

Children starting school
An exploration of issues around
whether there is an ‘optimal’ school
starting age

Heather Gorton

Matriculation Number: 070015726

A Critical Literature Review-Submitted for module one as part of a Professional
Doctorate in Educational Psychology

Introduction

The age that children should start school has become an area of increasing debate in the United Kingdom (UK). Internationally children generally start school between the ages of 5 and 7 (National Foundation for Educational Research (NFER), 2007). The UK has one of the earliest school starting ages of between 4 and 5 years old. This varies between different parts of the UK.

Northern Ireland has the earliest school starting age of four years old (NFER, 2007) with the cut off date for school entry at the end of June (Menet, Eakin, Stuart & Rafferty, 2000). In England and Wales children are entitled to start school the term that they turn five and must attend school once they have turned five. In my previous experience of working for 10 years as an Educational Psychologist (EP) in England it is extremely rare for children to have their entry into school delayed. The cut off date is usually the beginning of the school year (generally the first week in September). Due to a concern about the different lengths in schooling that this policy has previously produced, most children now start school in the September of the year that they turn five; although the first year is in a 'reception' class with a more play based curriculum (NFER, 2007).

In Scotland where I now work children have the oldest UK school starting age of between the ages of four and a half and five years. The cut off date is end of February in one year to the beginning of March in the next. Parents of children with January and February birthdays have a right to ask that their child's school entry is delayed

and a free nursery place is automatically provided for an additional year (automatic deferral). Parents of children whose birthday's fall between mid August and 31st December have a right to request that their child's school start is delayed. However, they need to provide supporting evidence for a request for funding for additional time in nursery and a decision is made by the local council as to whether this will be available (discretionary deferral) (Edinburgh City Council, 2007). Many parents do choose to defer their child's entry, particularly for children with January and February birthdays. An article by Macmillan (2006) in Scotland on Sunday reported that in 2006 five hundred and four requests were made by Edinburgh parents for their child's school entry to be delayed. This increased flexibility means that some children in Scotland are aged five and a half and older when they start school.

Wilson (2000) notes that research studies in an English and Welsh context have found that there appears to be a 'summer birthday effect' whereby children with summer birthdays (the youngest in any cohort) perform less well in school. He summarises the main findings from previous research as follows:

- The youngest summer born pupils (birthdays between May and August) have lower achievement levels than their older autumn born peers (September-December birthdays) (Mortimore, Sammons, Stoll, Lewis & Ecob as cited in Wilson, 2000).
- Younger/summer born children were found in higher than would be predicted proportions in lower ability groups (Jackson, Jinks, Pidgeon & Thompson as cited

in Wilson, 2000) or groups of children with special educational needs (Pumfrey, Peagam & Giles as cited in Wilson, 2000).

- Summer born children had poorer school attendance (Carroll as cited in Wilson, 2000).
- Summer born children scored less well than Autumn born children in Standardised Assessment Tasks (SATs). (Sharp, Hutchison & Whetton as cited by Wilson, 2000)
- In some studies these effects were found to persist into 16 year old exam results and proportions of relatively younger children entering higher education (Hedger, Sharp, Massey, Elliott & Ross as cited in Wilson, 2000).

Wilson (2000) notes that some of the earlier debate has been about what causes this ‘summer birth penalty.’ In his paper he describes two possible reasons:

- Previously in many areas of the UK children did not start school until the term in which they turned five (anecdotal evidence suggests this continues to be the case in some parts of England). In these areas, it was therefore the case that Summer born children actually had two terms less in school than their Autumn born peers. Some of the studies discussed in this review aim to address the question of the impact of different lengths of initial schooling on children’s long term performance.
- A second possible cause that has been proposed is that the differences are due to ‘age position effect’. It is argued that differences in performance occur because

summer born children are younger than their Autumn born peers. Contained in this claim is a 'maturational' view of child development (Marshall, 2003) i.e. younger children are less mature than their older peers and therefore will perform less well in school.

A third explanation is put forward by Lawlor, Clark, Ronalds and Leon (2006); these seasonal differences may arise because the developing foetus has been exposed to different temperatures, maternal diet or infections and this in turn has impacted on later brain development and performance in school.

With the introduction of both baseline and national testing public awareness of the standards that children attain at different ages has been raised and the standards children are achieving compared internationally. This sits alongside national targets for achievement set by the labour government that have not always been met. Sharp (2002) notes that one of the reasons proposed as to why this might be the case has been linked to the idea of an optimal school starting age; maybe children in the UK are starting school when they are too young and this is affecting their subsequent achievement. She adds that this leads to an argument that European and other English speaking countries model of a later school start (average age is 6 in most countries as late as 7 in some) is a better one.

As noted earlier in my own local context, there is one of the latest UK school starting age and more flexibility around when a child does start school. Educational Psychologists (EPs) in my service find that they are often consulted by pre-school

staff and parents about whether a child is ‘ready’ to start school and, in cases where a child will be five once the school year has started, EPs become closely involved in the decision making process as to whether the child would benefit from an additional year in nursery (referred to as retention). When being asked to consider these issues EPs feel concerned about what information they should be taking into account when supporting parents and pre-school settings in making these decisions. In Edinburgh, the progress of children whose school entry has been delayed is not formally tracked so my personal interest is to know what the impact of a further year in nursery has on a child’s progress during this additional year and once they start school.

This literature review has, therefore, been undertaken firstly to try and ascertain what evidence there is for an optimal school starting age. In looking at this issue the review has been widened beyond Wilson’s (2000) review of research in the UK to look at the more recent research in this area and also at evidence from an international context where children start school later. Secondly, it aims to begin to explore what the benefits and costs might be for children who start school at a later age and how EPs, parents and pre-school staff judge whether a child is ‘ready’ to start school.

Literature Search Strategy

A search of the literature in this area was carried out to see what evidence there is of a ‘best’ or ‘optimal’ school starting age. The following data-bases were searched for papers published in this area:

- Australian Education Index
- British Education Index
- ERIC
- ASSIA
- Scopus

The following search terms were used, initially on their own :

- school starting age
- best school starting age
- optimal school starting age
- age of school entry
- age of kindergarten entry
- Retained school entry
- Delayed school entry
- Deferred school entry

and then with the following conjunctions:

- and attainment
- and cognitive skills
- and emotional and social development
- and emotional and behavioural development

A review of abstracts was carried out to establish which papers were pertinent to the

topic and full copies of these papers obtained. Relevant references from papers not identified in the initial search were also followed up. As a final trawl for information the search engine Google Scholar was used; individual searches were carried out on sites that had emerged as being relevant from the initial searches e.g. NFER and Scottish Government publications and research reports. Relevant authors with an ongoing research interest in the area were also followed up. In total 69 papers were retrieved and from this 36 papers were identified for discussion. With such a large number of papers being identified initially strict criteria had to be applied to reduce this to a manageable amount for discussion. The criteria applied were as follows:

- Paper must have been published in the last ten years (findings prior to this have already been summarised using the Wilson review and the aim was to look at the most recent research in both a UK and international context).
- Children involved in the research must either be receiving their education in an early years setting, in their first year of school or be part of a longer term follow up based on the age that they started school.
- The main focus of the research must be on the impact of school starting age on the child's long term academic and/ or social and emotional development.
- Papers that focused solely on readiness were excluded; only those looking at readiness and impacts of delayed entry were included.

A key paper that emerged was by Stipek (2002). At the time of publication it reviewed a range of predominantly American research papers and took an educational

perspective. Stipek notes that three main research methodologies have been employed in trying to answer the question of the best age for children to enter more formal educational settings. These were as follows:

- 1) Studies that compare the outcomes for children across a year group by age.
- 2) Studies that compare the outcomes of children who are almost the same age but in different year groups and those who are virtually a year apart in age but in the same year group.
- 3) Studies that compare the progress of children whose entry has been delayed with those who have entered at the earliest eligible point.

In the current review it was found that the same research methodologies continue to be employed subsequent to Stipek's paper across a range of international contexts. The search also uncovered a series of papers that took a slightly different economic perspective. Although these studies took a different perspective they still employed similar research methodologies in terms of comparisons of children's performance by age and school start point. For the purposes of this review the information has been organised into sections based on whether the research occurred within the UK or beyond and which of the above research methodologies the authors have employed. The sections are structured so that they start with the wider international perspective then focus on findings in a UK context and then finally look at my own local Scottish context. Section 1 will discuss papers that compare children's performance across a year group, Section 2 will discuss papers that compare the outcomes of children who

are almost the same age but in different year groups and those who are virtually a year apart in age but in the same year group and Section 3 will look at the information arising from studies comparing the progress of children whose entry has been delayed and those who started at the earliest eligible point.

