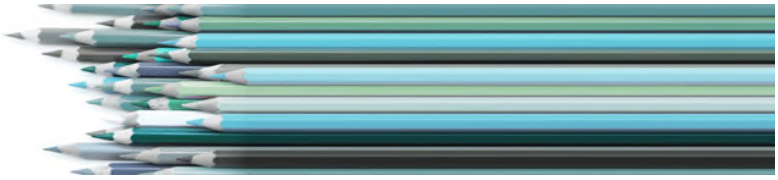
PrIME
Preterm birth: Impact on Maths & Education



Delayed School Entry for Preterm Children

Assessing the Feasibility of a Randomized Controlled Trial

Briefing notes and recommendations

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We would to thank Professor Simon Gates from the Clinical Trials Unit at the University of Warwick and all the parents and teachers for their invaluable input to the project.

About The Nuffield Foundation

The Nuffield Foundation is an endowed charitable trust that aims to improve social well-being in the widest sense. It funds research and innovation in education and social policy and also works to build capacity in education, science and social science research. The Nuffield Foundation has funded this project, but the views expressed are those of the authors and not necessarily those of the Foundation.

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Definitions

It is important to understand the meaning of the key terminology that will be used throughout this report. For clarification, we provide a definition of the key concept – delayed school entry – as well as three other key terms. This report is based on guidelines and policies as applied in England.

Compulsory School Entry Age

Children in England may start full-time in a reception class the September following their fourth birthday and admission authorities are required to provide a school reception place to these children. However, children are required to start school (Year 1) the September after their fifth birthday.

Delayed School Entry (DSE) – England

Specific to children born in the summer term (1. April to 31. August) parents are allowed to request for their child to be admitted to school a full year after compulsory school age – the point at which other children in their age range are beginning Year 1. This means that the child would start reception when they should, according to their age, start Year 1.

Deferred School Entry – England

A practice, where parents request that their child attends school part-time until they reach compulsory school age, or that the date their child is admitted to school (reception) is deferred until later in the **same academic year.** Parents may not defer beyond the point of reaching compulsory school age or beyond the start of the final term of that school year.

Redshirting – USA

A practice in the United States, whereby parents intentionally withhold their child from entering kindergarten at appropriate age (usually all children who turn five 1before 1August that year) and allowing them to mature for an additional year. This means that these children can enter kindergarten one full year later, thereby joining a cohort that would be one year younger than them.

1. Executive Summary

The literature on the potential outcomes of delayed school entry (DSE) is controversial, in particular for children who are born preterm. Parents often request delayed school entry for their preterm children, but there is no conclusive evidence that delaying children's school entry is beneficial. Indeed, there is evidence from observational studies that indicate that it may even disadvantage a child's academic success. A gold standard assessment of the merits or disadvantages of DSE would be a randomised controlled trial (RCT). This report assesses the feasibility of whether it is possible to conduct a RCT of delayed school entry for preterm children in the UK.

The key finding from this report is that conducting a RCT of DSE is not feasible: the barriers largely outweigh the prospect of successfully conducting a trial. The main stakeholders, the parents of preterm children, overwhelmingly reported that they would not consider participating in a RCT of DSE as they strongly feel that this would be too drastic an intervention to be left to chance and tested in this way. Furthermore, the authorities who decide upon delaying a child's school entry are entrusted with making decisions on an individual basis, making it impossible to ensure DSE for all participants randomized to the DSE arm of a trial. There would also be high financial costs involved in such a study as the additional year of day care costs for children in the DSE arm may be too large to be covered by potential funding agencies.

We propose that an alternative intervention at the transition to primary school around additional support for preterm children, teachers and parents should be considered and would be more acceptable for all stakeholders.

2. Introduction

Parents of preterm children, and those of children born in the summer months (1 April to 31 August) have been campaigning for delayed school entry (DSE) in the UK. Following a campaign by parents building on some emerging research results on summer born children and a campaign by Bliss – a UK charity for babies born preterm, influenced the UK School Admission Code to be revised in December 2014. A directive by the Department of Education[1] now allows for the possibility of DSE for children born in the summer months, however it is still unknown what the potential benefits or drawbacks might be for children who are granted DSE.

There is consistent evidence that the youngest children in the classroom perform on average worse academically compared with the oldest children in their academic year (i.e., cohort) [2,3] with effects shown well into secondary school and beyond[4]. DSE has been proposed as a potential route towards compensating for lower average performance for the youngest in the classroom. However, there are some logistic and practical reasons why DSE for all summer born children may not be a solution. If all summer born children delayed school entry, they would be the oldest in the next years' intake thereby shifting the disadvantage to those who were born in spring and so on. Thus, it has been proposed that a more appropriate strategy would be to adjust final exam results according to birth date in relation to age at testing.[5]

In contrast, there may be a different argument for DSE for those born preterm. These children are born 3 weeks to 4 months before their expected date of delivery (EDD). For example, a child expected to be born on 5th October may be born very prematurely 3 months early on 5th July. According to the birth date, this preterm born child would now have to go to school a year earlier than if she/he would have been born at full term. S/he would then become one of the younger children in the class, in addition to potentially experiencing health conditions, developmental problems and social-emotional immaturity which may reduce their school readiness and potential for learning. Preterm birth and its related complications have been shown to have adverse effects on academic achievement and school outcomes[6,7,8]. Entering school a year early, as a result of being born preterm poses an additional disadvantage with adverse effects on academic achievement[9,10]. Thus the parents of preterm children, in particular those born very (< 32 weeks' gestation) or extremely preterm (<28 weeks' gestation) have

[1] Department of Education, (2014). Advice on the admission of summer born children. For local authorities, school admission authorities and parents. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/389448/Summer_born_admissions_advice_Dec_2014.pdf

[2] Verachtert, P., De Fraine, B., Onghena, P., Ghesquiere, P. (2010). Season of birth and school success in early years of primary education. *Oxford Review of Education*, 36, 285-306.

[3] Robertson, E. (2011). The effects of quarter of birth on academic outcomes at the elementary school level. *Economic Educational Review*, 30, 300-311.

[4] Crawford, C., Dearden, L., Meghir, C. (2010). When you are born matters: The impact of date of birth on educational outcomes in england. http://www.ifs.org.uk/wps/wp1006.pdf

[5] Crawford, C., Dearden, L., & Greaves, E. (2014). The drivers of month-of-birth differences in children's cognitive and non-cognitive skills. Journal of the Royal Statistical Society: Series A (Statistics in Society), 177(4), 829-860. doi:10.1111/rssa.12071

[6] Johnson, S., Hennessy, E., Smith, R., Trikic, R., Wolke, D., Marlow, N. (2009). Academic attainment and special educational needs in extremely preterm children at 11 years of age: the EPICure study. *Archives of Disease in Childhoos – Fetal and Neonatal Edition*,, 94(4), F283-F289.

[7] de Jong, M., Verhoeven, M., van Baar, A. L. (2012). School outcomes, cognitive functioning, and behaviour problems in moderate and late preterm children and adults: A review. *Seminars in Fetal & Neonatal Medicine*, 17, 163-169.

[8] Jaekel, J., Wolke, D., Bartmann, P. (2013). Poor attention rather than hyperactivity/impulsivity predicts academic achievement in very preterm and full-term adolescents. *Psychological Medicine*, 42(1), 183-196.

[9] Roberts, G., Lim, J., Doyle, L. W., Anderson, P. J. (2011). High rates of school readiness difficulties at 5 years of age in very preterm infants compared with term controls. *Journal of Developmental & Behavioral Pediatrics*, 32(3), 117-124.

[10] Quigley, M. A. Poulsen ,F., Boyle, E., Wolke, D., Field, D., Alfirevic, Z., Kurinczuk, J. J. (2012). Early term and late preterm birth are associated with poorer school performance at age 5 years: a cohort study. *Achieves of Disease in Childhood*

called for the opportunity to delay school entry for their children to counter-act the double disadvantage that they may experience.

There are a range of studies that have investigated the potential outcomes of DSE[11,12,13,14], however these typically come from countries where DSE has been permitted for years, did not control for known confounders and decisions of DSE were not randomized. Moreover, findings have been contradictory, with some pointing towards no difference between children who have been delayed compared to controls[15], while others have found both advantages[13]and disadvantages for those children who have DSE[8]. One reason being whether comparisons have been made according to performance at the end of the first school year or according to comparison with same-aged peers[16].

A randomized controlled trial would be the gold standard test to assess whether or not delaying school entry would benefit children born in summer. In particular, it would be a gold standard test of whether this intervention (DSE) would benefit those born preterm in summer. However, there are no such studies. Jaekel, Strauss, Johnson, Gilmore and Wolke[8] have so far offered the best available evidence informing professionals and parents of the possible outcomes of DSE. Using propensity score matching to control for important confounders, they found that according to teacher ratings of achievement, there was no difference between DSE children compared to those with age-appropriate school entry at the end of Year 1 (i.e. according to school experience). In contrast, according to standardized tests that were administered at 8 years of age (i.e. performance compared to same aged peers), children with DSE were found to have poorer average performance in reading, writing and maths, even after accounting for less time spent in school.

This report is concerned with the opportunities and obstacles for conducting a RCT for children born preterm *and* in the summer months. A flow diagram (Figure 2.1) illustrates all of the report components and a wide range of stakeholders and sources of information that were used to assess the feasibility of carrying out a RCT.

[11] Martin, A. J. (2009). Age appropriateness and motivation, engagement, and performance in high school: effects of age within cohort, grade retention, and delayed school entry. *Journal of Educational Psychology*, 101(1), 101-114.
[12] Altwicker-Hámori, S., Köllo, J. 2012. Whose children gain from starting school later? – evidence from Hungary. *Educational Research and Evaluation: An Onternational Journal on Theory and Practice*, 18(5), 459-488.
[13] Dagli, U. Y., Ithel, J. (2012). The effects of on-time, delayed and early kindergarten enrolment onchildrens mathematics achievement: Differences by gender, race, and family socio-economic status. *Educational Sciences: Theory and Practice*, 12(4), 3061-3074.
[14] Jaekel, J., Strauss, V. Y., Johnson, S., Gilmore, C., Wolke, D. (2015). Delayed school entry and academic performance: a natural experiment. *Developmental Medicine & Child Neurology*, 1-8.
[15] Graue, B., DiPerna, J. (2000). Reshirting and early retention: Who gets the "gift of time" and what are the outcomes? *American Educational Research Journal*, 37(2), 509-534.
[16] Crawford, C., Dearden, L., & Greaves, E. (2014). The drivers of month-of-birth differences in children's cognitive and non-cognitive skills. *Journal of the Royal Statistical Society: Series A (Statistics in Society), 177*(4), 829-860. doi:10.1111/rssa.12071

Figure 2.1 Flowchart of Report Components

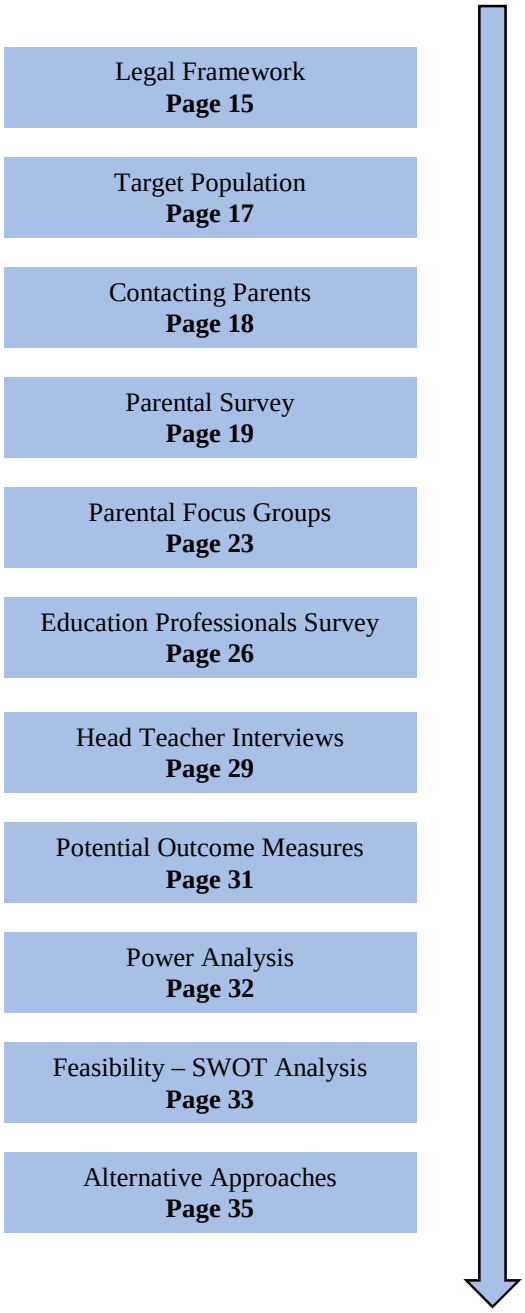


Figure 2.2 Figure and Table Outline

Table 2.3 Literature review: Advantages of delayed school entry.

