; and 2386 with KS2 data. The smaller amount of KS2 data available was due to COVID-19 related school closures in 2020/2021.

Missing data analysis investigated the extent to which control variables with missing data varied by the amount missing and the proportions within categories (see online supplementary table S2). It was found that, proportionally, there were no differences greater than 5% between the distribution of data in the full BiB cohort sample and samples analyzed (see online supplementary table S2).

Figure 1: Sample selection



[1]The numbers tested at Key Stage 2 were lower than at other testing periods due to Covid-related school closures.

Results

Overall Educational Attainment

The percentages and odds ratios for not reaching the expected level of overall educational attainment at each time-point are shown in Table 1. At ages 5 and 7, children born LPT had significantly increased odds of not reaching expected levels of overall educational attainment. However, at age 11 results narrowly missed statistical significance once the model included the control variables. In the adjusted models (Figure 2); male sex, mother's education, and month of birth were also strong predictors of overall attainment. Meanwhile, early-term birth was not found to predict overall attainment at any stage. Very small numbers in the VMPT births category mean effects within this category should be interpreted with caution. Nonetheless, with the exception of Key Stage 1, patterns are as we would expect, with this group having the greatest odds of not achieving expected levels of overall attainment.

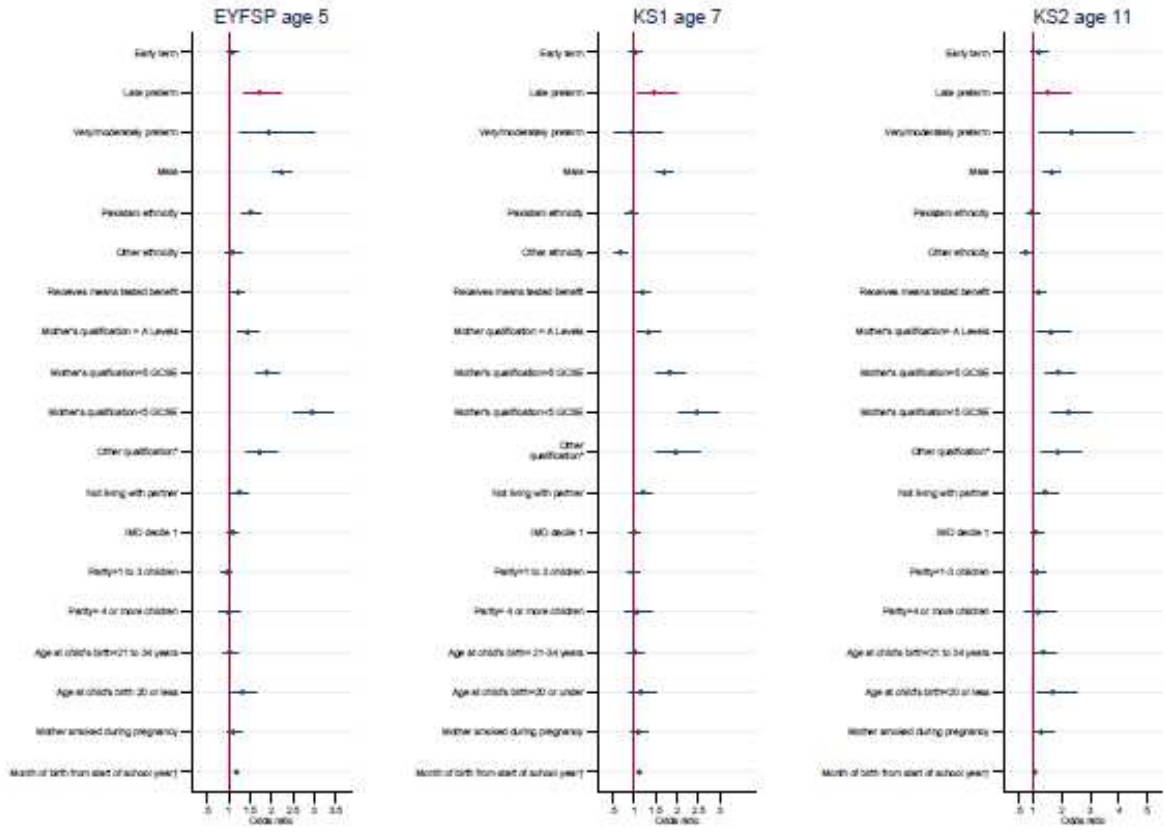


Figure 2

OR for not reaching expected levels of educational achievement to age 11 (adjusted for child and maternral characteristics).* Other qualification=foreign with unknown equivalent or unknown by participant. † Month of birth is used as an ordinal variable and was transformed relative to the start of the English school year to reflect

age with thin the year. EYFS ,Early Years Foundation Stage; GCSE, General Certificate of Education;IMD, Index of Multiple Deprivation;KS1, Key Stage 1;KS2,Key Stage 2.