Section 1: Studies looking at variation in children's performance by age across a year group

Studies carried out in international contexts

This first set of papers looks at variation in children's progress by age across a whole age cohort in an international context. This research methodology explores the longer term impact of age of entry on a child's achievement, cognitive skills and social and emotional development. When discussing these international studies it should be borne in mind that these children are likely to have started school at an older age and to have been educated in a system where different pedagogies operate in relation to the UK. However, it is interesting to note that the same debate as to whether the countries' school starting age is too young or too old and whether it should be moved to a different point exists. To help the reader gain an overview of the studies each group of papers have been organised into a table offering a summary with a more detailed discussion following. The main findings from the international papers looking at children's performance by age across a year group are summarised in the table on the following page.

Table 1: International studies looking at variation in performance across a year group

Reference	Sample	Comparison	Consequences of Age of Entry
Grissom (2000)	USA (California) data for all children tested in 1998-2002.	Performance on 2 standardised tests of younger and older children. Some delayed /retained children in sample.	Older children performed better than their younger peers. Differences were small and no longer evident at a High School level.
Stipek and Byler (2001)	USA 237 children in three schools from low income backgrounds. Longitudinal study tracking children from kindergarten to 3 rd grade.	Achievement in literacy and maths, child's ratings of relationship with teacher, perception of their academic competence and teacher ratings of child socially and behaviourally compared by age across the year group.	Relatively older children achieved better initially but these differences were no longer evident in third grade. No significant differences were found in child or teacher ratings of social and emotional development or in relation to academic competence. Older children reported having a closer relationship with their teacher.
Stipek (2002)	Reviewed 14 papers (mainly US based research)	Asked is there an optimal age for starting Kindergarten? One section looked specifically at comparing variations in attainment, cognitive scores and social and emotional skills continuously by age.	Most studies found that older children initially had better attainments than younger children, however this decreased over the time that they spent in school. A few studies found no differences. Overall there was some small advantage of being relatively older but this reduced over time. There was only limited evidence that relatively younger children were more vulnerable to emotional and social difficulties. In one study where race and socioeconomic factors were also included it was found that the risk these factors presented was 13 times more than age.
Elder and Lubotsky (2006)	14,333 USA children from NCES National Educational Longitudinal study in 1988.	Age of kindergarten entry to attainment in maths, reading, grade progression and diagnosis of learning difficulties.	Relatively older children achieved 0.53 standard deviation better reading scores, 0.85 standard deviation better maths scores. Relatively younger children 13% were more likely to be retained, 3% more likely to be diagnosed as having Attention Deficit Hyperactivity Disorder (ADHD) or Attention Deficit Disorder (ADD). Delayed entry disadvantaged children from lower SES backgrounds.

National Institute of Child Health and Human Development (NICHD) (2007)	Over 900 children in various parts of the USA.	Longitudinal study from birth to 3 rd grade. Attainment, cognitive skills, social and emotional development of younger and older children in a class, control for confounding factors (i.e. socio-economic background, parental education level, ethnic background, pre-school experience)	Found same 'modest' advantage for older children in a year group as Stipek (2002). Some of these effects persisted for older children. No differences found in social and emotional development of the younger and older children.
Dobkin and Ferreira (2007)	Data from restricted access 'Decennial Census Long Form Data' for the states of California and Texas	Effect of school entry laws on attainment and labour market outcomes.	Youngest children in a class were more likely to be held back a grade. Found no impact on later labour market outcomes of early school entry. Entry laws were poor instruments for making judgements on eventual incomes.

The widest review of papers in this area was carried out by Stipek (2002) her search found fourteen research papers using this kind of methodology; thirteen reported on studies carried out in the USA and one on a study carried out in Israel. Overall the evidence from these studies suggested that relatively older children had higher achievements than relatively younger children in the early stages of school; this effect became less evident over time. Most of the studies focused on attainment and IQ scores but four also looked at social, emotional, behavioural and motivational factors and here the findings were more mixed. The Israeli study (Breznitz & Teltsch cited in Stipek, 2002) found that younger children showed signs of increased anxiety but showed no age related differences in terms of self esteem or sociometric measures. In another study that looked at teacher ratings it was found that relatively older children were rated as having better social skills and being more popular (Spitzer, Cupp & Parke cited in Stipek, 2002); however other related factors were not associated with age. In contrast to this, two other studies (Stipek & Byler 2001, Kinard and Rheinherz as cited in Stipek, 2002) did not find an impact of age on children's social, emotional

and behavioural development using a range of measures. Stipek concluded that there is only limited evidence to support the hypothesis that relatively younger children are more vulnerable to social, emotional and motivational difficulties. The review papers described in this section support this conclusion. However different conclusions emerge from more recent and UK studies which will be discussed later in this review. Stipek observed that most of the studies do not factor in confounding factors that might be affecting children's progress such as socioeconomic status and ethnic background of their parents. In the one study that did do this (Jones & Mandeville cited in Stipek, 2002), it was found that these factors were much more important in determining a child's eventual achievement than age. Stipek argued that as younger children eventually catch up with their older peers they are learning at a faster rate and potentially benefiting more from school. However, she contradicts her argument with regard to the application of this methodology:

“Few of the studies using this methodology assess change in achievement over the school year; they therefore cannot be used to determine whether older children benefit relatively more from schooling than do younger children.” (Stipek, 2002, p.5)

It can be argued that the reverse of this argument applies to the younger group.

Stipek's (2002) approach is mainly a discussion of findings rather than a critique of each paper. The predominantly American context of these papers where children start school at an older age (6 years for first grade) makes it harder to compare and

extrapolate these findings to a UK context. From Stipek's discussion it is also evident that in the USA parents often delay their child's entry and this also has an impact on the data used in the studies discussed. This review, therefore, offers a good starting point for the consideration of optimal school starting age but may have less application in the UK setting.

Further and more recent studies also report on children's achievement in an American context and how this varied by age (Grissom, 2000; Elder & Lubotsky, 2006; Dobkin & Ferrareira, 2007). All these studies used secondary data collected from large population surveys. Grissom and Elder, and Lubotsky both found in line with Stipek's review that relatively older children had better achievements initially but this effect reduced over time. In addition to this, Elder and Lubotsky reported that relatively younger children are 13% more likely to be retained and 3% more likely to be diagnosed as having Attention Deficit Hyperactivity Disorder (ADHD) or Attention Deficit Disorder (ADD). They also found that children coming from higher socioeconomic backgrounds show a greater accumulation of skills prior to kindergarten entry. They suggest the evidence showed that having relatively older peers increased younger children's attainments but also made them more vulnerable to repeating a grade in the future. This pattern was also reflected in Dobkin and Ferrareira's (2007) seemingly contradictory finding that the younger children were more likely to be held back a grade but also that the youngest in a cohort had slightly higher academic attainments than their older peers. In the United Kingdom it is very unusual for children to be held back in the same way as in the USA. However, there

is evidence from some of the UK studies that the younger children in a class are more at risk of being incorrectly ‘labelled’ as having Additional Support Needs¹ by their teachers and it is possible that this is part of the effect here in this USA sample. A younger child may appear to not have certain skills however this could be related to their relative maturity as opposed to an intrinsic difficulty in this area. Elder and Lubotsky, and Dobkin and Ferraria are discussion rather than peer reviewed empirical papers so we can therefore not be fully confident in whether their findings and methodology have been thoroughly scrutinized. Grissom’s paper is peer reviewed, however the findings should be borne in mind alongside the different context and policies of the UK for example in the USA many children have their entry delayed or repeat a grade. In his own discussion, Grissom acknowledges that this will have had some impact on the results and because the data is secondary in nature the exact reasons behind any decision to delay are not known.

Using the wider international context Bedard and Dhuey (2006) carried out an analysis of secondary data from the “Trends in Mathematics and Science Study” (TIMMS) based on data from the following countries; Austria, Canada Czech republic, Denmark, England, Finland, France Greece, Iceland, Japan, New Zealand, Norway, Portugal, Slovak Republic, Spain and Sweden. They reported that they had chosen these countries because they all have clear school entry cut off dates.