Study	Sample	Aim	Measures	Results	Reference
Dagli & Jones (2012)	United States N=15,779 children in the Early Childhood Longitudinal Study: Kindergarten Cohort (ECLS-K)	To explore whether children's mathematics achievement differs by kindergarten enrolment status and how kindergarten enrolment status interacts with children's gender, race and family SES in predicting maths achievement.	Children's kindergarten enrolment status (early, delayed, on-time), gender, status, race, SES Outcome Variables: Mathematics assessment batteries done in fall and spring.	Early enrolled children had significantly lower mathematics achievement than on-time enrolled children. On-time enrolled children had significantly lower mathematics achievement compared to children whose enrolment was delayed.	Dagli, U. Y., Jones, I. (2012). The effects of on-time, delayed and early kindergarten enrollment on children's mathematics achievement: Differences by gender, race, and family socio-economic status. Educational Sciences: Theory & Practice, 12, 3061-3074.
Malone et al. (2006)	United States N=21,000 children Early Childhood Longitudinal Study, Kindergarten Class of 1998-99 (ECLS-K)	To examine the relationship between kindergarten enrollment status (repeating kindergarten vs. delaying entry into kindergarten) and children's spring first grade reading and mathematics achievement.	Same grade approach. Comparing children within the same grade. Reading: 1) letter recognition 2) beginning sound 3) ending sound 4) sight words 5) word context. Maths: 1) number/shape 2) relative size 3) ordinaltity/sequence 4) add/subtract 5) multiply/divide	At the end of first grade children whose KG entry was delayed demonstrated slightly higher reading knowledge and skills vs. those who attended KG on-time. In mathematics, however children with delayed entry were behind their classmates who began on-time.	Malone, L. M., West, J., Denton, K. F., & Park, J. (2006). The early reading and mathematics achievement of children who repeated kindergarten or who began school a year late (NCES 2006–064). Washington, DC: National Center for Education Statistics, Institute of Education Sciences.
Oshima & Domaleski (2006)	United States Early Childhood Longitudinal Study, Kindergarten Class of 1998-99 (ECLS-K)	To investigate redshirting (difference between children with summer birthdays vs fall birthdays) and academic performance.	Students reading and mathematics performance (cross-sectionally).	Older KG students performed better in reading and mathematics up to grade 5 after which there was no more a difference.	Oshima, T. C., & Domaleski, C. S. (2006). Academic performance gap between summer-birthday and fall-birthday children in

					grades K 8. Journal of Educational Research, (99)4, 212-217.
Altwicker-Hamori & Kollo (2012)	1) Hungarys National Assessment of Basic Competencies (NABC) covering Grade 4 and 8 in the country N=80,000 2) Progress in International Reading Literacy Study (PIRLS) Study available for 35 countries at Grade level 4 3) Trends in International Mathematics and Science (TIMSS) based on 48 countries at Grade 4 and 8	How does delaying school entry affect academic achievement? How does disadvantaged/advantaged background play a role?	Mothers level of education to determine disadvantaged status. NABC: Composite cognitive-academic test score – Grade 4 (reading, writing, arithmetic, combinative thinking, analytic skills) Grade 8 (literacy and mathematics) PIRLS: Student Questionnaires (reading test scores, basic student background information), Home Survey (socio-economic and demographics) TIMSS: Mathematics score	Main results based on NANBC : Children with delayed school entry were found to gain from starting school later, especially when coming from low-educated families. Effect holds even when looking at mathematics and reading tests separately. When analysis repeated with PIRLS and TIMSS sample, results follow the same pattern.	Altiwcker-Hamori, S., Kollo, J. (2012). Whose children gainf rom starting school later? – evidence from Hungary. Education Research and Evaluation, 18(5), 459-488.

Table 2.4 Literature review: Disadvantages or no impact of delayed school entry

Study	Sample	Aim	Measures	Results	Reference
Jaekel et al. (2015)	999 children who were part of a population-based longitudinal study in Germany.	To investigate the effects of DSE versus age-appropriate school entry (ASE) on children's academic achievement and attention in middle childhood.	Propensity score matching was applied to create two matched groups in terms of DSE and ASE. Teacher ratings of achievement in maths, reading, writing and attention were obtained in Year 1 and standardized tests were administered at 8 years of age.	No difference in teacher ratings in Year 1. Standardized mean test score for DSE children were lower than ASE children in all domains.	Jaekel, J., Strauss, V. Y.-C., Johnson, S., Gilmore, C., & **Wolke, D.** (2015). Delayed school entry and academic performance: a natural experiment. *Developmental Medicine & Child Neurology*, Vol 57(7), p652-659. doi: http://dx,doi.org10.1111/dmcn.12713
Stipek & Byler (2001)	237 children distributed among more than 80 school	To longitudinally assess effects of age at which children entered KG on children's academic achievement etc.	Achievement tests (math and literacy) during kindergarten (or in spring of first grade for age-matched sample) and again in third grade. Child self-ratings, teacher ratings.	Comparing children in the same grade (KG) but different ages: younger children performed worse academically but this difference disappeared by third grade. No difference in teacher ratings. Looking at children matched on age but in different grades (KG vs first grade) those children who entered school a year younger achieved sig. higher in math than children who entered school a year older. First graders also had higher perceptions of their skills in math and literacy.	Stipek, D., Byler, P. (2001). Academic achievement and social behaviors associated with age of entry into kindergarten. *Journal of Applied Developmental Psychology*, 22(2), 175-189.

Martin (2009)	3,684 high schoolers	To examine the relative salience of age within cohort, grade retention and DSE in student's academic motivation, engagement, and performance. *Retention=repeating a grade at during schooling. *DSE status only inferred based on those children who were older compared to cohort & not retained.	Motivation and Engagement Scale-High School (MES-HS), self-completed questionnaire.	Older-for-cohort students were higher in disengagement, lower in positive intentions, lower in homework completion & lower in performance scores. Over and above demographic and age-within-cohort effects, the effects of grade retention were the most negative.	Martin, A. K. (2009). Age appropriateness and motivation, engagement and performance in high school: Effects of age within cohort, grade retention, and delayed school entry. *Journal of Educational Psychology*, 101(1), 101-114.
Malone et al. (2006)	N=21,000 children United States Early Childhood Longitudinal Study, Kindergarten Class of 1998-99 (ECLS-K)	To examine the relationship between kindergarten enrollment status (repeating kindergarten vs. delaying entry into kindergarten) and children's spring first grade reading and mathematics achievement.	Same grade approach. Comparing children within the same grade. Reading: 1) letter recognition 2) beginning sound 3) ending sound 4) sight words 5) word context. Maths: 1) number/shape 2) relative size 3) ordinaltity/sequence 4) add/subtract 5) multiply/divide	At the end of first grade children whose KG entry was delayed demonstrated slightly higher reading knowledge and skills vs. those who attended KG on-time. In mathematics, however children with delayed entry were behind their classmates who began on-time.	Malone, L. M., West, J., Denton, K. F., & Park, J. (2006). *The early reading and mathematics achievement of children who repeated kindergarten or who began school a year late* (NCES 2006–064). Washington, DC: National Center for Education Statistics, Institute of Education Sciences.
Graue & DiPerna (2000)	United States N=8,595 students	To examine individual characteristics and outcomes associated with academic redshirting.	Early entry (entered KG before 60m), normal entry (entered KG between 60 and 71m), retained KG, retained grades 1-3, redshirt (entered KG 72m or older). Achievement: Reading scores in third grade.	Achievement of redshirts was similar to normal entry children. The youngest children who were normally entered also performed at the same levels as those children who were given an additional year to grow (delayed).	Graue, M. E., DiPerna, J. (2000). Redshirting and early retention: Who gets the 'gift of time' and what its outcomes. *American Educational Research Journal*, 37(2), 509-534.

Mauer (2005)	United States N=352 students	To examine scores on second, third and fourth grade reading and mathematics tests between children who were redshirted, attended KG on time or attended KG very young. Attended KG: 'Redshirted' Above 5 years and 8 months. 'Age-appropriate' Between 5 years and 5 years and 8 months. 'Very young' Between 4 years 9 months and 4 years 11 months.	Reading and mathematics tests in grades 2, 3 and 4.	Redshirted students did not differ from age-appropriate students in reading across any grade. Very young children performed worse in reading only in grade 4. No differences between any groups and across grades was found for mathematic performance.	March, C.(2005). Academic redshirting: Does withholding a child from school entrance for one year increase academic success? *Issues In Educational Research*, 15, 69-85.
Mendez et al. (2015)	United States Longitudinal Cohort Study Data from Omnibus Project collected on children from KG until Grade 12 N=7,319 students	To examine the differences between retained (repeating kindergarten), delayed and on-time school entry (into kindergarten) in terms of i) demographics and early development ii) to see whether SES changed these results	Comprehensive Test of Basic Skills (CTBS-4) used as achievement test in Grades 3, 5 and 7. Teacher completed survey on student attention, behaviour and attitudes towards school in Grades 3 and 5. Student Adjustment Scale (SAS) in Grade 5.	Children whose kindergarten entry was delayed had similar outcomes to children who entered KG on-time. Retained children had the poorest outcome. Delayed entry students however were sig. more likely to be placed in special education vs. students who entered on time.	Mendez, L. M. R., Kim, E. S., Ferron, J., Woods, B. (2015). Altering school progression through delayed entry or kindergarten retention: Propensity score analysis of long-term outcomes. The Journal of Educational Research, 108(1), 186-203.

2.2 Literature Review Summary[17]

The studies conducted on DSE have so far been mixed with some showing advantages of DSE, while others have found disadvantages or no effects associated with DSE. A larger portion of studies conducted stems from samples in the United States where parents have made decisions on whether

[17] All full references in this section are available above in Table 2.3 and Table 2.4.

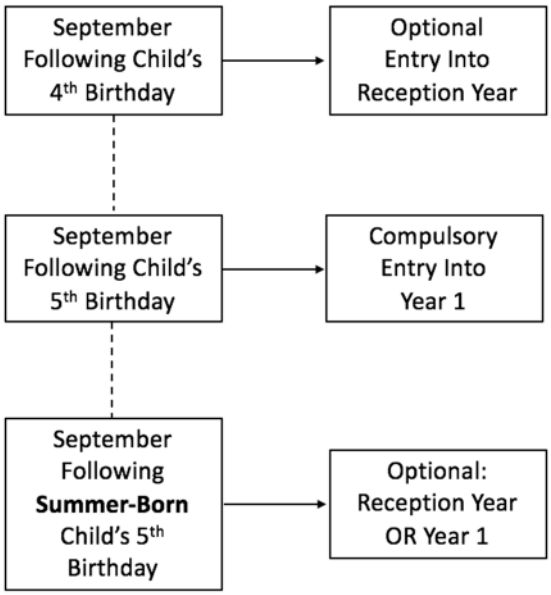
to delay their child's kindergarten entry (also known as redshirting). Some evidence is suggesting that there are short-term advantages in mathematics (see all references in table 2.3) and literacy achievements (Malone et al., 2006), while others demonstrate positive effects lasting into middle childhood (Oshima & Domleski, 2006; Altwicker-Hamori & Kollo, 2012). Contrary to this, there are a few studies showing no difference in academic achievement between children whose kindergarten entry was delayed with those who entered kindergarten on-time, across early and middle childhood (Graue & DiPerna 2000; Mauer, 2005; Mendez et al., 2005). Yet again, other studies have found a range of disadvantages associated with DSE. For example, using an Australian sample Martin (2009) found that older-for-cohort children were higher in disengagement, lower in homework completion and lower in performance scores in high school compared to age-appropriate counterparts in the class. Moreover, when looking at children matched on age, but different in grades (KG vs. grade 1) children who have entered school a year later have been shown to have lower mathematics achievements compared to those who entered school on-time (Stipek & Byler, 2001). The biggest limitation of the majority of studies exploring the relationship between redshirting/DSE and academic performance has been the lack of appropriate of inclusion and control for confounders. Most studies typically control for gender, SES and some aspects of familial characteristics, often disregarding early individual characteristics of children themselves (i.e. gestational age, birth weight, IQ, early vocabulary test, attention span etc.). The only study to date that has effectively controlled for pre-existing confounders via propensity score matching was conducted by Jaekel et al. (2015). They found that according to teacher ratings of achievement, there was no difference between DSE children and those with age-appropriate school entry at the end of Year 1. In contrast, according to standardized tests children with DSE were found to have poorer average performance in reading, writing and maths, even after accounting for less time spent in school. There is a clear need for more controlled studies examining the relationship between DSE and academic performance. Ideally these should be randomized – as there is no single RCT of DSE that has been conducted to date.

3. Legal Framework

On the 19th of December 2014, the Department of Education in the United Kingdom put forward a revised code addressing the topic of DSE for summer-born children[18]. Advice has been provided with the aim of helping local authorities, school admission authorities and parents to understand the policies and the legal framework under which admission authorities must operate.

- School admission authorities are required to provide a school reception place to ensure the admission of all children in the September following their fourth birthday.
- *However*, children do not reach compulsory school age until the September after their fifth birthday.
- **"Summer-Born"** is used to refer to children born between 1. April and 31. August. These children are *not required* to start school until a full year after the point at which they could have been admitted.
    - Parents of summer-born children may request for their child to be admitted out of their normal age group.

Figure 3.1 Flowchart of formal admission code provided by Department of Education.



[18] Department of Education, Schools: Departmental Advice. (2014). *Summer-born children: School admission* (1-11). London.

3.1 Who are the Admission Authorities?

- Foundation and voluntary aided schools, academies and free schools
  ⇒ Governing body or the Academy

- Community and voluntary controlled schools
  ⇒ Local authorities

3.2 Considerations Admission Authorities take when deciding to Delay School Entry

- Parent's views
- Views of school's head teacher.
- Information about child's academic development
- Information about child's social development
- Information about child's emotional development
- Child's medical history
- Views of a medical professional
- Whether the child has previously been educated out of normal age group
- Whether they may naturally have fallen into a lower age group, if it were not for premature birth.

Parents do have the statutory right to appeal against the refusal of a place at a school for which they have applied for; *this does not apply if they are offered a place at the school, **but** it is not in their preferred age group.*

Parents of children born **prematurely** (without being summer-born) may not request for their child's delayed school entry.

3.3 Caveats of the Code Addressing Delayed School Entry

One of the main caveats about the revised code provided by the Department of Education is that it fails to take into account premature birth as a central factor in deciding whether to grant DSE for a child. For instance, a child with an expected birthdate in June, who is born prematurely in March, would not be treated as summer-born. This means that children who are expected to be summer-born, but failed to match the criteria (being born between 1. April and 31. August) as a result of prematurity, would be prohibited from requesting DSE.

This is surprising, as premature birth on its own has been found to increase the odds of experiencing developmental delays[19] [20] and academic problems; hence this subgroup of children is experiencing double-jeopardy compared to those born full-term.

4. Identifying Target Population

Data on all live births in 2013 across England was collated in order to provide an overview of the total number of children born across the summer months (April through August). These numbers served as an estimation of our target population, identifying those children who were both preterm and summer-born.

Figure 4.1. Overview of total number of preterm children in England born in the summer months in 2013 based on the ONS[21] and MBRACE-UK[22].