Attainment by Subject

Table 2 shows percentages and odd ratios for not reaching expected levels of attainment in reading, phonics, writing and EGPS, with Table 3 showing the maths outcomes. For maths, there was consistent evidence of LPT birth, but not early-term birth, increasing the odds of not reaching expected levels of attainment on every assessment. For writing outcomes the effects of LPT birth were also relatively consistent, with the confidence intervals suggestive of a significant effect on three of the four assessed outcomes, even after adjusting for control variables. For reading assessments LPT births showed significantly increased odds of not reaching expected levels of attainment up to age 6, with no consistent effects for early-term birth observed.

Discussion

The results suggest that a clear gestational gradient exists both overall and by subject at 5 years-old, with both preterm groups at a statistically significant disadvantage. Whereas, at age 11 years the only gestational group showing statistically significant lower odds, with respect to overall attainment, was children born VMPT. However, the subject-specific results indicate that within mathematics an effect persisted, with lower odds for children born at VMPT and LPT term gestations, consistent with other studies [15,31]. An effect was also still present in writing.

This study makes a substantial contribution to the sparse evidence currently available on the impacts of LPT birth on educational attainment [3]. We find reductions in the frequencies with which children born LPT show expected levels of attainment, compared to term-born peers, across a variety of assessments from age 5 to 11 years. Although, it should be noted that the effect size found was generally relatively small. To our knowledge we are the first to observe difficulties in maths and writing persisting up to age 11 whilst using standardised objective assessments of educational performance and controlling for a comprehensive range of factors known to influence later educational attainment.

Our research extends previous work that found children born LPT were more likely to experience educational difficulties between the ages of 5 and 7 years [12–17], showing these educational disadvantages appear to remain an issue into early adolescence. Importantly, our

findings contradict earlier research that suggested difficulties beyond age 7 were only evident if one examined subjective measures of educational progress [18] or failed to control adequately for confounding covariates [14]. Both these weaknesses were addressed in our study's design. In comparing this current study to previous research, it should also be noted that ours is the first to sample data from a relatively recent cohort study within which all children are studying under the current UK curriculum. Thus, the results are likely to be an especially apposite reflection of LPT birth's impact on children's learning within contemporary education systems.

Further, we found that the effect of LPT birth on overall attainment was often comparable in size to that of male gender, mother having fewer than 13 years education, and living in an area of high deprivation. The cumulative effect of month of birth relative to starting school was also highly significant, with children born later in the school year less likely to show expected levels of attainment. Given these are all already well-established important factors influencing childhood attainment [15,30–32], this argues for greater appreciation of the impact of LPT birth on educational outcomes. For example, at age 11 years, approximately one third of children born LPT were not achieving the expected level of attainment in writing and maths, compared to only one fifth of their term-born peers. With almost three-quarters of preterm births occurring in the LPT period [5] the increased incidence of educational difficulties within this specific group equates to a substantial population burden, raising the question of whether more should be done to monitor and support the development of children born LPT.

In contrast, we found no evidence of early-term births showing significantly increased odds of poorer attainment, compared to full-term births. This somewhat contradicts earlier work that suggests, at least up to age 9, this group maybe more vulnerable to experiencing educational difficulties [20,21]. However, some of this previous research has had the advantage of working with larger datasets[20,22,34]. It is also important to note that in our results the effects of early-term birth tended to be smaller in size but in the same direction as those for LPT birth. This is perhaps suggestive of a linear effect of gestational age on education, which diminishes in size the closer to full-term a child is born [30].

Considering possible limitations within our work, we acknowledge that our data drew from a regional cohort study situated within Northern England [19]. Consequently, our sample contained a higher than typical proportion of children from socioeconomically deprived

backgrounds and ethnic minorities. However, this can also be viewed as a strength, given that we investigated the effects of birth characteristics on later development in a population known to have increased susceptibility to health and educational deprivation. Indeed, even after controlling for ethnic and socioeconomic factors we found LPT birth independently increased the risk of poor educational attainment. This points to a clear need for targeted support within disadvantaged communities, to limit the extent birth characteristics (such as LPT birth) provide an additional source of disadvantage.