However, as detailed in the earlier discussion of school starting ages in the UK this is

¹ The term ‘Additional Support Needs’ has been used in Scotland since the introduction of the ‘Additional Support for Learning Act’ in 2004 (Scottish Executive, 2004). It is now used instead of the term ‘Special Educational Needs’(SEN) and in fact aims to identify and address the needs of a much wider range of children. Any child who requires some kind of additional support to access educational opportunities whether this need is temporary (e.g. resulting from a broken leg) or long term (e.g. resulting from a genetic difficulty such as Downs Syndrome) can be described as having Additional Support Needs.

actually not the case for England and this is likely to have some impact on the overall results. They found that the youngest children score 4-12 percentiles lower than the oldest in grade four and 2-9 percentiles lower in grade 8. They also used a different secondary data set from the USA and Canada to demonstrate that younger children in a cohort are less likely to move on to further and higher education. They use these two sets of data to argue that age effects do not dissipate over time and differences are due to the 'relative immaturity' of younger children. However, despite a range of different statistical approaches being applied to their data to factor in and out various effects, they do not at any point report on the statistical significance of the differences they find. A look at the raw data does show that the effect is reducing over time as reported in other studies and a test of statistical significance would be useful to confirm or refute the importance of this. Finally inclusion of such a wide range of countries also affects the data as a range of school starting ages operate and it would appear from their analysis that they have not factored in the impact that different lengths of schooling will have on children's attainments.

The studies discussed so far have been cross sectional in nature and have compared performance by age across a cohort. The difficulty with this research methodology, as highlighted by Stipek (2002), is that it only tells us about children's achievements at one point in time; it does not tell us how this varies for each individual over time. Longitudinal studies offer the opportunity to look more closely at this individual variation. This literature survey identified two papers that report on longitudinal studies and these are discussed next.

The first by Stipek and Byler (2001) was a longitudinal study of 237 children from kindergarten to third grade. All the children came from low income families with a representative ethnic mix, and their maths, literacy, social skills, self and teacher perceptions were measured by individual assessment, interview and teacher questionnaire each year. With respect to attainments a similar pattern of better attainment initially for the relatively older children was found but this effect was no longer evident in third grade. When they compared similarly aged children in kindergarten and first grade they found that the first graders' mathematical achievement was better than the kindergartens' with no effect for literacy. They argue, therefore, that there are more benefits to be gained for younger children in school than at home. No significant differences are found in self perception or teacher ratings of academic competence and social skills except that the relatively older children reported that they were more confident that their teacher liked them. Five children whose entry had been delayed were not included in the analysis. As this study stops at third grade it does not identify any later age of entry effects that might emerge such as a reduced likelihood of enrolling for further education in the relatively younger group. The focus here is on children from low income families (Stipek and Byler justify this focus as looking at the area of greatest concern for policy makers) however it could be argued that a different pattern of results would be evident for children from higher income families as these children may gain more from spending more time prior to school learning at home.

The second by the National Institute of Child Health and Human Development (NICHD) (2007) reported on a longitudinal study carried out with 900 children from birth to third grade. Within the sample they reported that they included a representational number of children from different ethnic, social and family backgrounds and controlled for this in their data analysis. Data was collected using interviews with mothers and teachers, teacher ratings of social skills and progress, formal standardised tests of literacy and cognitive skills, the Achenbach behavioural checklist and a social skills questionnaire and rating system with testing occurring in kindergarten and each year of school. Overall they found, in line with Stipek (2002), that relatively older children made better progress initially than their younger peers but the size of this effect reduced over time. However, their findings differed from Stipek (2002) in that this effect is still significant in grade three and there is evidence from some of the test scores that the older children did make more progress and therefore potentially got more out of school than their younger peers. This is despite evidence that some of the younger children had higher test scores initially in some areas of literacy. However they note that:

“...the associations detected are modest and would not appear to justify the strength with which beliefs about age and maturity dominate many, if not all, discussions about readiness for school (Meisels,1999). Moreover it remains unclear what policy implications would derive from these results, as there will always be children within a class who vary in terms of their age of entry to school.” (NICHD, 2007, para 62)

They found no differences in social, emotional and behavioural development by age either at the start of school or once in third grade. They suggest that age of entry should only be given some limited weighting when considering a child's readiness for school and that other factors such as the type of parenting the child receives, the level to which the parents are able to support their education and the economic situation of their family hold a greater weighting.

The information offered in the NICHD study appears to be fairly robust in nature as confounding factors, such as ethnic and socio economic background, not taken into account in other studies are factored in here and the longitudinal nature of the study means that an individual's progress over time is also considered. However, with respect to a UK context it should be borne in mind that the children in this study will have entered school at an older age than here. Although these findings may hold true for five and six year olds in the USA they do not consider the four year olds who enter formal educational settings in the UK. In addition a different pre-school system operates in the UK than the USA. One of the reasons that Stipek (2002) gives for not increasing the age of entry into kindergarten is that for children from lower socioeconomic backgrounds high quality pre-school may not be available. In the UK a system has now been in place for sometime to ensure that all three to five year olds have free access to high quality pre-school education.

As can be seen, findings predominantly from an American setting suggest that at the early stages of school there does appear to be an initial academic and possibly social advantage for relatively older children. However, this effect reduces over time and is less evident two or three years into school. Where other factors such as socio-economic background, ethnicity and parental education levels are taken into account these have more weighting in the eventual outcomes for a child than the age that they started school at.

Studies carried out in the UK or comparing a UK sample with an international one

This second set of papers looks at variation in attainment, cognitive scores, examination results, and emotional and behavioural development by age across a whole age cohort in the United Kingdom context. An initial look at the UK literature suggests that there is conflicting evidence in support of the argument that younger children have lower attainments and are more likely to have additional support needs in school. However, when the research methods and type of data used is looked at more closely alongside the different times the studies were carried out in relation to policy change, a slightly clearer picture begins to emerge. These papers are again offered in a summarised version in the table on the following page with a follow up discussion.

Table 2: UK studies looking at variation in performance across a year group

Reference	Sample	Comparison	Consequences of Age of Entry
Alton and Massey (1998)	All English, Welsh and Northern Irish pupils taking GCSE, GCEs (A Levels) in 1991, 1993, 1974, 1975.	Grades achieved in GCSE and A'level by month of birth. No's moving on to take A' levels by month of birth.	Younger pupils took fewer GCSEs and achieved poorer results than their older peers. Fewer summer born pupils went on to take A'levels but for those who did there was no age related pattern in performance evident.
Hutchison and Sharp (1999)	7000 children in 59 schools in outer London Local Education Authority	Suffolk reading test data from 6,8,10 year olds in 1988 and same cohort in 1990. Mean performance by season of birth.	Autumn born children performed significantly better than summer born at all stages. Effect reduced over time; significant at ages 6,8, and 10 but no longer at age 12. Steep drop between 6 and 8 and at transfer to Secondary School.
Wilson (2000)	178 secondary age pupils classified as having SEN (roll 1225)	Looked at season of birth and gender against percentage of children who were identified as having SEN. And their scores on the 'cognitive abilities test. (cat)'	10% Autumn born 16.6% Spring born 16.5% Summer born Found a higher incidence of SEN amongst the younger children and boys. Summer SEN children had higher cat scores than autumn born SEN children.
Daniels, Shorrocks, Taylor and Redfern (2000)	2500 children in 1991 & 1800 children in 1992	KS1 SATs results against season of birth, length of schooling, gender and social background.	Older children out performed younger children. Summer born children did not seem to have increased benefits from an additional 1 or 2 terms in school. Gender and Social background emerged as more important factors than season of birth.
Ford and Gledhill (2002)	1999 survey data from 8036 families in England, Scotland and Wales	Relationship between season of birth, incidence of SEN, IQ and reading and spelling attainment.	Children achieved in line with expectations of their age in reading and spelling with no higher incidence of specific learning difficulties. However teachers were more likely to rate summer born children as having SEN.
Sharp (2002)	British based, compares international papers	Comparison of papers on optimal school starting age.	Concluded mixed evidence for and against different school starting ages. Older children in a cohort did better. Some evidence that starting school young increased a child's anxiety levels, reduced their self esteem and motivation to learn.
Goodman, Gledhills and Ford (2005)	1999 survey data from 8036 families in England, Scotland & Wales	Level of emotional and behavioural difficulties based on the strength and difficulties questionnaire.	Younger children in a year were more vulnerable to emotional and behavioural difficulties.
Tymms, Jones, Merzell, Henderson and Cowie (2005)	Scottish children (8,652) compared to English speaking children in England (65,258), Western Australia (10,630) and New Zealand.(5,870)	Used Performance Indicators in Primary School (PIPs) data at school entry (baseline) and P3 to compare children's progress by relative age. Compared Scottish children's baseline scores to English, Australian and New Zealand children.	Older Scottish children achieved higher scores than younger children initially but this was no longer evident at P3 (there was a wide range of attainment at all ages). Scottish children had slightly lower scores at entry in English and Maths but the same scores in vocabulary as English, Australian and New Zealand children.