	Total live births in England & Wales in 2013	Estimate of total live births in England only in 2013	Estimate of the number of live births at 24-27 weeks gestation in England in 2013	Estimate of the number of live births at 28-31 weeks gestation in England in 2013	Estimate of the number of live births at 32-36 weeks gestation in England in 2013	Estimate of the number of all preterm live births (24-36w) in England in 2013	Estimate of the number of live births at 24-27 weeks gestation in England in 2013 that survived the neonatal period	Estimate of the number of live births at 28-31 weeks gestation in England in 2013 that survived the neonatal period	Estimate of the number of live births at 32-36 weeks gestation in England in 2013 that survived the neonatal period
April	55,286	52,522	168	399	3,256	3,823	143	387	3,223
May	58,615	55,684	178	423	3.452	4,053	150	410	3,417
June	56,981	54,132	173	411	3,356	3,940	145	399	3,322
July	61,422	58,351	187	443	3,617	4,247	157	429	3,580
Aug	60,238	57,226	183	435	3,548	4,166	154	422	3,512
Total summer	292, 542	277,915	889	2111	17,229	20,229	749	2,047	17,054
Open data source used	Using ONS data tables to obtain the total number of live births in England & Wales in 2013 by month	Using ONS data tables to derive proportion of all live births with area of usual residence in England = 95%. Subtracted from column 2.	Using MBRRACE-UK report for 2014 to derive the proportion of all live births at 24-27 weeks = 0.32%, Proportion subtracted from column 3.	Using MBRRACE-UK report for 2014 to derive the proportion of all live births at 28-31 weeks = 0.76%. Proportion subtracted from column 3.	Using MBRRACE-UK report for 2014 to derive the proportion of all live births at 32-36 weeks = 6.23%. Proportion subtracted from column 3..	Summed estimates for columns 4+5+6	Using MBRRACE-UK report to derive proportion of live births at 24-27 weeks that were neonatal deaths = 15.5%. Used to calculate survivors as a proportion of total gestation-specific live births in column 4 (84%).	Using MBRRACE-UK report to derive proportion of live births at 28-31 weeks that were neonatal deaths = 3.1%. Used to calculate survivors as a proportion of total gestation-specific live births in column 5 (97%).	Using MBRRACE-UK report to derive proportion of live births at 32-36 weeks that were neonatal deaths = 0.6%. Used to calculate survivors as a proportion of total gestation-specific live births in column 6 (995).

The highest risk group for academic delay are those born before 32 weeks' gestation (VP, very preterm), these are 1.1% of all births in England. There are almost 3000 VP children born each year in England who are born between 1. April and 31. August (summer born). Thus

[19] Schonhuat, L., Armijo, I., Perez, M. (2015). Gestational age and developmental risk in moderately and late preterm and early term infants. *Pediatrics*, 135(4), e835-e841.

[20] Ballantyne, M., Benizie, K. M., McDonal, S., Magill-Evans, J., Tough, S. (2016). Risk of developmental delay: Comparison of late preterm and full term Canadian infants at age 12 months. *Early Human Development*, 101, 27-32.

21 Office for National Statistics (2013). https://www.ons.gov.uk

22 MBRACE-UK (2014). MBRACE-UK Perinatal Mortality Surveillance Report. https://www.npeu.ox.ac.uk/downloads/files/mbrrace-uk/reports/MBRRACE-UK-PMS-Report-2014.pdf

theoretically, there will be sufficient numbers if the whole of England could be included (see power analysis; page 31).

5. Contacting Parents

Parents of preterm children born in the summer months were identified as the main stakeholders/primary target population for assessing the feasibility of a RCT for DSE. Contacting this sample and gaining insight on parents' knowledge, opinions and experiences with DSE and enquiring whether parents would be willing to consider the prospect of taking part in a randomized controlled trial of DSE, was therefore a key aim.

5.1 BLISS

Our first approach was to contact BLISS – a UK charity working towards supporting babies born prematurely or sick (www.bliss.org.uk). BLISS is a major campaigner for DSE of preterm children and works closely together with parents. We contacted the charity via a "support in research request form" asking for their support in recruiting parents to fill out a survey on delayed school entry.

Unfortunately, BLISS turned down our request for supporting our research. We were informed that our "project falls outside [their] remit and therefore [they] will not be able to support this work in the way [we] have outlined in the research request form submitted" (Research Engagement Officer, BLISS on 06.07.2016).

5.2 Parent Survey

The alternative approach to solicit the views of parents of preterm children was to engage parents directly via social media and ask about whether their child was preterm and/or summer-born.

5.2.1 Methodology

5.2.2 Design

We constructed an online survey designed for parents who either had a summer-born or preterm child and were interested in learning more about DSE and answering some questions on that topic. The survey was circulated across two UK online platforms for parents: "mumsnet" (www.mumsnet.uk.co) and "netmums" (www.netmums.co.uk). We further publicised the survey link via the social media platforms "twitter" (www.twitter.com), "facebook" (www.facebook.com) as well as on websites of our other ongoing studies lead by the investigators in order to attract parents to participate.

5.2.3 Sample

A total of 545 parents started the survey and gave consent for us to use their data. A detailed flowchart of all parental demographics can be found in Figure 5.1. It also illustrates the response rate for a range of items asked within the survey.

5.2.4 Measures

The parental survey was constructed using Qualtrics software (Qualtrics, Provo, UT). Parents were advised that the survey was targeted at parents of summer-born or preterm children and that the aim was to learn about their opinions on DSE. An external link was provided following the introduction of the survey and parents could then decide whether they wanted to complete the survey. All parents were asked to tick a box prior to starting the survey, indicating that they gave consent for us to use their data. Parents were also informed that their participation was entirely voluntary and that all information is treated confidentially and anonymously. A preview of the entire survey can be found in the appendix (Appendix A).

5.2.5 Analysis

Figure 5.1 shows how many participants gave a response to items pertaining to demographic characteristics (i.e. either of parents or their children). The flowchart also shows frequency of responses to individual items. Figure 5.2 on the other hand shows how many participants gave a response to items pertaining to DSE. Again, the flowchart shows how participants responded to each item.

In order to pinpoint our target population, only those participants who indicated that they had children who were both preterm and summer-born were selected and further analysed and reported in the quantitative results section (n=91).

Finally, illustrative examples of open-ended responses by parents are shown in the qualitative results section.

5.2.6 Results

Quantitative Survey Results

Out of the entire sample of parents that started the survey (N=545), there were a total of 91 (16.7%) parents who indicated that they had a preterm child that was also summer-born.

Out of these 91 parents, 71 (78.0%) had heard about DSE. When asked whether they would consider delaying their child's school entry, 50 (54.9%) said they were very likely to consider DSE for their child, 4 (4.4%) were likely, 18 (19.8%) were unsure, 9 (9.9%) were unlikely and 6 (6.6%) answered very unlikely. Unfortunately, the response rate when we asked respondents about whether they would consider participating in a trial where their child had a 50:50 chance of DSE was extremely low, with only 2 participants responding; 1 who said yes and 1 who said no. In terms of experience with DSE, 15 (16.5%) parents had previously delayed their child's school entry, while 70 (76.9%) had not. Finally, 3 (3.3%) parents wanted to receive a short report, 40 (44.0%) wanted to receive information about a follow-up focus group and 18 (20.9%) wanted both a short report and indicated being prepared to participate in a focus group follow-up.

Figure 5.2 Flowchart of Demographic Survey Items.

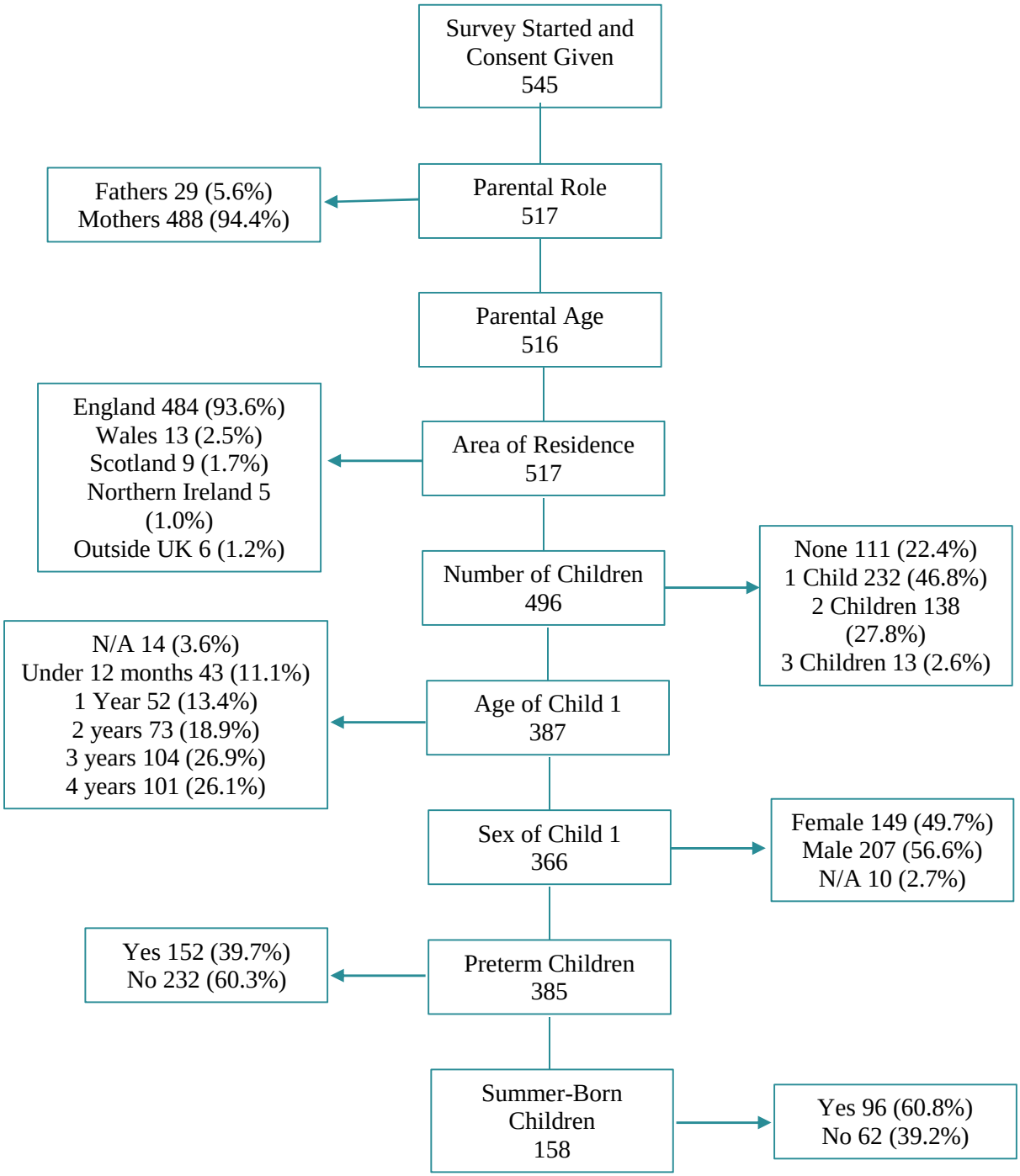
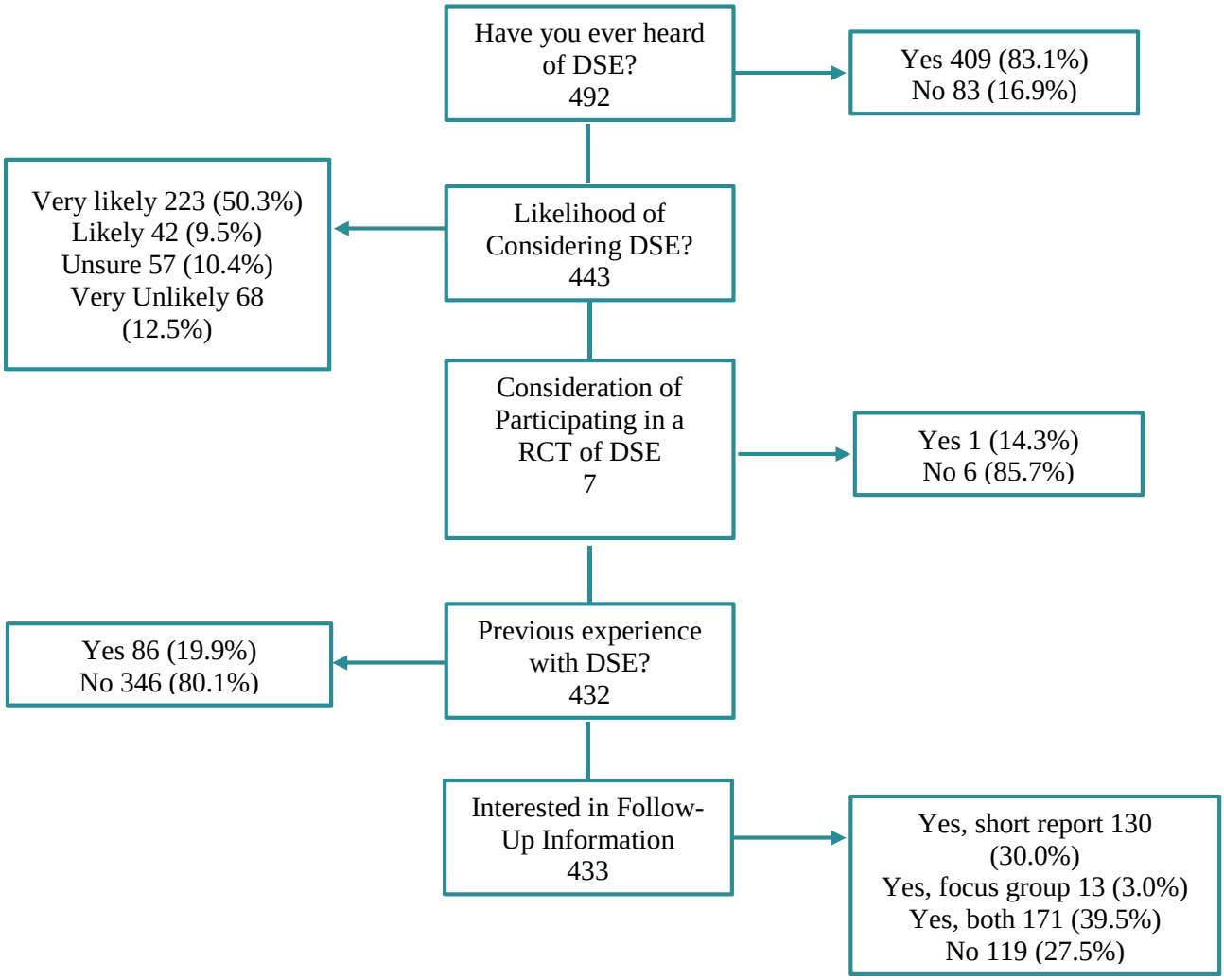


Figure 5.2.1 Flowchart of Delayed School Entry Items.