A further limitation of our study is the low number of children in the preterm groups, especially in the VMPT group. We acknowledge the small sample size in the VMPT affects our ability to estimate the effect size in this group with precision. However, the effect of VMPT birth on education and the increased prevalence of special educational needs in VMPT births is not the main focus of our paper and has already being well-documented in previous studies [34,37].

A final limitation of our work is the risk of bias due to missing data. In our online supplementary table S2 we attenuate this concern by showing there are very small differences in the distribution of our background variables between the full sample and the samples at different child's ages, suggesting that the missing bias is likely to be minimal.

In conclusion, this study established that a substantial number of children born LPT were likely to experience educational difficulties into early adolescence, and that this association is independent of maternal socioeconomic characteristics. This raises questions about whether more proactive monitoring and support is necessary within this group, during the pre-school years and into formal education. Such action would be contrary to current presumptions, that LPT births require no additional surveillance [38]. Given the large size of the LPT group, we feel that the use of routinely-collected linked data may have potential in increasing integrated automated monitoring [39]. Furthermore, teaching professionals report feeling ill-equipped to support children born prematurely [40] hence greater training in this area would be advisable.

(word count 2496)

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Competing interests: None.

Patient consent for publication: Not required.

Ethics approval Ethics approval was obtained for the main platform study from the Bradford Research Ethics Committee (Ref 7/H1302/112).

Data sharing statement

All the data we have used are available on request from the BiB longitudinal cohort study. Access to this data is available on request via this link (https://borninbradford.nhs.uk/research/how-to-access-data/). We (the authors) do not have permission to republish independently the data shared with us by to conduct our study, as per the conditions of the data sharing agreement we signed with BiB in order to be granted access to their data.

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Table 1: Percentage and odds ratios for not achieving expected levels of educational achievement to age 11

Outcome	Very/moderately Preterm	Late preterm	Early- term	Full-term
EYFSP @ 5 years old				
total n (%)[1]	97 (1.2%)	305 (3.9%)	1703 (21.7%)	5755 (73.2%)
not achieving threshold (%)[2]	**48 (49.5%)**	**149 (48.9%)**	**654 (38.4%)**	**2094 (36.4%)**
OR (95% CI)	1.71**(1.15 to 2.56)	1.67***(1.33 to 2.10)	1.09 (0.98 to 1.22)	
aOR[3] (95% CI)	1.94**(1.25 to 3.00)	1.72***(1.34 to 2.21)	1.08 (0.96 to 1.22)	
KS1 SATs @ 7 years old				
total n (%)[1]	63 (1.1%)	204 (3.7%)	1237 (22.2%)	4056 (73.0%)
not achieving threshold (%)[2]	**20 (31.7%)**	**86 (42.2%)**	**411 (33.2%)**	**1347 (33.2%)**
OR (95% CI)	0.94 (0.55 to 1.60)	1.47**(1.10 to 1.95)	1.00 (0.87 to 1.14)	
aOR[3] (95% CI)	0.96 (0.55 to 1.67)	1.46*(1.08 to 1.97)	1.02 (0.88 to 1.17)	
KS2 SATs @ 11 years old				
total n (%)[1]	43 (1.8%)	101 (4.2%)	468 (19.6%)	1774 (74.4%)
not achieving threshold (%)[2]	**23 (53.5%)**	**45 (44.6%)**	**181 (38.7%)**	**611 (34.4%)**
OR (95% CI)	2.19*(1.19 to 4.02)	1.53*(1.02 to 2.30)	1.20 (0.97 to 1.48)	
aOR[3] (95% CI)	2.35**(1.25 to 4.45)	1.51 (0.99 to 2.30)	1.20 (0.97 to 1.50)	

Notes: EYFS: Early Years Foundation Stage; KS1: Key Stage 1; KS2: Key Stage 2 SATs: Statutory Assessment Tests; OR: Odds Ratio; aOR: Adjusted Odds Ratio; [1]Percentage of total sample; [2]Percentage of children within this sub-group not achieving expected levels of overall achievement threshold of reaching expected standards in reading, writing and mathematics assessment in national testing. [3] Adjusted model controlled for gestational group, sex of child, ethnicity, age of mother at child's birth, Mother's education, parity, mother smoked during pregnancy, receipt of means tested benefit, mother living with/not living with partner, month of birth from start of school year, and IMD category of residence. ***p<.001,** p<.01, * p<.05

Table 2: Percentage and odds ratios for not achieving expected levels of educational achievement to age 11 in literacy related outcomes