Lawlor, Clark Ronald and Leon (2006)	Scottish sample of 12,150 people born between 1950 and 1956.	Attainment at ages 7, 9 and 11 compared in relation to season of birth and climatic differences at the time.	At age 9 younger children had lower score than older children in reading. At age 11 younger children had lower scores than older children in maths. These differences were small overall. No variation was found in pictorial and verbal reasoning or minor behaviour disorders by season of birth. Temperature at time of conception, during mother's pregnancy and at birth did not affect intelligence. Authors suggested it is age of entry and relative age that is having an impact.
--------------------------------------	--	--	--

The issue of whether different lengths of schooling offer an explanation of the different performances of summer and autumn born children is addressed by Daniels, Shorrocks-Taylor and Redfern (2000). They used Standardised Achievement Test (SATs) results from children in 1991 and 1992 to look at whether summer born/younger children do better when they have an additional two terms in primary school. This difference occurred due to varying admissions policies operating in different parts of England; some summer born children entered school at the same time as their autumn born peers, some had one or two terms less in school. They also factored in the impact of gender and social background. Overall they concluded that increased length of schooling did not mean that the younger children made any significantly better progress. Social background and gender emerged as more important factors. They suggested this may be due to maturational factors (younger children are not ready for formal learning) or that the curriculum available in a school classroom is not appropriate for younger children. Looking at how they have analysed the data it would appear that they are considering background, length of schooling and gender simultaneously rather than looking at each effect separately. In their discussion of the results they note that social background effects outweigh length of schooling. This study was conducted before several new educational approaches were

introduced in England; foundation stage curriculum (DfEE², 2000) and national literacy (DfEE, 1997) and numeracy strategies (DfEE, 1998). The foundation stage curriculum particularly aims to adjust the curriculum so that it is more appropriate to the needs of this younger group of children. To properly answer the question of whether increased length of schooling is beneficial for summer born children similar data from a more recent period would need to be considered. This question will be revisited in the next section.

The importance of length of school is also considered by Hutchison and Sharp (1999) who used a similar method but with different data. The data that they compared were raw scores from the Suffolk Reading test administered to 6, 8 and 10 years olds in 1988 and the same cohort in 1990. The results were compared on the basis of season of birth. They again found summer born children performed less well than their autumn born peers. This effect was evident at all ages and was statistically significant at ages 6, 8 and 10 but not at 12. They do not make any reference to what admission policy was operating in this area during the period so it is not clear from their paper whether length of schooling could be part of the picture here. In addition they do not quote or carry out any analysis of the age standardised scores and therefore do not fully explore what the data they have collected might show. Standardised scores would help to see whether the differences in performance are simply what we would expect when we take into account the variation of age within each group.

² Department for Education and Employment

Standardised test results are used to tease the issues out further by Ford and Gledhill (2002). They took existing data from a survey carried out in 1999 as part of a study of the mental health of children and adolescents in Britain. The data was collected in England, Wales and Scotland. They looked at the relationship between season of birth incidence of Special Educational Needs, IQ and reading and spelling attainment. Using standardised scores they found that children were achieving in line with the expectations of their age for reading and spelling with no higher incidence of specific learning difficulties. This finding is an interesting contrast to findings from the two previous studies that used SATs results and raw test data and found a statistically significant difference. Their data from teachers based on face to face interviews and self report questionnaires suggested that summer born children were more likely to be rated as having Special Educational Needs (although the data collected on SEN did not support this). This is a worrying finding given that this will lead teachers to have different expectations of these children which in turn will have a potential impact on the child's achievement and self esteem in the longer term. Unfortunately the authors do not seem to be aware of the different school starting ages of Scottish children. In Scotland the oldest children tend to have Spring/Summer birthdays and the younger Autumn/Winter birthdays. They do not seem to take this into account when putting together the groups for this data so this feature is likely to introduce a false picture into these results.

The question of whether younger children are more likely to be registered as having Special Educational Needs (SEN) is considered further by Wilson (2000). He looked

at season of birth, gender and cognitive scores against numbers on the school SEN register. He found that boys and younger children are more likely to be registered as having SEN although the numbers for spring born were slightly higher than summer born. He also compared the cognitive scores of children on the SEN register and found that although younger children were more likely to be registered as having SEN they had higher cognitive scores than their older SEN registered peers. This pattern of results suggests that in line with the findings from Ford and Gledhill's (2002) study there may be an element of negative labelling from teachers that affects judgements made about this younger group of children. Wilson notes that this concern is highlighted by Sharp as cited in Wilson 2000 and Mortimore as cited in Wilson 2000 in their papers on a similar subject. However, what Wilson does not analyse in this paper is the reasons for the children's SEN registration. If the children were registered because of concerns about their behaviour their cognitive scores might be less relevant as it may be that younger children are more vulnerable to emotional and behavioural difficulties. He also does not carry out any statistical analysis of the differences in the cognitive scores of the SEN registered children so we cannot know from this paper whether this effect has occurred by chance. Information about the children's socio-economic backgrounds and length of schooling are not included in the analysis which may also have had an impact on the results.

The question of whether younger children are more vulnerable to emotional and behavioural difficulties is explored further by Goodman, Gledhills and Ford (2005).

They have used the same survey data discussed in their 2002 paper. However, on this occasion they have separated out the data to take account of the different school cut off dates in Scotland. They compared a child's season of birth against data on prevalence of emotional and behavioural difficulties using the Strengths and Difficulties Questionnaire (SDQ) completed by parents, teachers and the children themselves (from 11 onwards) and also some data from face to face interviews. They also set the Scottish data against the English and Welsh data to look at whether any differences were due to "season of birth" or "relative age." From this comparison they concluded that it is relative age not season of birth that cause differences between these groups. They found that younger children received higher difficulty scores on the SDQ suggesting that they were more vulnerable to emotional and behavioural difficulties than their older peers. They noted that this effect was small at an individual level but added together becomes more significant at a public health level. It could be argued that this difference in patterns of behaviour is linked to the children's relative immaturity as opposed to them having a greater degree of emotional and behavioural difficulties. Furthermore, there is a risk that biased expectations may influence the ratings given by teachers in the same way that Wilson (2000) and Ford and Gledhill (2002) suggest that teachers are more likely to rate children as having SEN without any supporting evidence. Direct observations of the child's behaviour in context carried out by adults independent of the child and not aware of the children's SDQ scores would help to clarify the picture.

International findings are compared with those from a British context by Sharp (2002). She reviewed a range of UK and international studies and concluded that there is no definite evidence around the benefits of different school starting ages. Partly this is because it is hard to compare 'like with like' as different pedagogies and approaches apply throughout. Her review suggested that teaching children formal skills early gives them an initial advantage but this is not sustained in the longer term as later starters make rapid progress and catch up. She found some evidence that early exposure to a formal curriculum may make children more anxious and reduce their self esteem and motivation to learn. In an English and Welsh context, she found that older children in a year do better than younger ones even when different lengths of schooling were taken into account and she cited a further study by Hutchison and Sharp (1997) to support this. She identified important factors in creating an optimal early years environment and set this against some of the difficulties of the reception class environment (school based provision for children in their first year of school in England and Wales). Sharp does not discuss the Scottish context or the different system operating here. This review is mainly a summary and discussion of existing papers and does not critically evaluate the findings that emerge.

The papers discussed so far have focused on the impact of children's age on attainment, cognitive skills and social and emotional development in primary and the early stages of secondary school. Alton and Massey (1998) looked at whether there was a longer term impact of age and season of birth on General Certificate of Education (GCE) and Advanced (A) level results in England, Wales and Northern

Ireland. They used data for all children sitting these exams in 1974, 1975, 1991 and 1993 and analyse the grades achieved by season of birth. At a GCE level they found that older children achieved higher grades and were more likely to go on to take 'A' levels. No age related pattern was found in 'A' level results and they suggested this was because only the higher performing younger children go on to take this exam. The authors do not justify why they have chosen to discuss data from as far back as 1974 and 1975 given that a different exam structure was operating at this time (Ordinary levels and Certificate of Secondary Education) this data seems less relevant to current discussions. For both data sets the analysis of the data is descriptive, a more robust statistical analysis of the data would add weight to their arguments and would make it easier to compare these findings to other studies where more analysis has been applied. The authors also do not seem to take into account the different school cut of age operating in Northern Ireland whereby some of the summer born children will actually be the oldest in a year group. As in the Ford and Gledhill (2002) study this is likely to alter the overall picture.