Qualitative Survey Results

Most concerns that parents gave about DSE revolved around worries about their child falling behind both socially and academically. Parents' arguments against DSE were that they did not want their children to miss out on developing at the same rate as their age-matched peers. They were also worried that DSE might prevent their children from excelling academically. Contrary to this, parents who were in favour of delaying their child's school entry often said that they did not think that their child is emotionally and developmentally mature enough to start school yet. This was often linked to the idea that allowing them to delay their school entry would give them more time to mature and hence they would be more prepared and able for the challenge of starting school.

Regarding prior parental experiences with DSE, responses were mixed, however the majority of experiences tended to be negative. Parents described the process as effortful, confusing and they felt largely unsupported.

Quotes of opinions against DSE by parents:

"I feel that preventing them from starting school holds them back from moving with their friends that they have bonded with either in a nursery setting or playgroup, also I feel that my child's development has increased dramatically for the better since starting school: reading, writing."

"Think school is very important and feel that by delaying entry they are just getting further behind their peers. Teachers differentiate by ability so this shouldn't be an issue."

"Would want my daughters to be schooled with their peers. Wouldn't want them to fall behind."

"I was going to send my son delayed as he was preemie and is born at the end of May, but his exposure to a special needs nursery, a physically disability class and a regular nursery from the age of 2 years and 4 months has seen him develop and improve more than I had considered. While I agree that parents should be able to delay their child's starting age, I also feel that each child is different and it may actually benefit the child's development to go to school after they turn 4 and not the following year. Another point I have considered is that holding them back 1 year could help them socially later on during school, they would be the oldest in the class and therefore be able to always participate in high school activities and social outings. I was one of the youngest in my year and quite often couldn't attend social functions as I was under 18, this is not overall important but something I had thought about. If my son had not already started school type activities, I would have held him back."

"Although being both preterm and summer-born, he may be some way behind others developmentally, I would have strong concerns about him missing out on the important time when friendships and social circles are developing amongst the class. I also think being within the reception environment with slightly older peers will help him develop and catch up. However, this is with knowledge of the school and how that particular reception class is taught – I may feel differently in a different school (or more unsure if I wasn't familiar with the school)."

Quotes of opinions in favour of DSE by parents:

"I have requested my twins to have a delayed school entry, as I feel they would benefit from the extra year before starting school. In their nursery class they are very behind their class mates."

"Child is emotionally immature for age."

"Compulsory school age in the UK is 5 and I believe children should not start school before the age of 5. I consider 4 years old to be too young to start school, especially when other children in the same class could be 11 months older."

"I don't believe that children should have to start school at just turned 4 years old. I think that there is more value in them staying at home for an extra year. With premature twins who were born on 31/08 I believe that it will be in their best interests to start at school in reception when they reach compulsory school age."

"Concerns about development research I have seen suggests that attending school too young is not beneficial."

"My son was due to be born on 20th November 2015 but was born on 8th August. In my mind he was in an external womb until his due date so developmentally he's now seven & a half months old (not 11 months) so it doesn't feel fair that he'd then go to school based on the day he was born rather than the day he was due to be born."

"All three of our children are summer-born, two are premature twins. I do not feel like my eldest is going to be socially and emotionally ready to start school shortly after turning four and feel he will benefit from an extra year to develop."

Quotes of prior Experiences of DSE by parents:

"We are currently going through the process. The teachers involved with my children agree they would benefit from an extra year."

"It took over a year I was told it was impossible I fought hard and considered (and threatened) legal action. I lobbied. I won!"

"Surprisingly straight forward. Initially put off by reports of it being difficult for others. Met with preschool head who gave support met with exec head of school accepted into who was really supportive no doubts from her at all. Then approached Learning Trust who were slow but agreed."

"Yes we have had a delayed school entry for our June born son who is currently 4. It was the most stressful thing I have done for my children. I felt I was gambling with my son's future and still do. Whilst after fighting a no from Harrow Borough LA. Having to take our case to local MP and local councilors we finally got a yes from them, but it was not without many sleepless nights worrying that he would end up being made to skip a whole year of school and go into Year 1 in 2017. Now we have to relocate to Surrey and I am having to repeat the process all over again. It is hard enough having to relocate and find a school for our eldest son in an oversubscribed area. Now I also have to find a school that will accept a delayed entry into reception and hope that Surrey CC will accept our application to delay and enter into Reception. It is so stressful and so upsetting that schools and LA's have the upper hand on this – forgetting that all children should be schooled within their best interests! And how can being the youngest in a year give that child the opportunity to thrive!?!"

"I enquired about it but the head teacher was very rude about it."

6. Parental Focus Groups

The focus groups were aimed at parents who have a child that is both preterm and summer-born. These were recruited from those who had indicated in the survey (see results section of 'contacting target population') that they would be interested in the prospect of participating in a follow-up focus group. The aim, was to explore the key concerns and barriers of designing a RCT of DSE.

6.1 Response Rate

A total of 58 parents who completed our online survey and had children who were both preterm and summer-born, indicated that they were interested in participating in a follow-up focus group. After ensuring that these participants had provided us with relevant contact details, we were able to identify a total of 43 parents who could be contacted. All 43 parents were contacted via email and were also provided with an invitation letter[23] to one of our prospective focus group interviews. We received 21 positive replies from parents, confirming that they would still be happy to participate in a follow-up focus group.

6.2 Methodology

The parents lived across the UK and parents were unable to attend face-to-face focus groups that we considered in several locations. Thus, we decided to conduct focus groups online using Skype and creating an online video group.

Parents were contacted a day prior to their session, reminding them of their appointment and giving them detailed guidance regarding the sequence of the session. Parents were called into the session by us. All sessions were transcribed and recorded in order to aid the transcription process. The researcher who conducted the interviews utilized an inductive thematic analysis approach[24] in order to identify and generate themes. Transcripts were first matched to the recordings to ensure all details of responses were captured. All transcripts were then thoroughly re-read several times in order to familiarize with the content. Initial codes were generated by reducing the data into more basic segments/elements of relevant information. Axial coding was utilized to group codes into benefits and concerns about DSE. Finally, themes were extracted by grouping similar codes (within the selective code) into themes. Themes were then reviewed to test whether these were comprehensive.

6.3 Results

We were able to arrange for two small focus group discussions. Unfortunately, not all parents who initially confirmed their willingness to participate in our focus group were available and joined the actual sessions. We had a total of 6 parents who finally took part in the focus groups. Parents were asked about i) possible benefits of DSE ii) their concerns about DSE iii) their experience with DSE and iv) their willingness to take part in a RCT of DSE. An overview of all probes is available in the Appendix (Appendix C).

Benefits of DSE according to Parents:

Three common themes emerged when discussing the possible benefits of delaying school entry for children that are both summer-born and preterm: maturity, confidence and the gap between classmates.

All but one parent spoke about how delaying their child's school entry would be beneficial as it would allow their child to mature a little longer. Most parents perceived their child to be

[23] See appendix B for invitation letter.
[24] Braun, V., Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77-101.

delayed in their development, i.e. language, motor skills, emotion regulation and thereby not ready to start school at 4 years:

> *"I think for me it was the benefit of him having another year to mature and to kind of commence himself a little bit."* (Parent #6, 3-year old)

> *"But then also long-term it can't do any harm to be a little bit older a bit more mature."* (Parent #4, 4-year old).

Becoming more confident with age was another theme that arose from our analysis of parent's responses. This also often tied into the theme of maturity:

> *"I just would prefer her to be more mature and more able to keep up and feel more confident in herself when she starts school."* (Parent #1, 2-year old)

> *"I think its confidence and actually catching up with things and having enough time to develop."* (Parent #4, 4-year old)

> *"I think having the confidence to being out there on your own every day at school is a very important factor.* (Parent #5, 4-year old)

Finally, a third common belief of parents was that delaying their child's school entry would help fill the gap between their child and other older children in their classroom:

> *"…he is sitting there in a classroom with other children that are much older 5 year-olds and he is seeing what they can do and he therefore feels less of and less able."* (Parent #5, 4-year old)

> *I don't want her to be the weakest in class and not being able to speak up and not being able to defend herself.* (Parent #4, 4-year old)

Concerns about DSE by parents:

Parent's concerns about delaying their child's school entry seemed to circulate around two potential problems: other people's perceptions of their child as well as more long-term academic difficulties.

Half of the parent's addressed their worry of what others might think of their child:

> *"There could be a perception that there's something wrong with him, when actually that is not the point I am coming from at all"*. (Parent #6, 3-year old)

Half of the parent's also mentioned their concern regarding their child's long-term school career such as:

> *"My biggest concern about delayed school entry is that they might try and make her miss a year at some point of her school career."* (Parent #3, 4-year old)

Parent's Experience with DSE:

Parent's experience with DSE was mixed. Half of the parents we spoke to had successfully applied and been granted delayed school entry, whereas one parent was still waiting to hear back and two parents had no prior experience. What emerged from our discussion with parents was that there appears to be no strict regulation under which decisions are made, rather it appears to depend entirely on the individual local authority:

> *"There is very little information at our local authority. And nobody really seems to be knowing any of the answers if you ask them." (Parent #2, 2-year old).*

> *"I think having a local counsellor who was supportive was really key to us getting that delayed fortress down."* (Parent #5, 4-year old)

Parent's Willingness to Participate in RCT:

A majority of parent's that we spoke to dismissed the prospect of potentially participating in a randomized controlled trial where their child would get a 50:50 chance of DSE. In fact, 5 out of 6 parents felt this was something they would never consider:

> *"…this is such a big thing, it's something you'll only really get a shot at."* (Parent #1, 2-year old)

> *"Well I think that is quite outrageous for research."* (Parent #3, 4-year old)

> *"No. I wouldn't gamble on it."* (Parent #4, 4-year old)

> *"No and it just sounds absurd."* (Parent #5, 4-year old)

However, many did agree that research was an important cause to support and while not agreeing with the prospect of participating in a randomized controlled trial, 4 of these 5 parents said that they would be happy to participate in studies with less ultimate and long-term consequences for their children:

> *"Rather than like when she starts her entire school career if it was something about like if you could do tests, like if you could send children at 4 or 5 into test centres and do tests and have them socialize with each other. So if it was something a kind of one off thing, I would definitely be interested."* (Parent #1, 2-year old)

7. Education Professionals Survey

We used data collected by a national survey[25] in order to gain further insights on what educational professionals think about delaying school entry for prematurely born children.

[25] Johnson, S., Gilmore, C., Gallimore, I., Jaekel, J., Wolke, D. (2015). The long-term consequences of preterm birth: What do teachers know? *Developmental Medicine & Child Neurology*, 57(6), 571-577.

7.1 Methodology

585 teachers and 212 educational psychologists completed a survey to assess their knowledge of preterm birth, which included items to solicit their opinions about DSE. Data assessing the knowledge of outcomes following preterm birth have been previously analyzed[22], here specific items addressing DSE are considered. We specifically looked at two key survey items which directly related to the purpose of this report:

“

1. I believe the parents of children born very preterm should be able to *delay* their child’s entry to school. (This means holding back a child from joining their own age-peer group and starting school a year later. This means the child will chronologically be the oldest in the class).

2. Please give reasons for your answer.

”

Educational professionals were asked whether they believe that parents of children born very preterm should be able to delay their child’s entry to school. They were then asked to give the reasons for their answer.

7.2 Results

Out of the 649 educational professionals who completed the item about DSE, 421 (64.9%) said that they do believe that parents of preterm children should be able to delay their child’s school entry, while 228 (35.1%) said that they do not believe that parents of preterm children should be able to delay their child’s school entry. Table 1 illustrates the break down according to the position the educational professional held.

Table 7.2 Educational professionals' opinion on whether parents should be allowed to delay their preterm child's school entry according to position.

Educational Position	N	Yes (%)	No (%)
Head Teacher[a]	284	64.8	35.2
Teacher	285	68.8	31.2
Teaching Assistant	38	55.3	44.7
Administrative or Other Support Staff	42	47.6	52.4

[a]Head teacher includes: Executive head, head, deputy head, assistant head.
[b]Teacher includes: Classroom, advanced skills, excellent, advisory teacher.

Reasons given in Favor of DSE

"I think this needs to be done on a case by case basis as each child is different. If medical advice shows this could be beneficial then it should be tried."

"I think parents should be able to hold their children back until the 'due date' to allow children to develop further before joining school."

"For children born early, which puts them into a school year as the youngest - e.g. a baby due in October but born in August, is likely to meet early developmental milestones later, and is therefore doubly disadvantaged, and may not be ready to start Reception in the correct chronological year."

"Despite being chronologically older, development is likely to be hampered, therefore placing the child in a group based on birth date is likely to disadvantage preterm birth children."
"I have worked with several children who have had developmental delays and who would have benefitted greatly from starting school according to their due date rather than their birth date (for some reason I have met several summer-born boys who should have been born in the autumn). If the due date were accepted for such children it would remove the perceived stigma of being held back a year. Being the oldest in the class would help to balance out the disadvantages from being premature."

"This should be offered, especially if a child was born in the summer (April to Aug)."

"The reception year in school is vital for any child in order to prepare them for the later school years. Being older and more mature will support these vulnerable children to be successful."

Reasons given against DSE

"It will cause confusion with parents about which year they are in. As children get older and become aware they are in the "wrong" age group, it has a negative impact on self-esteem and learning."

"The sooner we get children into education, the sooner we can close the gap educationally. "

"I think this labels a child by making them different. I think reception and nursey teachers are very skilled and can help children catch up if there is any developmental delay."

"Schools are required to report attainment at age not stage."

"Children should go through school with the cohort and adaptations be made. More problems can occur through deceleration and differentiation is the key."