Assessment	Outcome	VMPT	LPT	Early-term	Full-term
EYFS reading and writing	Total n: (%)[1]	97 (1.2%)	305 (3.9%)	1703 (21.7%)	5755 (73.2%)
EYFS reading @ age 5	**Not achieving threshold(%)[2]**	**38 (39.2%)**	**116 (38.0%)**	**543 (31.9%)**	**1683 (29.2%)**
	OR (95% CI	1.56*(1.03 to 2.35)	1.49**(1.17 to 1.88)	1.13*(1.01 to 1.27)	
	aOR[3] (95% CI)	1.75*(1.12 to 2.74)	1.50**(1.16 to1.94)	1.12 (0.99 to 1.27)	
EYFSP writing @ age 5	**Not achieving threshold(%)[2]**	**44 (45.0%)**	**144 (47.2%)**	**607 (36%)**	**1944 (33.8%)**
	OR (95% CI)	1.63**(1.09 to 2.44)	1.75***(1.39 to 2 21)	1.09 (0.97 to 1.22)	
	aOR[3] (95% CI)	1.83**(1.18 to 2.84)	1.81***(1.41 to 2.33)	1.07 (0.94 to 1.20)	
Phonics[4]@ age 6	Total n: (%)[1]	106 (1.3%)	306 (3.8%)	1724 (21.5%)	5895 (73.4%)
	Not achieving threshold (%)[2]	**33 (31.1%)[2]**	**91 (29.7%)[2]**	**351 (20.4%)[2]**	**1157 (19.6%)[2]**
	OR (95% CI)	1.85**(1.22 to 2.81)	1.73***(1.35 to 2.23)	1.05 (0.92 to 1.20)	
	aOR[3] (95% CI)	1.94**(1.25 to 3.01)	1.76***(1.35 to 2.30)	1.06 (0.92 to 1.22)	
KS1 SATs reading and writing	Total n (%)[1]	63 (1.1%)	204 (3.7%)	1237 (22.2%)	4056 (73.0%)
KS1 reading @ age 7	**Not achieving threshold (%)[2]**	**15 (23.8%)**	**58 (28.4%)**	**297 (24.0%)**	**957 (23.8%)**
	OR (95% CI)	1.01 (0.56 to 1.82)	1.29 (0.94 to 1.76)	1.02 (0.88 to 1.19)	
	aOR[3] (95% CI)	1.10 (0.60 to 2.01)	1.24 (0.89 to 1.72)	1.02 (0.87 to 1.19)	
KS2 writing @ age 7	**Not achieving (%)[2]**	**18 (28.6%)**[2]	**72 (35.3%)**[2]	**353 (28.5%)**[2]	**1143 (28.2%)**[2]
	OR (95% CI)	1.02 (0.59 to 1.77)	1.39**(1.04 to 1.87)	1.02 (0.88 to 1 .17)	
	aOR[3] (95% CI)	1.07 (0.60 to 1.90)	1.36 (1.00 to 1.86)	1.04 (0.89 to 1.20)	
KS2 SATs reading and writing	Total n(%)[1]	43 (1.8%)	101 (4.2%)	468 (19.6%)	1774 (74.4%)
KS2 reading @ age 11	**Not achieving threshold(%)[2]**	**15 (34.9%)**	**36 (35.6%)**	**139 (29.7%)**	472 (26.6%)
	OR (95% CI)	1.48(0.78 to 2.80)	1.53**(1.00 to 2.33)	1.17 (0.93 to 1.46)	
	aOR[3] (95% CI)	1.49(0.76 to 2.89)	1.51(0.97 to 2.34)	1.14 (0.90 to 1.44)	
KS2 Writing @ age 11	**Not achieving threshold (%)[2]**	**14 (32.6%)**	**29(28.7%)**	**110 (23.5%)**	338 (19.1%)
	OR (95% CI)	2.05**(1.07 to 3.92)	1.71**(1.09 to 2.68)	1.31**(1.02 to 1.67)	
	aOR[3] (95% CI)	2.10**(1.05 to 4.21)	1.64**(1.02 to 2.62)	1.32**(1.02 to 1.70)	
KS2 EGPS[4] @ age 11	**Not achieving threshold (%)[2]**	**13(30.2%)**	**35(34.7%)**	**98 (20.9%)**	321 (18.1%)
	OR (95% CI)	1.96**(1.01 to 3.80)	2.40***(1.57 to 3.68)	1.20 (0.93 to 1.55)	
	aOR[3] (95% CI)	2.07**(1.03 to 4.25)	2.38***(1.52 to 3.73)	1.23(0.95 to 1.60)	