Focusing more closely on our Scottish context Lawlor et al. (2006) attempted to tease out the different hypotheses around length of schooling, relative age and actual seasonal differences that might affect brain development. They used retrospective data from 12,150 people born between 1950 and 1956 who took part in the Aberdeen Child Development study to look at attainment, IQ scores and teachers ratings of minor behavioural disorders. This information was set alongside school admission policies and ambient temperatures at that time to see what relationships existed. They

found that at age 9 younger children had lower scores than older children in reading. At age 11 the younger children had lower scores than older children in maths. These differences were small overall and not quite as predicted strictly by age as some of the younger children were in the higher scoring groups. No variation was found in pictorial and verbal reasoning or minor behaviour disorders by season of birth. Temperature at time of conception, during mother's pregnancy and at birth did not affect intelligence. The authors suggested it is age of entry and relative age that is having an impact rather than season of birth. The data set that they chose to analyse measured the effects of pedagogies and approaches that are likely to differ markedly from those used currently in Scotland. Today children's progress is much more regularly assessed at entry (baseline) and as they move through school through national tests. Therefore, more contemporary studies are likely to produce a clearer picture of the development in children's achievement over time. Finally, only one aspect of the likely impact of seasonal variation on brain development is discussed in this paper (ambient temperature) the other factors of maternal diet and infection are not explored making it impossible to completely rule out this hypothesis as a possible explanation.

A further analysis of Scottish data is offered by Tymms, Jones, Merzell, Henderson and Cowie (2005) this study looked at age, cognitive development and progress from school entry to the third year of primary for a sample of Scottish children. They compared Scottish children's developmental profile to that of children in England, Western Australia and New Zealand (they only look at English speaking children

here to achieve a like for like comparison) at school entry. They conclude by asking whether there is evidence of an optimal school starting age in Scotland. The data is from the Performance Indicators in Primary Schools (PIPs) project which used a computerised baseline assessment on school entry and is repeated later in school. In the Scottish context they found a wide variation in age and attainment at school entry, from exceptional to struggling with most parts of the assessment. In line with other studies they find girls are ahead of boys in reading and vocabulary but about the same in maths. Children on free school meals had lower starting points. Older children achieved higher initial scores than younger ones however this effect was no longer significant in P3. They found some older P3s were doing significantly less well than their peers and they suggest that these are probably ones who have had their school entry delayed due to concerns about their development prior to school. They found that length of pre-school experience was not significantly linked to baseline scores. They suggested that this might be because the generally older Scottish children have all had quite a bit of pre-school experience in line with the recent national policy of giving all children a free pre-school place from the term after they turn three. From comparison of the progress of younger and older children they concluded that there does not appear to be an optimal school starting age. They suggested that the policy should not be changed without further supporting evidence and that it is an area where strong opinions are held without confirmation from a research base.

With respect to international comparisons Tymms et al. (2005) found that Scottish children overall have slightly lower scores than the other three countries in reading

and maths but the same scores in vocabulary at school entry. They suggested this might be due to differences in the type of pre-school curriculum on offer and proposed that further research in this area would be useful. When considering these results it should be borne in mind that the Scottish sample are likely to be older than the English and Welsh ones as a later school cut off date is in place and more flexibility around school starting age. This therefore suggests that in this case younger children are showing better baseline scores than older children. This paper is of particular pertinence as it looks at the Scottish context and compares it internationally. However, the authors do not cite or link their findings to any of the other research studies. The paper's focus is on cognitive/ attainment outcomes although in their recommendations for further research they do suggest looking at the social and emotional factors. It does not offer any analysis as to whether the Scottish children 'catch up' with the other English speaking countries at a later stage. This would seem to be an important next step in a Scottish Government sponsored report that aims to provide guidance on decisions about school starting age. However, they finish by suggesting that a way forward would be to adopt an evidence based approach and introduce pilot projects where the impact of different school starting ages could be evaluated in a controlled way.

As can be seen from this section UK studies have found an initial advantage for the relatively older children in a school cohort, some went on to find this reduced over time others did not find this. This may partly be due to the type of data they were using to measure changes in attainment and also the time scale data was collected

over. One study found that younger children do less well at a secondary and further education level. There appears to be increased teacher labelling of relatively younger children in a cohort as having Additional Support Needs when this isn't confirmed by evidence from other assessments of their skills. One study found that younger children are at increased risk of having social, emotional and behavioural difficulties. In Scotland when TIMMS data was used children appeared to have a lower starting point in literacy and numeracy skills than their younger English and Welsh peers. In the Scottish sample the younger children were found to have lower initial attainments but this gap was no longer evident three years into school. Studies where length of schooling and other factors are teased out begin to suggest that it is 'relative age' rather than 'actual' age which produces these different initial patterns of attainment.

Section 2: Studies that compare the performance of children who are almost a year apart in age but in the same year group or children virtually the same age but in different year groups

This third set of papers compares the progress of children who are virtually a year apart in age but in the same year group and/or children who are virtually the same age but in different year groups. Stipek (2002) describes this as the most powerful methodology for teasing apart the optimal school starting age debate as this approach allows the different impacts of age of entry and length of schooling to be considered.

Studies carried out in an International Context

The main findings from international studies using this kind of methodology are summarised in a table on the following page. A more detailed discussion of the research findings in this area follows the table.

Table 3: International Studies comparing the performance of children virtually a year apart in age but in the same year group or children virtually the same age but in different year groups

Reference	Sample	Comparison	Consequences of Age of Entry
Fredrickson and Ockert (2000)	Swedish administrative data for everyone born 1935-84.	Compared long term outcomes of children who are only one month apart in age but one year apart in terms of when they started school	Older children had better attainments than younger children and stayed on at school longer. Younger children had better earnings in the long term because they entered the labour market sooner.
Stipek (2002)	8 North American papers and some of author's own research in a USA context.	Aimed to find from the review of papers if there is an optimal age for starting Kindergarten.	Concluded that increased time in school leads to greater gains than simply being older when you start school. Actual age was found to be important for some cognitive competencies; conservation tasks, two out of five figural tests, use of pronouns and story production and recall.
Puhani and Weber (2005)	6,591 German school children and 1,199 adults	Attainment of children who started school at 6 and 7 respectively using Progress in International Reading Literacy Study (PIRLS) data.	Older children achieved 0.42 standard deviation better attainments than younger children and spent an additional 6 months at secondary school.
Kawaguchi (2006)	Data from Japanese employment status survey, 259,756 males and 267,838 females	Statistical comparison of attainment and eventual earnings of youngest and oldest children in a cohort. Retrospective data of adults aged 25-60.	Younger children had lower average educational attainment than older children. There was no impact of age of school entry on earnings. Looked at particular cohort where there was a low birth rate due to superstition and concluded that it was relative (how old child is in relation to others in their class) not absolute (actual age of child) age that had an impact.
Hamari (2007)	Hungarian population, 4,508 observations for reading (PIRLS) in 2001, 3,222 observations for maths from TIMMS in 2003 at a grade 4 level.	Attainment of youngest and oldest children in a school year.	Older children in a year group had better levels of attainment than younger ones. Authors argued that you have to weigh up this relative advantage against the negative impact that starting school later has on increased child care costs for a family, mother returning to work later and older children entering the labour market later.

The widest review of papers in this area was carried out by Stipek (2002); her review described eight North American research papers using this kind of methodology. She noted that most of the studies found that length of schooling has a greater impact on a child's progress than the age that they start school at. She quotes two main studies to support this:

- Cahan and Davis (cited in Stipek, 2002), found that one year in school has twice the effect of one year in age.
- Crone and Whitehurst (cited in Stipek, 2002), found that one year in school explains 62% of progress in literacy skills in the first year of school and 81% in the second.

The other papers reviewed by Stipek also showed that there were some cognitive areas where development did seem to be more age related; conservation skills, two out of five figural tests, use of pronouns and story production and recall skills. Stipek's approach to this review was discursive rather than critical. It should be noted that the sample sizes in four of the studies were relatively small, ranging from 20 to 79. Also readers from a UK context should continue to be aware of how possible it is to extrapolate these findings to a UK context with its different pedagogies and school starting ages.

A discussion paper that takes an economic perspective by Fredrickson and Ockert (2000) directly contradicts Stipek's conclusions. In their study they used secondary data from a large sample of the Swedish population to compare the progress of children one month apart in age but one year apart in schooling (school starting age in Sweden is 7). They reported that the older children in the sample had better attainments and stayed on at school longer. They also argued that children from families with a 'weaker educational tradition' had more to gain from starting school later and that it was absolute age rather than relative maturity which impacted on

children's progress in school. The arguments and analysis in this paper are based on a dense statistical analysis of a large secondary data set and the paper is not peer reviewed. This makes it difficult for someone coming from outside an economic background to make full sense of it. Many of the claims seem to be based on a complex statistical analysis and the retrospective and cross sectional nature of the data makes it difficult to be certain of the claims made. Also some passing reference is made to the changing levels of child care available to children before they formally start school and how this has altered over time. However how this impacts on the overall results is not discussed and the authors do not indicate how they have taken account of this in their data analysis. It could be the quality and nature of the child care available prior to school that is having an impact here. It is possible that this kind of curriculum is more suitable for children of a younger age than the Swedish school curriculum and hence the older children have had more time to benefit from this.