"This is not helpful to the child in the long term, particularly socially. Where do we draw the line with holding children back? If we begin to do this for children who are born preterm it will open the floodgates for other children to delay their start to education. This philosophy of delaying school is not one that sits comfortably with me and it is not something that I would want to see happening in the future."

8. Head Teacher Interviews

In addition to the data we had available from the national survey outlined above, we decided to seek out head teachers in the Warwickshire area in order to conduct more thorough face-to-face interviews in order to gather more information on the process and thoughts head teachers may have regarding delayed school entry.

8.1 Methodology

Face-to-face interviews were conducted with a head teacher and a deputy head teacher in two schools in Warwickshire. Taking part in the research was voluntary. Prior to the interviews the interviewees were informed that data confidentiality and anonymity would be strictly respected during the process of data analysis and writing the report. Open-ended questions were asked and interviews were audio-recorded and transcribed. Data was coded using Thematic Analysis. Two major themes emerged: school readiness and parents' roles in decision making.

8.2 Results

School Readiness

Generally, the interviewed head teachers were not in favor of DSE, arguing that most children usually catch up naturally and it may be more beneficial for children to receive the support from their teachers rather than delaying entry.

> *"The parents might think their children might not be ready to start school and when the children are in the school with their peers it is amazing how quickly they could settle in […] There are many children when you look at them you say 'OK', but later on they surprise us all the time. Sometimes you put up expectations and [the children] meet those expectations."*[Head teacher, School 1]

> "*Some are in specialist provision as well. They [schools] say that they are fully equipped to meet the needs of all children including very late summer born children. Again is very little reason for children not to start school."* [Head teacher, School 1]

> *"In certain circumstances it is better to have the children in school and support them rather than to be delayed for social development or something like that."* [Head teacher, School 2]

However, one head teacher did mention that those children who are summer-born and preterm may be more delayed and have greater difficulties in school compared to those who are only summer-born.

> "*Some are summer born in July or August, but others are born in July or August and prematurely and could have severe delays that could impact on their development that could be greater than for children that are born in June, July or August. It just depends on the child."* [Head teacher, School 2]

Teachers also expressed some concerns regarding the process of deciding upon DSE.

"How do we measure that emotionally they are not ready? Cognitively we could put measure into place but it will be very difficult to prove or even disprove." [Deputy of head teacher, School 1]

"*Chronologically at that age, if they missed one year of education which the other children had or they should have the assessments when they are older than the other children.*" [Deputy of head teacher, School 1]

"Sometimes we found language issue with Polish children. Some children have a tricky start in reception because of language issue not necessarily a delay in age. We don't know until they start school." [Head teacher, School 2]

Parents' Roles in Decision Making

Head teachers emphasized that it is typically the parents who want to delay their child's school entry.

"You will not hear from school 'you will not start school now', it will be from parents' point of view. If they want their child to be in year group they wanted to be, I would find it very difficult as a head teacher to say 'no you can't do that'". [Head teacher School 1]

"*If somebody wants to defer school entry, then that is not our decision to make. It is the Local Authority*." [Head teacher School 1]

"*Parents say 'I make this decision to defer'. But most of the time Local Authority says that children should be in the school in the chronological year*." [Deputy of head teacher, School 1]
"Sometimes parents are quite strong that their child to start in September." [Head teacher School 2]

However, they also emphasized that it is important to triangulate evidence from multiple sources: local authorities, teachers and parents.

"But we need to have medical and special needs evidence, education psychology involved and Local Authority." [Deputy of head teacher, School 1]

"*You also need to have good relationships with the parents, you need to have education health care plans for children that they need to access and internal reviews for children with special education needs. And we review every single child on that list. So, we bring other professionals around the table as well and we make sure we have regular contact with parents. You have to think what is the best thing for the child and the family in a partnership way*." [Head teacher, School 2]

9. Potential Outcome Measures

Should a randomized controlled trial be possible, it is important to determine the primary and secondary outcome measures that could be utilized. We propose three possible outcome measures and outline these below.

9.1 The Teacher Academic Attainment Scale (TAAS) (Appendix D)

A short seven-item questionnaire completed by teachers in order to assess a child's academic attainment. The TAAS offers a cost- and time-efficient alternative to other standardized testing and has been found to indicate excellent internal consistency and good test-retest reliability[26]. It has been found to have good concurrent validity correlating highly with standardised test scores (contemporary standardized test of curriculum-based attainment) for reading and mathematics

9.2 Strength and Difficulties Questionnaire[27]

The Strengths and Difficulties Questionnaire (SDQ) is a 25-item behavioural screening questionnaire consisting of 5 scales measuring emotional symptoms, conduct problems, hyperactivity/inattention, peer relationship problems and prosocial behaviour. The SDQ has previously been reported to have high reliability and validity regarding Cronbach alpha, cross-informant correlations and retest stability[28].

The Office for National Statistics carried out a large national survey[29] of child and adolescent mental health providing representative information of a British sample (N=10, 438) aged between 5 and 15 years. Sample means, standard deviations and frequency distributions are provided below. Information was gathered from parents, teachers and 11-15 year olds.

9.3 The National Curriculum[30]

All children aged 5 to 16 attending state schools are required to be taught the National Curriculum. The curriculum is divided into four Key Stages, according to pupil's ages.

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[26] Johnson, S., Marlow, N., Wolke, D. (2012). Assessing educational outcomes in middle childhood: validation of the teacher academic attainment scale. *Developmental Medicine & Child Neurology*, 544-551.

[27] See appendix E for tables with descriptives.

[28] Goodman, R. (2001). Psychometric properties of the Strengths and Difficulties Questionnaire (SDQ). *Journal of the American Academy of Child and Adolescent Psychiatry*, 40, 1337–1345.

[29] Meltzer, H., Gatward, R., Goodman, R., Ford, F. (2000). *Mental health of children and adolescents in Great Britain.* London: The Stationary Office.

[30] http://www.education.gov.uk/schools/performance/archive/ks3_05/k5.shtml
See appendix F for achievement assessments, 2016.

Table 9.3 Key stages according to year group and age of pupils												
Year group	Reception	1	2	3	4	5	6	7	8	9	10	11
Age of pupils at end of year	5	6	7	8	9	10	11	12	13	14	15	16
Key Stage	KEY SAGE 1			KEY STAGE 2				KEY STAGE 3			KEY STAGE 4	

Pupil's attainment in the core subjects is assessed via National tests that are taken at the end of each key stage. All key stage tests are designed to offer an independent and nationally standardized measure of how children and schools are doing compared to the national standards in the core subjects.

Table 9.3.1 Key stage expected level according to age

Age	7 years	11 years	14 years
Key Stage	KS1	KS2	KS3
Level 8			Level 8 in maths only
Level 7			
Level 6			
Level 5			
Level 4			
Level 3			
Level 2a, 2b, 2c			
Level 1			

	Beyond expectations
	At level expected
	Below expectations

10. Power Analysis

For the continuous outcome measures, SDQ and TAAS, obtaining a statistically significant result ($p< 0.05$) with 90% power if the true difference between the groups was 0.3 standard deviations, would require 468 participants. This may need inflation to account for expected missing outcome data. The true difference in scores between the groups would be about 0.225 points for the TAAS, and about 1.8 points for the SDQ.

The required sample size is larger if the proportion below expectation in national test results are used as the outcome of interest, because it is dichotomous rather than continuous. To achieve a statistically significant result ($p < 0.05$) with 90% power, if the true effect of the intervention is to reduce the proportion below expectation from 20% in the control group to 14% in the intervention group, would require 1,638 participants (without any allowance for missing outcome data).

11. Feasibility

11.1 SWOT Analysis

SWOT stands for strengths, weaknesses, opportunities and threats and it is a common tool used for strategic planning[31]. The SWOT analysis is typically used by organizations and businesses, however it can also be applied to various other contexts, including our purpose of assessing the feasibility of conducting a RCT.

Strengths: Qualities that will enable the proposed objective.

Weaknesses: Qualities that will prevent the accomplishment of the set objective.

Opportunities: External conditions/opportunities presented by the environment that can help the planning and executing of the objective.

Threats: External conditions which jeopardize to reach the objective.

Figure 11.1 Example of a SWOT matrix.

	Helpful To achieve the objective	**Harmful** To achieve the objective
Internal (Attributes of the organization)	Strength	Weaknesses
External (Attributes of the environment)	Opportunities	Threats

11.1.1 Strengths

- Randomized controlled trial (gold standard in terms of methodology)
- Expertise: Investigators who are leaders in the field, design and implementation led by a clinical trials unit with experience of educational trials, statistical support

[31] Osita, I. C., Onyebuchi, I. R., Justina, N. (2014). Organization's stability and productivity: the role of swot analysis an acronym for strength, weakness, opportunities and threat. *International Journal of Innovative and Applied Research*, 2(9), 23-32.

- Facilities (i.e. clinical trials unit, statistical support).

11.1.2 Weaknesses

- Obtaining support from all local authorities is necessary
- Obtaining the funding to carry out the research, in particular, including provision for the high costs parents in a DSE arm may incur as a result of requiring an extra year of child care
- Identifying the preterm children and their current addresses to contact across the whole of England by 4 years of age located across all local authorities

11.1.3 Opportunities

- Legal guidelines allow for DSE
- Teachers are 65:35 in favour of supporting DSE

11.1.4 Threats

- Most parents would not consider to take part
- Even after enrolling parents into a trial they may not participate after being assigned their non-preferred trial arm
- Ethical considerations
- Possible litigation (no consent from children)
- Inconsistent regulations: local authorities have different rules and not all authorities would allow randomisation
- High costs of funding RCT: e.g. allowing for alternative nursery provision

- Funding RCT for long term follow-up may be difficult

11.2 Conclusion

Considering the four components of the SWOT analysis, the weaknesses and threats outweigh the strengths and opportunities for a RCT of DSE. The key weakness and threat is that the essential stakeholders, the parents, expressed consistently strong views that they would not consider participation in such a trial. The large majority felt that participating in a RCT and allowing their children to have a 50:50 chance of being delayed is too much of a long-term decision that carries too much importance for their child's future and development to be left to chance. Given that parental consent is essential, it is impossible to recruit a sample without any volunteers. Thus, this on its own makes it near impossible. Furthermore, mechanisms to identify the preterm children and their families across local authorities before 4 years of age would be highly difficult to put in place. Furthermore, even if it were possible to recruit a large enough sample receiving approval from all necessary local authorities, there are no consistent criteria that local authorities follow in applying the guidelines. Finally, a great amount of costs would incur for both parents and the actual trial that might make it difficult to obtain funding. For example, costs of an additional year of child care must be considered to allow parents of all incomes the chance to participate and those might be prohibitive to a funder. Although a RCT would be a gold standard approach to settle the question whether DSE does benefit or disadvantage preterm summer born children, the likelihood to successfully conduct the trial with sufficient numbers participating is low. Considered together, there is a need for alternative evidence and interventions that may be developed.

12. Alternative approaches for evidence

The only alternative route would be to conduct a systematic review and meta-analysis of existing studies on DSE. However, our literature review has indicated that there may not be sufficient studies so far that have considered preterm or very preterm children, in particular being able to obtain data for a subset born during the summer months. Furthermore, many studies from the USA are based on redshirting, i.e. parents' decisions to delay their child's school entry rather than indication either due to general educational guidelines or expert decisions.

Alternative Intervention and RCT

Major considerations of parents who consider DSE are that their child may be too young to enter school and s/he needs maturing. Maturing refers to becoming fully grown. However, it is unclear how this maturing actually happens – in the parents' views it appears to be a process of waiting and giving it time.

In contrast, a majority of teaching professionals, in particular head teachers consider the school as an appropriate place to provide appropriate developmental support to assist the child to grow. Thus more specific ideas of how maturing can be achieved are given.

Considering that an RCT of testing DSE versus appropriate school entry against each other is unlikely, it may be possible to test whether a managed transition into school with extra support when entering reception class and between reception and Year 1 would benefit preterm children born in the summer months. This intervention could firstly, provide psycho-education about the special needs of preterm children and those who are summer born to both parents and teachers. Secondly, it could provide structured training for teachers in supporting areas that have been described as the "preterm phenotype", i.e. attention regulation, academic achievement, in particular support in math learning and assistance in social integration, and managing worry and anxiety. Thirdly, it could provide parents with information how to support their child's learning and social relationships. This is an intervention that may be much more acceptable for parents as it offers additional support, also for the parents themselves and would be grounded in research evidence on the profile of problems for preterm children that may be improved by adequate intervention.

This intervention would have to be tailored to VP children. Previous interventions have mainly focussed on infancy and the preschool years and the effects have been limited to short term beneficial effects[32] [33].

An additional intervention option is offered in the form of adaptive computerized training programs. While some have suggested that working memory training may be the best route to intervention,[1-3] recent evidence indicates that potential training gains may not transfer to

[32] Orton, J., Spittle, A., Doyle, L., Anderson, P., & Boyd, R. (2009). Do early intervention programmes improve cognitive and motor outcomes for preterm infants after discharge? A systematic review. *Developmental Medicine & Child Neurology, 51*(11), 851-859. doi:10.1111/j.1469-8749.2009.03414.x

[33] Spittle, A. (2015). Early intervention cognitive effects not sustained past preschool. *The Journal of Pediatrics, 166*(3), 777-780. doi:http://dx.doi.org/10.1016/j.jpeds.2014.12.048

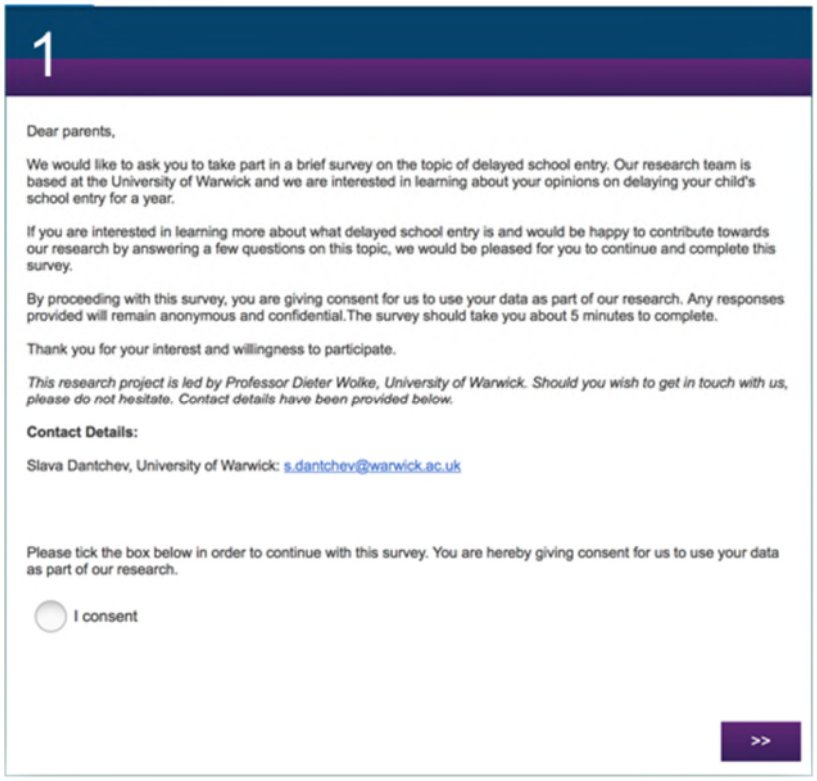
improve children's academic achievement.[4-6] Alternatively, preterm children who are often struggling with maths in school could access domain-specific, adaptive online training programs such as XtraMath in order to complement classroom maths instruction.