Notes: VMPT: Very/Moderately Preterm; LPT: Later Preterm; EYFS: Early Years Foundation Stage; KS1: Key Stage 1; KS2: Key Stage 2 SATs: Statutory Assessment Tests; OR: Odds Ratio; aOR: Adjusted Odds Ratio; EGPS: English Grammar Punctuation and Spelling [1]Percentage of total sample; [2]Percentage of children within this sub-group not achieving expected level of achievement threshold within this assessment. [3]Adjusted model controlled for gestational group, sex of child, ethnicity, age of mother at child's birth, Mother's education, parity, mother smoked during pregnancy, receipt of means tested benefit, mother living with/not living with partner, month of birth from start of school year, and IMD category of residence. 4. Phonics and English grammar punctuation, and spelling do not form part of the overall educational achievement variable assessment and were not assessed at the other time points. ***p<.001,** p<.01, * p<.05

Table 3: Odd Ratios and percentage not achieving expected levels of educational achievement to age 11 in mathematics related outcomes

Assessment	Outcomes	VMPT	LPT	Early-term	Full-term
EYFS @ 5 years old	**Total n: (%)[1]**	97 (1.2%)	305 (3.9%)	1703 (21.7%)	5755 (73.2%)
EYFS Profile maths @ 5 years old	**Not achieving threshold(%)[2]**	**45 (46.4%)**	**127 (41.6%)**	**556 (32.6%)**	**1736 (30.2%)**
	OR (95% CI)	2.00**(1.34 to 3.00)	1.65***(1.31 to 2.09)	1.12 (1.00 to 1.26)	
	aOR[3] (95% CI)	2.30***(1.49 to 3.56)	1.72***(1.34 to 2.21)	1.11 (0.98 to 1.26)	
EYFS Profile number @ 5 years old	**Not achieving threshold (%)[2]**	**43 (44.3%)**	**122 (40.0%)**	**531 (31.2%)**	**1637 (28.4%)**
	OR (95% CI)	2.00**(1.34 to 3.00)	1.68*** (1.32 to 2.12)	1.14*(1.01 to 1.28)	
	aOR[3] (95% CI)	2.31***(1.49 to 3.57)	1.76***(1.36 to 2.26)	1.13 (0.99 to 1.28)	
EYFS Profile space, shapes and measure @ 5 years old	**Not achieving threshold (%)[2]**	**39 (40.2%)**	**106 (34.8%)**	**475 (27.9%)**	**1480 (25.7%)**
	OR (95% CI)	1.94**(1.29 to 2.93)	1.54**(1.21 to 1.96)	1.12 ((0.99 to 1.26)	
	aOR[3] (95% CI)	2.22***(1.42 to 3.45)	1.57***(1.21 to 2.04)	1.09 (0.96 to 1.25)	
KS1 SATs maths @ 7 years old	**Total n: (%)[1]**	63 (1.1%)	204 (3.7%)	1237 (22.2%)	4056 (73.0%)
	Not achieving threshold (%)[2]	**14 (22.2%)**	**66 (32.4%)**	**297 (24.0%)**	**941 (23.2%)**
	OR (95% CI)	0.95(0.52 to 1.72)	1.58**(1.17-2.14)	1.05(0.90-1.22)	
	aOR[3] (95% CI)	0.96 (0.52 to 1.78)	1.60***(1.16-2.19)	1.06(0.91-1.24)	
KS2 SATs maths @ 11 years old	**Total n: (%)[1]**	43 (1.8%)	101 (4.2%)	468 (19.6%)	1774 (74.4%)
	Not achieving threshold (%)[2]	**15 (34.9%)**	**35 (34.7%)**	**103 (22.0%)**	**342 (19.3%)**
	OR (95% CI)	2.24* (1.19 to 4.25)	2.22***(1.45 to 3.40)	1.18 (0.92 to 1.52)	
	aOR[3](95% CI)	2.46**(1.27 to 4.77)	2.35***(1.50 to 3.67)	1.21 (0.94 to 1.56)	

Notes: VMPT: Very/Moderately Preterm; LPT: Later Preterm; EYFS: Early Years Foundation Stage; KS1: Key Stage 1; KS2: Key Stage 2 SATs: Scholastic Assessment Tests; OR: Odds Ratio; aOR: Adjusted Odds Ratio; SSM: Space, Shape & Measure; [1]Percentage of total sample; [2]Percentage of children within this sub-group not achieving expected level of educational achievement in this assessment. [3] Adjusted model controlled for gestational group, sex of child, ethnicity, age of mother at child's birth, Mother's education, parity, mother smoked during pregnancy, receipt of means tested benefit, mother living with/not living with partner, month of birth from start of school year, and IMD category of residence.
***p<.001,** p<.01, * p<.05