The literature search revealed further discussion papers taking an economic perspective by Puhani and Weber (2005), Kawaguchi (2006) and Hamari (2007). They compared the progress of the very oldest and youngest children in a cohort in Germany, Japan and Hungary respectively. Large secondary data sets were used to carry out this comparison. In line with the studies discussed in Section 1 there was an overall finding that the older children in a cohort made better progress than the younger ones. In addition they found that this effect persisted in terms of how long a child then spends in further education. It should be noted that this is partially due to different policies operating in these countries whereby children need to complete a set

number of years of schooling before they can leave. This is in contrast to the UK and USA where children leave school when they reach a set age and if they reach this age sooner they can leave before their education is complete. Fredrickson and Ockert (2000) and Hamari (2007) noted that the cost of later school entry means that the individual enters the labour market later and therefore earns less overall. Kawaguchi (2006) looked at the impact of a cohort with fewer births against overall attainment and argued, in contrast to Fredrickson and Ockert, that it is relative age not absolute maturity that caused these differences in attainment. The lack of peer review of these papers and difficulties in making direct comparisons with the UK context should again be borne in mind when trying to extrapolate these findings. The data that these authors all draw from is survey data collected for a different purpose that only gives a cross sectional snapshot. A longitudinal study that collects data directly in relation to the questions being explored would offer a stronger base to make these arguments from.

It can be seen from this section that relatively older children have an initial advantage over their younger peers in the wider international settings covered by these papers. This effect is evident when children start school at an older age than in the UK. Whether this effect persists in the longer term is less clear with the papers having different findings. An economic cost of children starting school later both on their families and that child's later earning potential is identified. The debate about

whether the differences are due to ‘relative’ or ‘actual’ age is explored but not finally settled on.

Studies carried out in the UK or comparing a UK sample with an international one 1998 onwards

This fourth set of papers compares the progress of children who are virtually a year apart in age but in the same year group and/or children who are virtually a year apart in age but in different year groups in a UK context. They are again summarised in a table on the next page with a follow up discussion.

Table 4: UK studies comparing the performance of children virtually a year apart in age but in the same year group and/ or virtually the same age but in different year groups

Reference	Sample	Comparison	Consequences of Age of Entry
Menet, Eakin, Stuart and Rafferty (2000)	Northern Ireland 108 pupils taking part in school based assessments and 695 psychological service referrals.	Compares performance of youngest (May/June birthdays) and oldest (July/August birthdays) on measures of literacy, behaviour questionnaire and referrals to psychological services	Younger group performed less well than the older group on measures of literacy and behaviour. Younger children had a higher referral rate to psychological services. Concluded that it is relative age not season of birth that is the important factor here.

Keaney, Doherty, Johnston e, Malone, Miller and Young (2006)	Data from 896 Scottish children	Longitudinal study, compares scores of youngest and oldest children in P2, P5 and S1.	Younger children had lower reading ages at every stage, statistically significant in P2.
Crawford , Dearden, Meghir (2007)	All children in England born between 1985 and 1998	Compares attainments of the youngest and oldest children in a year group by looking at their Foundation Stage profile SATS and GCSE results, admissions policy in their area, free school meals and statementing levels.	Youngest children did significantly less well than their older peers at all stages in school. Most evident at school entry but persisted into exam results at 16. Younger children who entered school at the same time as their older peers did better than children of the same age who had less time in school.

In Northern Ireland different school cut off dates exist and Menet, Eakin, Stuart and Rafferty (2002) use this to compare the progress of the youngest and oldest children in a school year. The Northern Irish school cut off date falls in the middle of the summer (children with May/June birthdays are the youngest and those with July/August birthdays are the oldest) so this also allowed them to explore the hypothesis of whether the differences were linked to feature of the season when the child was born. Children entered school at one set starting point so age of entry and length of schooling are also controlled for. The measures they used are assessments of literacy in Years 1, 3 and 5 (reading and spelling), a teacher completed behaviour questionnaire and an analysis of referrals to psychological services. For all three years tested they found that the youngest children achieved lower scores in literacy than their older peers and were perceived by their teachers as having a higher incidence of behavioural difficulties. The perceived incidence of behavioural difficulties was highest in year one with teachers rating this group as being less able to concentrate,

follow rules and instructions and work without direct teacher support but continued to be significant in years 3 and 5. With respect to referrals to psychological services they found that the youngest children were more likely to be referred than the oldest ones (significant at $p < 0.05$ level). They concluded from this study that the differences in performance of older and younger children were linked to their age in relation to their peers rather than their season of birth, as the oldest and best performing in the sample have summer birthdays. This difference was evident despite all children having started school at the same point and therefore having had the same length of schooling. So in relation to the three possible explanations for the differences presented in the introduction they argued that these differences occur due to 'age position' effect or 'relative age' as it is referred to in some other studies. It should be borne in mind that the overall sample size used in this study was relatively small in relation to many of the other studies discussed and its cross sectional nature means that we cannot be sure that some of the differences found occur due to factors not controlled for e.g. different teaching approaches to literacy being used with the different cohorts. The behavioural measures used rely solely on teacher ratings. An independent observation would be useful in confirming whether the children concerned actually exhibit different behaviours. The impact of this finding is concerning as this will affect how the children are treated by the teacher and possibly effect their self-esteem in the long term. One of the remedial strategies that they recommended is flexibility around when these younger children start school. Such a system exists in Scotland and further research in this area would help in exploring the impact of this approach.

In a study based in the English system Crawford, Dearden and Meghir (2007) looked at Foundation Stage Profile (assessment of children at the age of 5) SATs and GCSE results for the oldest and youngest English children in a cohort born between 1985 and 1998. They looked at the data in relation to the attainments of August (the youngest children in the English system) and September (the oldest children in the English system) born children, the admissions policy operating in their area, eligibility for free school meals, statementing levels (i.e. those with very significant special educational needs) and less severe SEN. They find that children with August birthdays did significantly less well on all measures throughout their time in school in relation to their September born peers. This difference is the most evident when children started school but persisted on into exam results at age 16. They also found that August born children were less likely to stay on into further education and were slightly more likely to be statemented or have less severe SEN (this effect was smaller). They found that children with August birthdays had better outcomes in areas where a single point entry system operated i.e. they entered school in September in any session alongside their older peers (the disadvantage of an August birthday still remained for these children). They propose that this August 'birth penalty' arises because August born children sit the SATs when they are 11 months younger than their September born peers and perform accordingly less well. They recommended a number of possible policy changes that could be put in place to counter this effect:

- Age normalize SATs tests. When they model this on the existing data they find that the young-for-year effect is no longer evident. This is an interesting finding alongside that of Ford and Gledhill (2002) who found no differences between the groups when age standardized scores were used.
- Introduce greater flexibility in when children sit SATs and base targets on what children are expected to achieve at a given age rather than at a set point in the school year. This kind of system already operates to some extent in Scotland as teachers decide when to put a child forward for a National Test rather than all children sitting the test at the same time as occurs in England. This literature search did not reveal any Scottish studies focusing on this and this is an area that would merit further research.
- Make funding available for free nursery places for rising 3's so that they have the same amount of time in nursery as their September born peers. Due to the current system children only start in nursery the term that they turn 3, so even if the youngest children start school at the same point they still risk being disadvantaged with respect to the length of their nursery education. However in contrast to this Tymms et al. (2005) found that the length of time in pre-school education is not linked to a child's baseline scores in Scotland.
- Introduce greater flexibility around school starting ages so that younger children can choose to defer school for a year. As outlined in the introduction Scottish parents of relatively younger children do have the right to defer their child's school start if they have not yet turned five when the school session starts. This literature search did not find any Scottish studies tracking the long term progress

of this deferred group of children, although anecdotal evidence from my practice as an Educational Psychologist suggests that parents and teachers both view it positively. Tymms et al. (2005) found some much older P3 children in their study who were doing significantly less well than their peers. They suggest that these are children who are likely to have had their school entry delayed because of earlier concerns about their development. The authors suggest that this would need to be accompanied by an increase in funding for full time nursery places for deferred children as parents from less prosperous backgrounds might otherwise choose not to defer. This would be hard to justify politically given that the Effective Provision of Pre-school Education (EPPE) project (Sylva et al., 2005) found no advantages in terms of later attainment for children who have attended nursery on a full time basis as compared to those attending part time.