We consider such an alternative supportive approach using an RCT design as feasible for the following reasons: 1. Although parents were not in favour of participating in a RCT of DSE, they were open to participating in alternative interventions that may have less radical impact on their children's life trajectory in an either and or manner.
2. Data from the national survey used in this report previously found that 84% of teachers had said that they would be happy to receive more training in order to better understand how to help children who have DSE[34].
3. Head teachers indicated that while the majority accept the right of parents to ask for DSE, they consider on time school entry and support for the child and their parents as favourable.

The primary outcome measures for an alternative intervention could be the same: TAAS, SDQ and Key Stage assessments. They would yield measures for both academic attainment as well as behavioural difficulties, which are both suitable for measuring adjustment difficulties that preterm children may have, irrespective of DSE. Ideally, any intervention study that is conducted should incorporate assessments according to academic year as well as age, given that these two methods of assessment may yield differential outcomes[8].

[34] Johnson, S., Gilmore, C., Gallimore, I., Jaekel, J., Wolke, D. (2015). The long-term consequences of preterm birth: What do teachers know? *Developmental Medicine & Child Neurology, 57(6),* 571-577.

Appendix A:
Parental Online Survey



1

Dear parents,

We would like to ask you to take part in a brief survey on the topic of delayed school entry. Our research team is based at the University of Warwick and we are interested in learning about your opinions on delaying your child's school entry for a year.

If you are interested in learning more about what delayed school entry is and would be happy to contribute towards our research by answering a few questions on this topic, we would be pleased for you to continue and complete this survey.

By proceeding with this survey, you are giving consent for us to use your data as part of our research. Any responses provided will remain anonymous and confidential.The survey should take you about 5 minutes to complete.

Thank you for your interest and willingness to participate.

This research project is led by Professor Dieter Wolke, University of Warwick. Should you wish to get in touch with us, please do not hesitate. Contact details have been provided below.

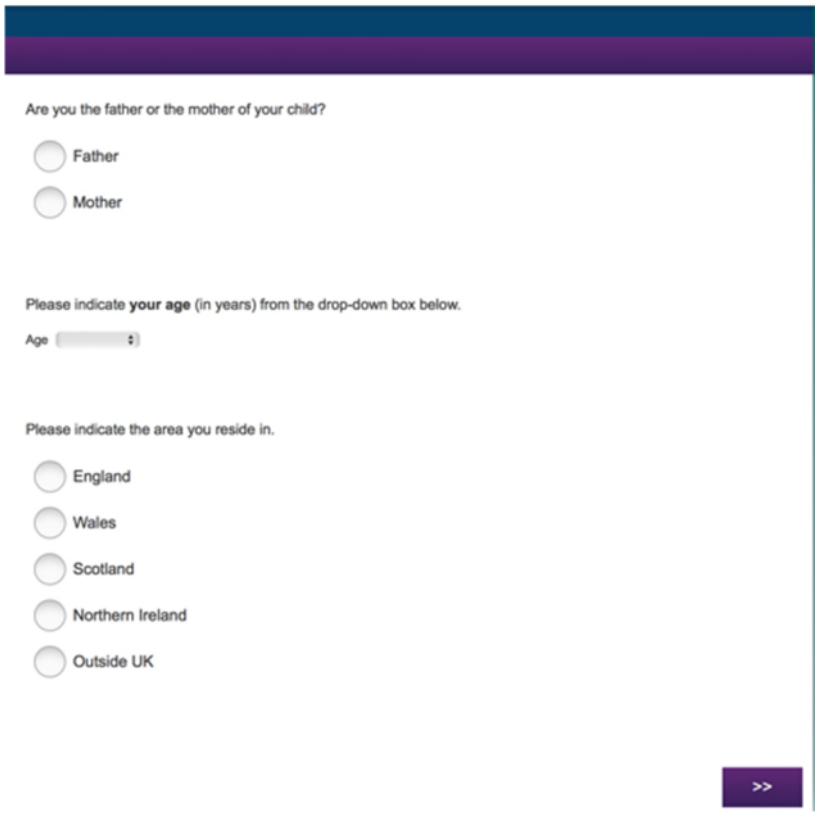
Contact Details:

Slava Dantchev, University of Warwick: s.dantchev@warwick.ac.uk

Please tick the box below in order to continue with this survey. You are hereby giving consent for us to use your data as part of our research.

I consent

>>



Are you the father or the mother of your child?

Father

Mother

Please indicate **your age** (in years) from the drop-down box below.

Age

Please indicate the area you reside in.

England

Wales

Scotland

Northern Ireland

Outside UK

>>

2

How many children do you have that are *under the age of 5?*

Number of children

>>

Please indicate the age of your child(ren) that are *under the age of 5.*

	N/A	Under 12 months	1 year	2 years	3 years	4 years
Child 1						
Child 2						
Child 3						

Please indicate the sex of your child(ren) that are *under the age of 5.*

	N/A	Female	Male
Chid 1			
Child 2			
Child 3			

>>

Were any of your children that are currently *under the age of 5* born **preterm** (before 37 weeks gestation)?

- Yes
- No

>>

3

What was the gestation (in weeks) of your child?

Gestation (weeks)

>>

Do you have any other children that are currently *under the age of 5* **and** were born **preterm** (before 37 weeks gestation)?

- Yes
- No

>>

What was the gestation (in weeks) of your child?

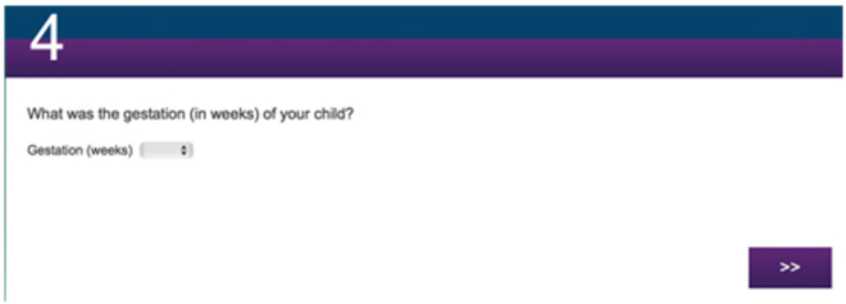
Gestation (weeks)

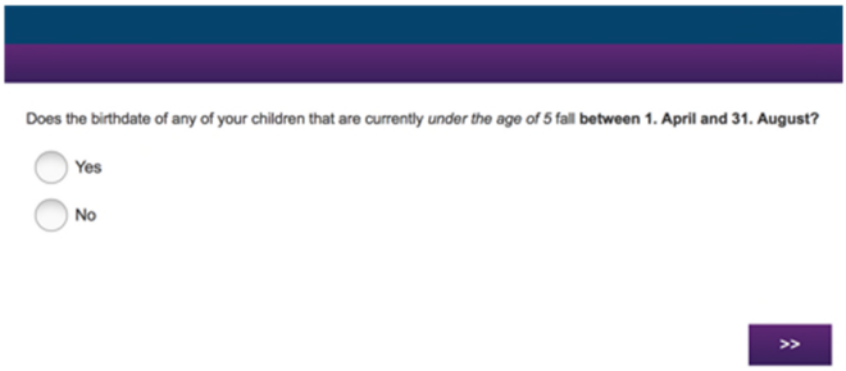
>>

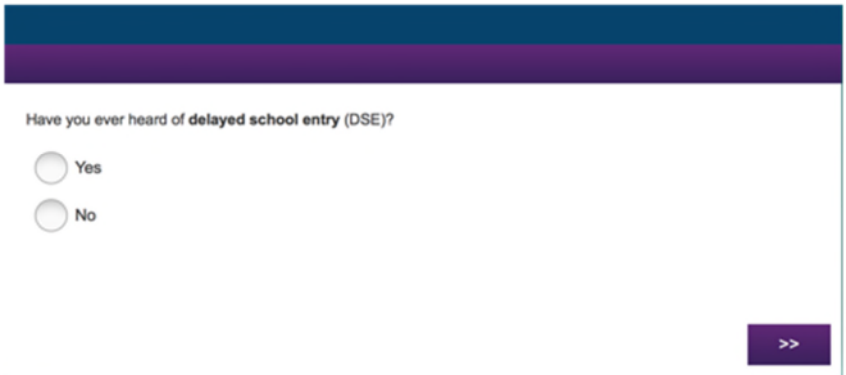
Do you have any other children that are currently *under the age of 5* **and** were born **preterm** (before 37 weeks gestation)?

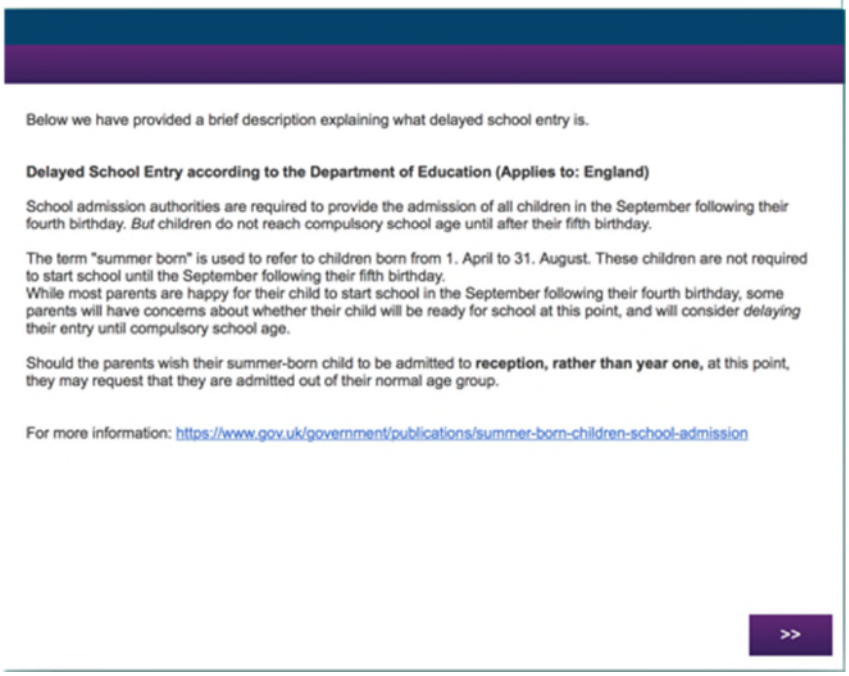
- Yes
- No

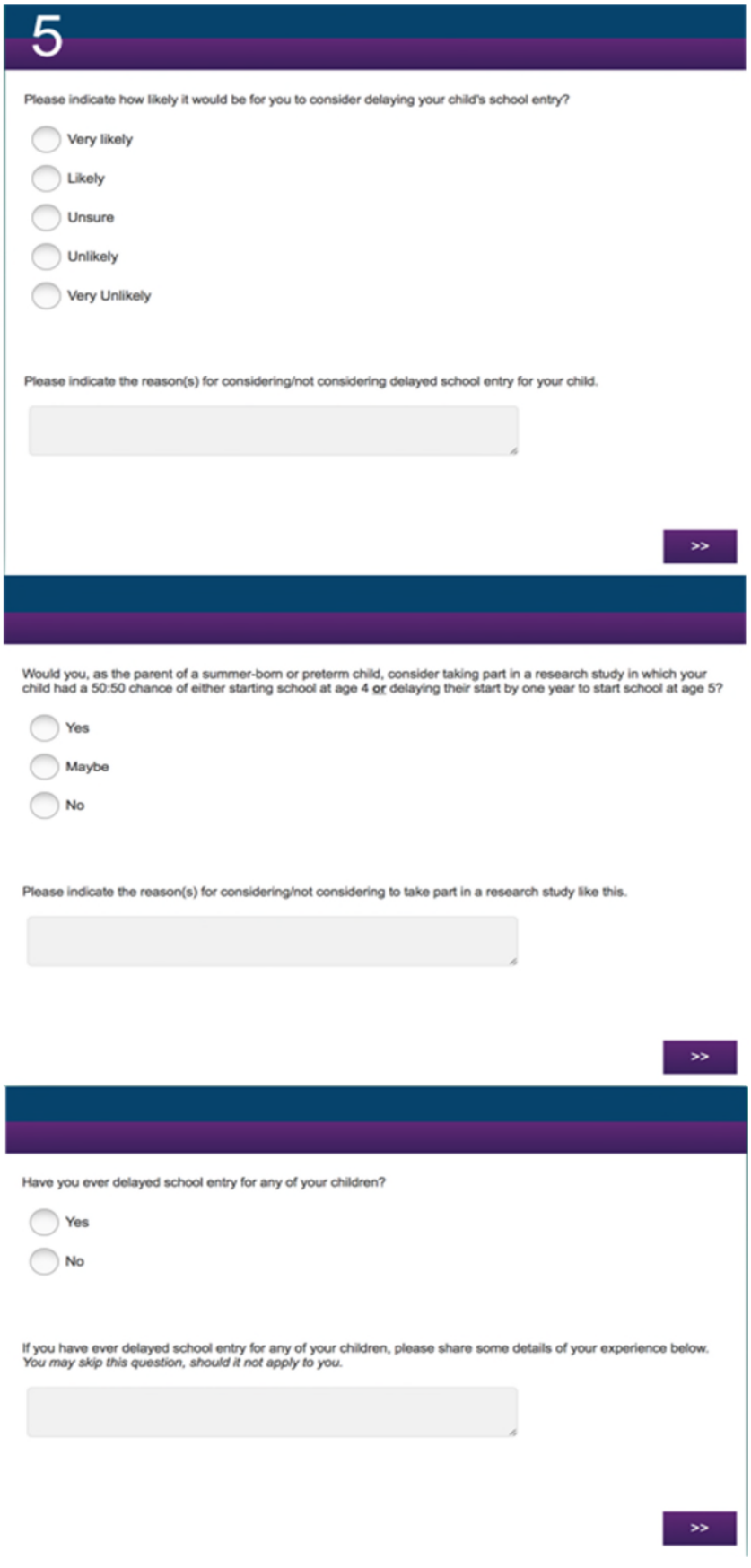
>>

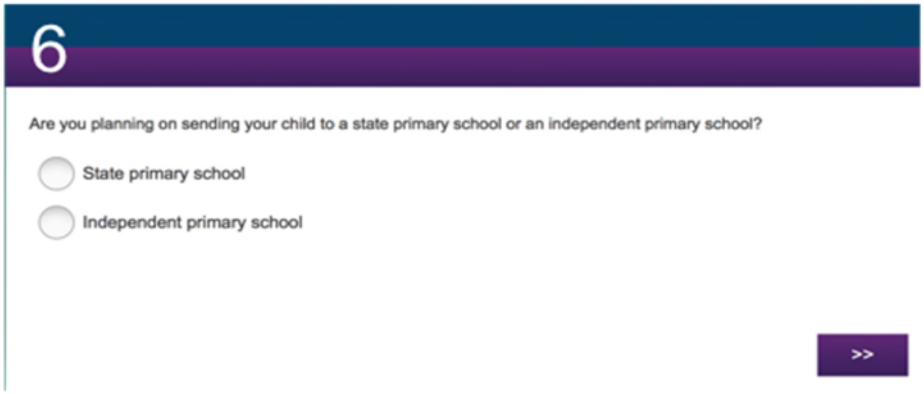

4
What was the gestation (in weeks) of your child?
Gestation (weeks)
>>

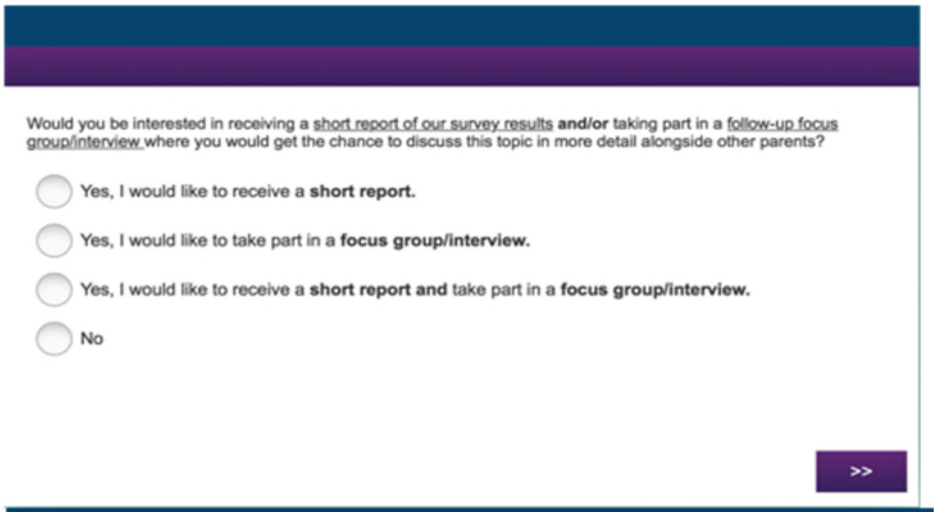

Does the birthdate of any of your children that are currently *under the age of 5* fall **between 1. April and 31. August?**
Yes
No
>>

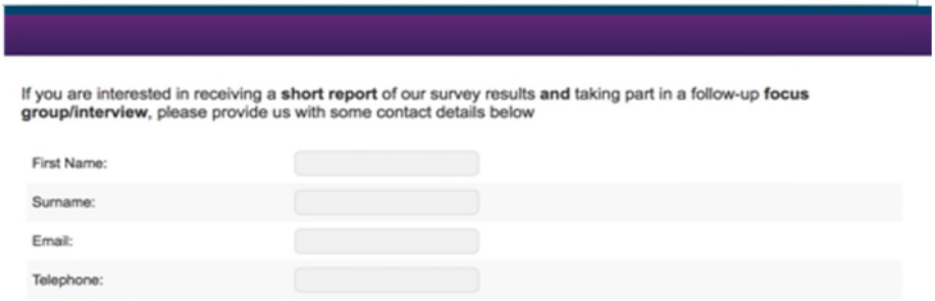

Have you ever heard of **delayed school entry** (DSE)?
Yes
No
>>


Below we have provided a brief description explaining what delayed school entry is.
Delayed School Entry according to the Department of Education (Applies to: England)
School admission authorities are required to provide the admission of all children in the September following their fourth birthday. *But* children do not reach compulsory school age until after their fifth birthday.
The term "summer born" is used to refer to children born from 1. April to 31. August. These children are not required to start school until the September following their fifth birthday.
While most parents are happy for their child to start school in the September following their fourth birthday, some parents will have concerns about whether their child will be ready for school at this point, and will consider *delaying* their entry until compulsory school age.
Should the parents wish their summer-born child to be admitted to **reception, rather than year one,** at this point, they may request that they are admitted out of their normal age group.
For more information: https://www.gov.uk/government/publications/summer-born-children-school-admission
>>


5
Please indicate how likely it would be for you to consider delaying your child's school entry?
Very likely
Likely
Unsure
Unlikely
Very Unlikely
Please indicate the reason(s) for considering/not considering delayed school entry for your child.
>>
Would you, as the parent of a summer-born or preterm child, consider taking part in a research study in which your child had a 50:50 chance of either starting school at age 4 or delaying their start by one year to start school at age 5?
Yes
Maybe
No
Please indicate the reason(s) for considering/not considering to take part in a research study like this.
>>
Have you ever delayed school entry for any of your children?
Yes
No
If you have ever delayed school entry for any of your children, please share some details of your experience below.
You may skip this question, should it not apply to you.
>>







We would like to thank you for taking the time to complete this brief survey addressing the topic of delayed school entry. Your participation is greatly appreciated. Should you have any further queries or concerns regarding this survey, please do not hesitate to get in touch with us.

This research project is led by Professor Dieter Wolke, University of Warwick. Contact details have been provided below.

Contact Details:

Slava Dantchev, University of Warwick: s.dantchev@warwick.ac.uk

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Should anyone have any complaints relating to a study conducted at the University or by Warwick University's employees or students, the complainant should be advised to contact the Director of Delivery Assurance, details as below:

Director of Delivery Assurance
Registrar's Office
University House
University of Warwick
Coventry

Appendix B
Parental Focus Group Invitation Letters

WARWICK
THE UNIVERSITY OF WARWICK

Parental Survey: Delayed School Entry
[Date]

Dear [Parents Name],

We would like to thank you for expressing your interest in receiving additional information about the prospect of taking part in a follow-up focus group interview on the topic of delayed school entry.

If you may recall, you were so kind to support our research by participating in our online parental survey on delayed school entry. We are now at the next stage of our research project, where we would like to ask parents a little more about their thoughts regarding this topic.

We would therefore like to kindly invite you to take part in one of our focus group discussions that we will be scheduling towards the end of September.

As we are not aware of your location within England, we plan to schedule focus groups close to your home location. We intend to have 6-8 parents together.

We wonder, whether you would be happy to indicate the town and county you live in – this way, we will do our best to schedule a focus group that is within a reasonable radius of your home town.

We would also like to inform you that all travel expenses will be reimbursed.

If you are still interested in the prospect of participating in one of our focus groups, we would like to ask you to briefly respond to this email and complete the template we have sent you.

We are looking forward to your reply and thank you in advance for completing the information so that we can arrange for a focus group.

Yours sincerely,

Professor Dieter Wolke
Dr. Sukhdeep Dosanjh
Dr. Corina Shivu
Slava Dantchev, BSc

Department of Psychology
University of Warwick
University Road
Coventry CV4 7AL UK
T (0)24 7652 3096
S.Dantchev@warwick.ac.uk
www.warwick.ac.uk

Appendix C

Focus Group Probes

- We would like to start by having everyone briefly introduce themselves.

- We were wondering what you believe the possible benefits or advantages might be of delaying your child's school entry?

  Probe the following if they go unmentioned:

  - Emotional development?
  - Social development?
  - Academic/scholastic development?
  - Cognitive development?

- Are there also possible concerns that you might have about delaying your child's school entry?

  Probe the following if they go unmentioned:

  - Emotional development?
  - Social development?
  - Academic/scholastic development?
  - Cognitive development?

- Has anyone here had any previous experience with delaying their child's school entry?

  Probe the following if they go unmentioned:

  - If yes, could you please share some of your experiences?
    - Was it difficult?
  - If no, would you know what to do in order to start the process?

- Finally, we would like to discuss the prospect of taking part in a randomized controlled trial of delayed school entry with you. This would mean that your child would have a 50:50 chance of either starting school at age 4 or delaying your child's school entry to start at the age of 5.

  Probe the following if they go unmentioned:

  - Is there any particular reason for your decision?
  - Would there be any alternative study/intervention you might be interested in participating?

Appendix D

Descriptive Statistics of WIAT-II and TAAS for children at 6 and 11 years.

Table I: Wechsler Individual Achievement Test, 2nd (UK) edition (WIAT-II) and Teacher Academic Attainment Scale (TAAS) descriptive statistics for children assessed at 11 and 6 years

	Full sample	Term children	Preterm children
WIAT-II at 11y	*n*=340	*n*=153	*n*=187
Reading: mean (SD)	90.91 (15.97)	98.47 (11.64)	84.73 (16.40)
Impairment in reading: *n* (%)	34 (10.0)	2 (1.3)	32 (17.1)
Mathematics: mean (SD)	85.79 (20.71)	98.50 (15.00)	75.39 (18.88)
Impairment in mathematics: *n* (%)	70 (20.1)	2 (1.3)	68 (36.4)
Any impairment: *n* (%)	75 (22.1)	4 (2.6)	71 (38.0)
TAAS at 11y			
TAAS English/literacy subject rating	*n*=316	*n*=145	*n*=171
Very below average: *n* (%)	42 (13.3)	1 (0.7)	41 (21.6)
Below average: *n* (%)	76 (24.1)	23 (15.0)	53 (27.9)
Average: *n* (%)	103 (32.6)	50 (32.7)	53 (27.9)
Above average: *n* (%)	73 (23.1)	55 (35.9)	18 (9.5)
Very above average: *n* (%)	22 (7.0)	16 (10.5)	6 (3.2)
Mean (SD)	2.86 (1.13)	3.43 (0.91)	2.39 (1.07)
TAAS mathematics subject rating	*n*=313	*n*=144	*n*=169
Very below average: *n* (%)	51 (16.3)	1 (0.7)	50 (26.3)
Below average: *n* (%)	81 (25.9)	21 (13.7)	60 (31.6)
Average: *n* (%)	84 (26.8)	42 (27.5)	42 (22.1)
Above average: *n* (%)	79 (25.2)	65 (42.5)	14 (7.4)
Very above average: *n* (%)	18 (5.8)	15 (9.8)	3 (1.6)
Mean (SD)	2.78 (1.16)	3.5 (0.89)	2.17 (1.01)
Summary score	*n*=291	*n*=136	*n*=155
TAAS score: mean (SD)	2.92 (0.83)	3.41 (0.59)	2.49 (0.78)
Below average (score <2.5): *n* (%)	84 (28.9)	7 (4.6)	77 (40.5)
TAAS at 6y[a]			
TAAS English/literacy subject rating	*n*=265	*n*=107	*n*=158
Very below average: *n* (%)	38 (14.3)	3 (2.8)	35 (22.2)
Below average: *n* (%)	67 (25.3)	11 (10.3)	56 (35.4)
Average: *n* (%)	84 (31.7)	40 (37.4)	44 (27.8)
Above average: *n* (%)	63 (23.9	45 (42.1)	18 (11.4)
Very above average: *n* (%)	13 (4.9)	8 (7.5)	5 (3.2)
Mean (SD)	2.80 (1.11)	3.41 (0.88)	2.38 (1.05)
TAAS mathematics subject rating	*n*=266	*n*=108	*n*=158
Very below average: *n* (%)	37 (13.9)	2 (1.9)	35 (22.2)
Below average: *n* (%)	72 (27.1)	11 (10.2)	61 (38.6)
Average: *n* (%)	96 (36.1)	49 (45.4)	47 (29.7)
Above average: *n* (%)	48 (18.0)	35 (32.4)	13 (8.2)
Very above average: *n* (%)	13 (4.9)	11 (10.2)	2 (1.3)
Mean (SD)	2.73 (1.06)	3.39 (0.87)	2.28 (0.94)
Summary score	*n*=246	*n*=100	*n*=146
TAAS score: mean (SD)	2.81 (0.77)	3.32 (0.54)	2.46 (0.72)
Below average (score <2.5): *n* (%)	74 (30.1)	3 (3.0)	71 (48.6)
Special educational needs at 11y	*n*=338	*n*=152	*n*=186
Presence of special educational needs: *n* (%)	122 (35.6)	17 (11.1)	105 (55.3)

[a]TAAS data at 6y are presented for children who were assessed at both 6 and 11y. Learning impairment classified using WIAT-II scores <−2SD.

APPENDIX I: TEACHER ACADEMIC ATTAINMENT SCALE (TAAS)

Please rate this child's ability in relation to the average level expected of his/her class in each of the following National Curriculum subjects during the current academic year. Please cross out any subjects that are not received by (or not applicable) to this child.

Please tick one box for each subject.