- Make teachers aware of the issues for younger children. They also note a need for research to look at what kind of curriculum/approaches are effective for this younger group. The EPPE project (Sylva et al., 2005) gives some good guidance which the authors do not make reference to.
- Consider holding children back if they have not met the standards at a key stage. There are dangers in holding children back which are discussed further in a later section.

A large sample was used in this study and this makes the data appear quite robust. However a very statistical approach that looks only at attainment is taken and the main aim of the paper appears to be to address the question “How can we to try and

improve SATs results against targets being set by the government not being reached?” Other studies reviewed here also look at emotional and social factors and these may be more important than cognitive factors in determining adjustment to school. This measure also needs to be taken into account when considering the impact of being the youngest in a year.

Focusing more closely on our local Scottish context, Keaney, Doherty, Johnstone, Malone, Miller and Young (2006) carried out a longitudinal study in North Glasgow which tracked children’s reading and spelling age from the first year in primary school through to the first year in secondary school (1097 originally 896 for this study due to data available). They compared the scores of the youngest (January/February birthdays) with the oldest (March/April birthdays) in P2, P5 and S1 (a reason for this restriction was not given). They found the younger children had lower reading ages at every stage with this difference being statistically significant in P2. In the study they have only used raw test scores rather than age standardised scores. It would have been interesting to see whether these differences still existed when this aspect is taken into account. If, as is the case in Ford and Gledhill (2002) study, these differences are no longer evident it could be argued that the children are making the progress that would be expected for a child of their age. They suggested that EPs should promote the idea of an additional year in nursery. To fully support this suggestion they need to demonstrate that children’s literacy progress once in school is improved with an additional year in nursery and no evidence is offered in support of this. As noted earlier this literature search has not revealed any Scottish

studies tracking the long term progress of children who have had their school entry delayed so we cannot be sure of the potential advantages or benefits of this approach. Evidence from the Tymms et al. (2005) study showed that slightly older population of Scottish children entered school with lower baseline scores than their younger English and Welsh counterparts. This would suggest that simply having more time in nursery might not help improve these children's literacy attainments once they start school.

In this review it is again seen that younger children initially achieve less well than their older peers. This effect does reduce over time but was still found to be evident at a secondary school level by Crawford and Dearden (2007). Menet et al. (2000) found that the 'season of birth' hypothesis does not explain the differences in their Northern Irish data set and argue that it is relative age that is producing the difference in attainments. Crawford and Dearden (2007) also endorse the relative age hypothesis as an explanation. Length of schooling is found to be having some effect on the different patterns of attainment in younger English children but does not offer a full explanation of the differences. Keaney et al. (2006) argued that delaying children's school entry would improve overall literacy attainment but do not offer any direct evidence in support of this.

Section 3: Studies that compare the performance of children whose school entry has been delayed against those who have started at the usual entry point

This final section looks at research on the impact of delaying children's entry into school. Stipek (2002) warns that this dataset is the most difficult to draw definitive conclusions about optimal entry age from, as the reasons behind such a delay are often not known and may have an impact on the child's later attainment. For example, it may be the case that a child's school entry is delayed because there are already concerns about his/her development and this in turn could mean that s/he will perform less well in school. The literature search did not reveal any studies carried out in a UK context that compare the progress of children who enter school at the earliest entry point and those who have had their school entry delayed and spend additional time in a nursery setting. My own experience as a practitioner suggests that this practice is relatively uncommon in England (in 10 years as working as an Educational Psychologist in Hampshire, Cambridgeshire and Oxfordshire I was involved in one case where we agreed the child concerned would have an additional year in their second year of school) so this may be a reason for the lack of research from an English context. However, it is in more widespread use in Scotland where children's school entry is often delayed (e.g. figure of 504 deferrals in Edinburgh in 2006) and psychologists in our service are involved in a number of retentions each year (analysis from our service database suggests that EPs in the service were involved in 29 retentions over the past two years). Therefore, it is surprising to find that no research has been carried out in a Scottish context to explore this. One paper

by Hannah and Myant (2004) discusses research by Sharp 2002 and applies the outcomes of this to identify implications for a Scottish context. These implications are outlined in the summary at the end of this section. The papers discussed in the next section are all therefore based on international studies. The main findings from these papers are summarised in the table on the next two pages.

Table 5: International studies comparing children whose school entry is delayed or who are retained at a Kindergarten (usually aged 5-6) stage with those who started school at the usual entry point

Reference	Sample	Comparison	Consequences of Age of Entry
National Center for Educational Statistics (NCES) (2000)	United States of America statistics from the 1993 and 1995 National Household Education Survey.	Explores the characteristics and later performance of children whose entry into kindergarten is delayed and children retained in kindergarten for an additional year.	Delayed group-more likely to be male, relatively younger than their classmates and non-hispanic. Retained group-more likely to be male with a diagnosed developmental delay. Delayed group-less negative feedback from teachers with less concerns about their learning in relation to their same age peers. Retained group-lower performance than their same aged peers, more difficulty with concentrating, felt to be not learning up to their capabilities. When demographic factors were controlled for the differences were still significant with the 1993 data but not the 1995 data.
Graue and DiPerna (2000)	United States of America 47 school districts, 8,595 pupils.	Performance on state wide reading test and later need for special educational needs services by school enrolment status; early entry, normal promotion, retained kindergarten, retained in grades 1-3, delayed entry into kindergarten, unidentified overage.	Those with delayed entry performed on par with their normally promoted peers, retained children performed less well than their same age peers. This was also the case for those with summer birthdays. Both delayed and retained children required more special education services than their normally promoted peers. Authors argued that delayed and retained entry meant that children missed out on accessing the special educational services they needed a 'theft of opportunity.'
Katz (2000)	United States of America	Review of existing research.	NCES survey showed about 9% children had their entry delayed each year in the USA. It offered an initial advantage, but this effect reduced over time. Increased likelihood that children will drop out of school before the end of High School. There may be a higher incidence of behavioural problems in the delayed group.
Stipek (2002)	United States of America	Review of 4 research papers in this area to try and answer the question 'at what age should children enter kindergarten?'	No significant differences found between delayed, retained and normal entry peers. Higher incidence of later behavioural difficulties found in delayed and retained group.

Liddell and Rae (2001)	Longitudinal study of 150 pupils in 3 different rural south African schools.	Tries to identify factors that will predict subsequent retention.	Best single predictor was children's academic achievement at the end of first grade.
Guevermont, Roos and Brownell (2001)	Data from a health data base in Manitoba, Canada (school enrolment records, standard test results, social service records and demographics-age, gender,region).	Aims to look at characteristics of retained students (also some age for grade analysis), whether grade 3 retention improves later academic performance and influence of retention on High School withdrawal rates.	Males who were relatively young for their grade were most likely to be retained. 1:4 retainees improved their performance after a year of being retained. Retained children are three times more likely to drop out of High School early.

Reference	Sample	Comparison	Consequences of Age of Entry
Marshall (2003)	Review of existing US research.	Aims to identify the assumptions behind parents and teacher's decisions to retain and delay school entry, looks at what the long term impact might be.	Two different assumptions exist about children's readiness; 'maturationist' assumption and 'interactionist' assumption. Those who hold a maturationist view are more likely to recommend delay or retention. Argued that some skills need to be taught and therefore supports an interactionist model. Argued the maturationist assumption is faulty but widely held, delaying a child's entry to school may inadvertently deprive them of opportunities that they need.
Wils (2004)	Mozambique-data from ministry of education's population census in 1997, exact not specified. (official age of entry is 6 years but some children start as late as 11)	Relationship between age of entry and amount of time spent in school and whether pupil completes all possible grades.	Children who enter school later are less likely to complete all of their education: Age of entry % completing all education 5-7 yrs 95% 8-10yrs 55% 11-14yrs 2%
March (2005)	United States of America, Natural experiment with 352 pupils in New York	Reading and maths scores for age appropriate (started school at earliest eligible point), young (entered school early) and academically red shirted (school entry delayed to the year after they were first eligible).	Initially the red shirted group showed higher maths and reading scores but these differences were not statistically significant. In grade 4 academically red shirted group achieved significantly higher reading scores than the young group.
Malone, West, Flanagan and Park (2006).	USA, data from the Early Childhood Longitudinal Study (ECLS) sample of 21000 children entering kindergarten in Autumn 1998.	Aimed to establish prevalence of delayed entry and kindergarten repeaters, looked at differences between delayed and repeating children and compared their reading and maths scores..	5% repeating kindergarten, 6% delayed entry, 2% early entry, 88% 'on time.' Kindergarten repeaters were more likely to be male, to have a diagnosed developmental delay by the end of grade 1, to come from a poorer family and have parents with less high school education. Those with delayed entry were more likely to be male, white, parents with a bachelors degree .Repeating kindergartners had lower maths and reading scores, delayed group had better reading scores but lower maths scores. Data modelled to show that retained children would have gained more from being promoted to the next class.
Datar (2006)	Same ECLS data listed above.	Uses different statistical manipulation, 'instrumental variable approach' to look at impact of delaying deferring entry.	Children starting kindergarten 1 year later scored 5.4 points higher in maths and 4.6 points higher in reading. Older entrants gained 0.52 points more in maths and 0.89 points more in reading during their first two years in school. Children from lower socio economic backgrounds and disabled children gained more from having their entry delayed.