		Very below average	Below average	Average	Above average	Very above average
1	English/Literacy	☐	☐	☐	☐	☐
2	Geography	☐	☐	☐	☐	☐
3	History	☐	☐	☐	☐	☐
4	Information Technology (IT)	☐	☐	☐	☐	☐
5	Mathematics	☐	☐	☐	☐	☐
6	Science	☐	☐	☐	☐	☐
7	Design/Technology	☐	☐	☐	☐	☐

1. Figures include those independent schools who chose to take part in key stage 2 assessments

Appendix E
Tables with descriptives and frequencies of SDQ measures.

British means and standard deviations split by age band.

British means and standard deviations for the sample split by age band.

	Mean score (Standard deviation)		
	5-10 years old	**11-15 years old**	**Combined**
Parent SDQ	N=5855	N=4443	N=10298
Total	8.6 (5.7)	8.2 (5.8)	8.4 (5.8)
Emotional	1.9 (2.0)	1.9 (2.0)	1.9 (2.0)
Conduct	1.6 (1.7)	1.5 (1.7)	1.6 (1.7)
Hyperactivity	3.6 (2.7)	3.2 (2.6)	3.5 (2.6)
Peer	1.4 (1.7)	1.5 (1.7)	1.5 (1.7)
Prosocial	8.6 (1.6)	8.6 (1.6)	8.6 (1.6)
Impact	0.3 (1.1)	0.4 (1.2)	0.4 (1.1)
Teacher SDQ	N=4801	N=3407	N=8208
Total	6.7 (5.9)	6.3 (6.1)	6.6 (6.0)
Emotional	1.5 (1.9)	1.3 (1.9)	1.4 (1.9)
Conduct	0.9 (1.6)	0.9 (1.7)	0.9 (1.6)
Hyperactivity	3.0 (2.8)	2.6 (2.7)	2.9 (2.8)
Peer	1.4 (1.8)	1.4 (1.8)	1.4 (1.8)
Prosocial	7.3 (2.4)	7.1 (2.4)	7.2 (2.4)
Impact	0.4 (0.9)	0.4 (1.0)	0.4 (1.0)
Self-Report SDQ		N=4228	N=4228
Total	N/A	10.3 (5.2)	10.3 (5.2)
Emotional	N/A	2.8 (2.1)	2.8 (2.1)
Conduct	N/A	2.2 (1.7)	2.2 (1.7)
Hyperactivity	N/A	3.8 (2.2)	3.8 (2.2)
Peer	N/A	1.5 (1.4)	1.5 (1.4)
Prosocial	N/A	8.0 (1.7)	8.0 (1.7)
Impact	N/A	0.2 (0.8)	0.2 (0.8)

British means and standard deviations split by gender.

Males only	**Mean score (Standard deviation)**		
	5-10 years old	**11-15 years old**	**All ages (5-15)**
Parent SDQ	N=2901	N=2252	N=5153
Total	9.3 (6.0)	8.8 (5.9)	9.1 (6.0)
Emotional	1.8 (2.0)	1.8 (1.9)	1.8 (2.0)
Conduct	1.8 (1.8)	1.6 (1.8)	1.7 (1.8)
Hyperactivity	4.1 (2.8)	3.8 (2.7)	4.0 (2.7)
Peer	1.5 (1.7)	1.6 (1.7)	1.5 (1.7)
Prosocial	8.4 (1.7)	8.3 (1.7)	8.4 (1.7)
Impact	0.4 (1.2)	0.5 (1.3)	0.5 (1.2)
Teacher SDQ	N=2368	N=1705	N=4073
Total	8.0 (6.2)	7.6 (6.5)	7.8 (6.3)
Emotional	1.5 (1.9)	1.3 (1.9)	1.4 (1.9)
Conduct	1.2 (1.8)	1.2 (1.9)	1.2 (1.8)
Hyperactivity	3.8 (3.0)	3.4 (2.9)	3.7 (3.0)
Peer	1.5 (1.8)	1.6 (1.9)	1.5 (1.9)
Prosocial	6.7 (2.5)	6.4 (2.5)	6.6 (2.5)
Impact	0.5 (1.1)	0.5 (1.1)	0.5 (1.1)
Self-Report SDQ		N=2135	N=2135
Total	N/A	10.5 (5.1)	10.5 (5.1)
Emotional	N/A	2.6 (1.9)	2.6 (1.9)
Conduct	N/A	2.4 (1.7)	2.4 (1.7)
Hyperactivity	N/A	3.9 (2.2)	3.9 (2.2)
Peer	N/A	1.6 (1.4)	1.6 (1.4)
Prosocial	N/A	7.5 (1.7)	7.5 (1.7)
Impact	N/A	0.3 (0.8)	0.3 (0.8)

Females only	**Mean score (Standard deviation)**		
	5-10 years old	**11-15 years old**	**All ages (5-15)**
Parent SDQ	N=2954	N=2191	N=5145
Total	7.9 (5.4)	7.6 (5.6)	7.8 (5.5)
Emotional	2.0 (1.9)	2.1 (2.1)	2.0 (2.0)
Conduct	1.5 (1.5)	1.4 (1.7)	1.5 (1.6)
Hyperactivity	3.1 (2.5)	2.6 (2.3)	2.9 (2.4)
Peer	1.3 (1.6)	1.5 (1.6)	1.4 (1.6)
Prosocial	8.9 (1.4)	8.8 (1.5)	8.9 (1.4)
Impact	0.2 (0.9)	0.4 (1.1)	0.3 (1.0)
Teacher SDQ	N=2433	N=1702	N=4135
Total	5.6 (5.3)	5.0 (5.4)	5.3 (5.3)
Emotional	1.5 (1.9)	1.3 (1.9)	1.4 (1.9)
Conduct	0.6 (1.3)	0.7 (1.4)	0.6 (1.3)
Hyperactivity	2.2 (2.4)	1.9 (2.2)	2.1 (2.3)
Peer	1.2 (1.7)	1.2 (1.6)	1.2 (1.6)
Prosocial	8.0 (2.1)	8.8 (1.5)	7.9 (2.1)
Impact	0.3 (0.8)	0.4 (1.1)	0.3 (0.7)
Self-Report SDQ		N=2093	N=2093
Total	N/A	10.0 (5.3)	10.0 (5.3)
Emotional	N/A	3.0 (2.1)	3.0 (2.1)
Conduct	N/A	2.0 (1.6)	2.0 (1.6)
Hyperactivity	N/A	3.6 (2.2)	3.6 (2.2)
Peer	N/A	1.4 (1.4)	1.4 (1.4)
Prosocial	N/A	8.5 (1.4)	8.5 (1.4)
Impact	N/A	0.2 (0.7)	0.2 (0.7)

British frequency distribution for 5-10 year olds.

SDQ frequency distribution for British 5-10 year olds, both sexes

1) SDQ total difficulties score, British 5-10 year olds

Total difficulties score	Parent (N=5855) %	Parent Cumul. %	Teacher (N=4801) %	Teacher Cumul. %	Self-report (Not applicable) %	Self-report Cumul. %
0	2.4	2.4	10.1	10.1		
1	4.3	6.7	8.3	18.4		
2	5.5	12.2	9.2	27.6		
3	6.6	18.7	8.4	36.0		
4	7.8	26.6	8.3	44.3		
5	7.5	34.1	7.5	51.8		
6	8.5	42.6	6.6	58.5		
7	7.4	50.0	5.9	64.4		
8	6.8	56.8	5.0	69.4		
9	5.9	62.7	4.6	74.1		
10	5.9	68.6	3.1	77.1		
11	5.4	74.0	3.2	80.3		
12	4.0	78.0	3.2	83.6		
13	3.7	81.7	2.8	86.3		
14	3.2	84.9	2.2	88.6		
15	2.7	87.6	1.8	90.4		
16	2.6	90.1	1.7	92.1		
17	1.9	92.0	1.4	93.5		
18	1.7	93.7	1.3	94.7		
19	1.3	95.1	1.3	96.0		
20	1.0	96.1	0.9	96.9		
21	0.8	96.8	0.8	97.7		
22	0.7	97.5	0.5	98.2		
23	0.5	98.0	0.4	98.6		
24	0.4	98.4	0.4	99.0		
25	0.4	98.8	0.3	99.3		
26	0.3	99.1	0.2	99.5		
27	0.2	99.4	0.1	99.6		
28	0.1	99.5	0.1	99.7		
29	0.2	99.7	0.1	99.8		
30	0.2	99.8	0.0	99.8		
31	0.1	99.9	0.1	99.9		
32-40	0.0	100.0	0.1	100.0		

British frequency distribution of 5-10 year old girls.

1) SDQ total difficulties score, British 5-10 year old girls

Total difficulties score	Parent (N=2954)		Teacher (N=2433)		Self-report (Not applicable)	
	%	Cumul. %	%	Cumul. %	%	Cumul. %
0	3.0	3.0	14.1	14.1		
1	5.1	8.2	9.9	24.0		
2	6.5	14.7	10.7	34.7		
3	7.2	21.9	9.9	44.6		
4	8.9	30.8	8.7	53.3		
5	7.8	38.6	6.7	60.1		
6	8.4	47.0	6.7	66.8		
7	7.4	54.4	5.3	72.1		
8	6.8	61.2	4.6	76.7		
9	5.8	67.0	4.1	80.8		
10	5.5	72.4	3.0	83.8		
11	5.6	78.0	2.8	86.5		
12	3.9	82.0	2.6	89.1		
13	3.4	85.3	1.9	91.0		
14	2.8	88.1	1.8	92.9		
15	2.4	90.6	1.4	94.3		
16	2.0	92.6	1.3	95.6		
17	1.8	94.4	0.9	96.5		
18	1.4	95.8	0.5	97.0		
19	1.1	96.9	0.7	97.8		
20	0.7	97.6	0.5	98.3		
21	0.4	98.0	0.5	98.8		
22	0.4	98.4	0.2	99.0		
23	0.4	98.8	0.1	99.1		
24	0.1	98.9	0.3	99.4		
25	0.2	99.1	0.1	99.5		
26	0.2	99.3	0.1	99.6		
27	0.2	99.5	0.1	99.8		
28	0.1	99.6	0.1	99.8		
29	0.1	99.7	0.0	99.8		
30	0.1	99.9	0.0	99.8		
31	0.1	100.0	0.1	99.9		
32-40	0.0	100.0	0.1	100.0		

Frequency distribution of total difficulties score for British 5-10 year old boys.

Total difficulties score	**Parent** (N=2901) %	Cumul. %	**Teacher** (N=2368) %	Cumul. %	**Self-report** (Not applicable) %	Cumul. %
0	1.8	1.8	6.0	6.0		
1	3.4	5.2	6.6	12.7		
2	4.4	9.7	7.7	20.4		
3	5.9	15.5	6.8	27.2		
4	6.8	22.3	7.9	35.0		
5	7.2	29.5	8.4	43.4		
6	8.7	38.2	6.6	50.0		
7	7.3	45.5	6.6	56.5		
8	6.8	52.3	5.4	62.0		
9	6.0	58.3	5.2	67.1		
10	6.3	64.6	3.2	70.3		
11	5.3	69.9	3.6	73.9		
12	4.1	74.0	3.9	77.8		
13	4.0	78.1	3.7	81.5		
14	3.6	81.7	2.6	84.1		
15	2.9	84.6	2.2	86.3		
16	3.1	87.7	2.2	88.5		
17	1.9	89.6	1.8	90.3		
18	2.1	91.7	2.0	92.4		
19	1.6	93.3	1.8	94.2		
20	1.2	94.5	1.3	95.5		
21	1.1	95.6	1.2	96.7		
22	0.9	96.6	0.7	97.3		
23	0.6	97.1	0.6	98.0		
24	0.8	97.9	0.5	98.5		
25	0.6	98.5	0.5	99.1		
26	0.4	98.9	0.3	99.4		
27	0.3	99.2	0.1	99.5		
28	0.1	99.3	0.1	99.6		
29	0.2	99.6	0.1	99.7		
30	0.2	99.8	0.0	99.8		
31	0.1	99.9	0.1	99.9		
32-40	0.1	100.0	0.1	100.0		

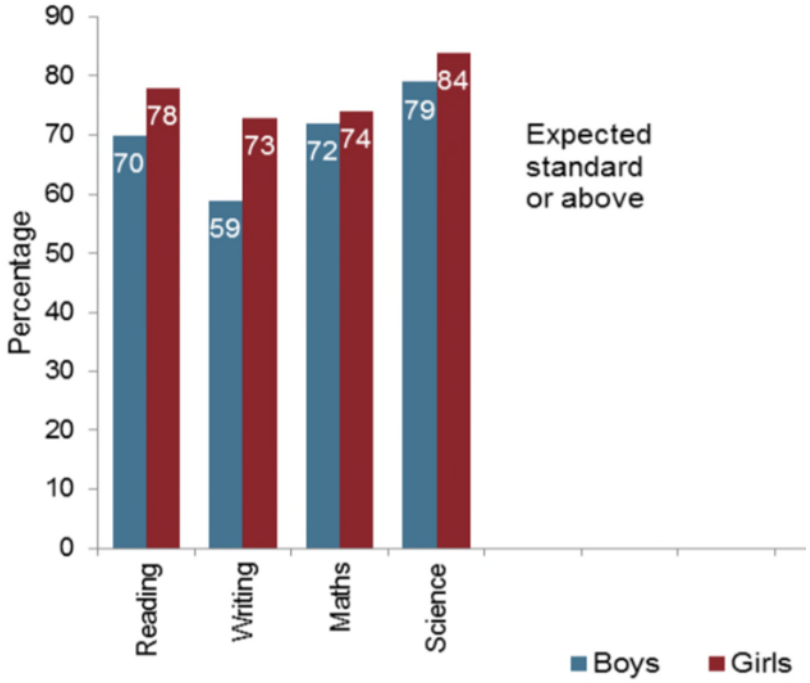
Appendix F

Key Stage 1 Assessments: England 2016[35]

Number of primary schools[3]:

There were 15,6777 state-funded mainstream with key stage 1 assessments in 2016.
12,980 (83%) were LA maintained schools
1,755 (11%) were converter academies
839 (5%) were sponsored academies.
103 were free schools.
See the methodology and quality information for information on types of schools

Key Stage 1 Teacher Assessments by Gender, England 2016.



Source: National Pupil Database

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