McEwan and Shapiro (2008)	Administrative data for Chilean students	Impact of delayed school entry on later likelihood of being retained in grade 1.	A one year delay in school entry decreased the probability of being retained in grade 1 by 2 percentage points. Increased 4 th and 8 th grade scores by 0.3 of a standard deviation. Largest effect was evident for boys. However those who were delayed beyond age of 6.92 years showed a greater likelihood of being retained in first grade and lower test scores.
---------------------------	--	--	---

Two different groups of children who experienced delayed school entry emerged from these research reports. One group started school one year later than the earliest possible school starting age usually as a result of a parental choice to delay their school entry. In the American research this is referred to as ‘academic red shirting’ or sometimes ‘delayed entry’ (in Scotland it is described as ‘deferral’) to avoid confusion and ease of comparison of the papers the term ‘delayed entry’ will be used throughout when discussing this group of children. The second group are those who have spent an additional year in a pre-school/early school context, this generally seems to be based on the recommendation of the school and/or failure to achieve set test scores. Again several terms are used to describe this group of children; ‘retained’, ‘repeat kindergarteners.’ In these cases the term ‘retained’ will be used throughout when discussing these papers.

From the table it is evident that much of the research has been carried out in a North American context (9 studies). The remaining 3 studies report on research that has taken place in developing countries (South Africa, Chile and Mozambique). For ease of comparison two further sub sections of ‘North American Studies’ and ‘studies from other international contexts’ have been created.

North American Studies

Most of the research around delayed entry and retention at a kindergarten stage has been carried out in North America (ten out of the twelve papers in the above table). From my reading of these research papers it would appear that the practice of delayed entry and retention has been in place for some time in North America and is widely debated. To aid comparison these studies will be discussed as a group.

Reviews of existing research papers are offered by Katz (2000) and Stipek (2002) and most of these are included in this table (the others pre-date 1998). They conclude that any positive impact of delay or retention is short lived and that there is a higher likelihood of early high school drop out and an increased incidence of behavioural problems. These two papers are mainly descriptive rather than critical in nature. They referred solely to USA data where a different structure of schools and pedagogy exists. From my reading of these papers it would appear that children can only move to the next year group if they have achieved a certain score on tests. So the process of delay and retention is a common experience for many children and families. This is in direct contrast to the UK where children move through the different stages in education based on their age rather than performance.

The different characteristics and outcomes of delayed and retained children are explored by the National Center for Statistics Survey (2000). This survey was carried out in 1993 and 1995 and is based on data from all American households. Delayed children were found to be; usually male, Caucasian and relatively younger whereas

the retained group whilst also generally male showed later evidence of developmental delay. Delayed children seemed to show better outcomes with less teacher concerns about their learning in relation to their same age peers. The retained group did less well with difficulty in concentrating and lower performance being reported than their younger peers. This is a secondary American data set which means that we can only draw tentative conclusions. The data is based on teacher report rather than any direct data on the children's performance such as reading and maths scores. This direct data would help in confirming or refuting these findings.

Data from the Early Childhood Longitudinal Study-Kindergarteners (ECLS-K) is used by Malone, West, Flanagan and Park (2006) to look at; the prevalence of kindergarten delay and retention, how the characteristics of these children vary and the relationship between a child's enrolment status and their first grade reading and maths attainments. This survey looked at a representative sample of 21,000 children across the USA who entered kindergarten in Autumn 1998 and has tracked the performance of this group to date. In their sample they found that 5% of children were retained, 6% delayed and 88% entered kindergarten on time (the remaining 2% were early entry). They found that both delayed and retained children were more likely to be male. However, differences also emerged between the two groups in line with the NCES (2000) survey. The delayed children were more likely to be white and have parents with a Bachelors degree or higher level of qualification and less likely to have attended pre-school. The retained group were more likely to be diagnosed with developmental delay by the end of grade 1 and have parents with less than a high

school education. In terms of later progress the retained children had lower maths and reading scores by the end of grade 1 in relation to their peers who entered kindergarten on time. The delayed children had better reading scores but lower maths scores than their peers who entered kindergarten on time. The authors went on to argue that the reason given for retention, 'that it will allow children to catch up with their peers', is not supported by the evidence. Stipek (2002) suggested that this initial advantage in learning for relatively older children will probably equal out later on in school; unfortunately the authors have not used this rich longitudinal data set to check whether this is the case with this sample. They also did not look at the impact of delay and retention on children's social and emotional development; as noted earlier other studies argue that this is an important additional factor to take into account.

The same ECLS-K data set was used by Datar (2006) who took an economic perspective and focused on comparisons between the delayed and normal entry groups. She also compared the impact of delayed kindergarten entry on children with disabilities. The differences in performance between the normal entry and delayed groups were compared for the first two years of school. A different kind of statistical analysis of the data was applied using an instrumental variable approach that treats variation in Kindergarten entrance age and date of birth as exogenous variables. Datar concluded that delayed entry produced higher initial entry scores at kindergarten entrance and a steeper growth in test scores during the initial years of school for both typically developing and disabled groups. This is in contrast to the finding reported by Malone et al. (2006) where delayed entry children are found to have slightly lower

maths scores than their normal entry peers. The two sets of authors did not discuss this difference in findings or cite each other in their references. This is probably because these papers are published in the same year so it is possible that the authors were not aware of each other's findings particularly as they are working from different economic and educational perspectives. Datar's comparisons were carried out over the first two years of school whereas Malone et al. looked only at children's performance in the spring of first grade. It could therefore be argued that Datar's results give a better picture of performance over time. The parameters for judging 'disability' are not clearly defined by Datar and this would make it difficult for policy makers or practitioners to know exactly which kind of difficulties children were experiencing in order to benefit from delayed entry. Datar does not discuss differences in social and emotional development or children's performance beyond grade 3 (the time found by Stipek, 2002 to be when scores between the different groups even out).

The long term impact of delayed entry on children's later academic performance is considered by March (2005). In her longitudinal study she looked at the progress of 352 pupils in New York, 260 entered school at the normal age (5 years-5 years 8 months at Kindergarten entry), 60 entered early (4 years 9 months to 4 years 11 months at entry) and 32 had their entry delayed (5 years 9 months or older at entry). Comparisons were made between maths and reading scores in grades 2, 3, and 4, although the maths data set was a partial one as only one school was able to contribute their scores. March found that the delayed entry group had slightly better

average scores than both the age appropriate and young group at all points in reading, however the only statistically significant difference was between the delayed group and young group's reading scores in grade 4. No statistically significant difference in performance was found between the groups in maths and March argues that this suggests that delayed entry does not seem to offer any benefit in this curriculum area. March queries whether the better reading performance of the delayed group over their classmates might raise their self esteem and create a more positive attitude to school but these factors were not measured in this study. March highlighted a further potential negative impact of delayed entry:

“...suppose further research concludes that teachers (wittingly or unwittingly) step up the level of the curricular demands to meet the higher levels of cognitive and social maturity of red shirted students. This accelerated program may be appropriate for red shirted students, but it is not the red-shirting itself that is causing the increased achievement, but rather the changes in curriculum. A potentially significant and negative effect of this up-graded curriculum, however, might be to jeopardize the heretofore success levels of age-appropriate students because they do not have the cognitive and social maturity to meet these new and accelerated instructional and behavioral demands.” (March 2005, para 15)

March makes a crucial point but unfortunately does not then make any proposals as to how this potential change in curriculum could be evaluated with further research. Estimates from the papers discussed so far suggest that delayed entry students

comprise 6-9% of a typical kindergarten class whereas the age appropriate group form around 88% of the class, if such a change is occurring it requires urgent investigation to protect the welfare of children entering school at the usual age.

Overall March's research seems to suggest that delayed entry may give children some advantage in reading but not significantly so and this runs alongside the risk that having older children in a class may cause teacher's to adjust the curriculum to fit the learning of the delayed group at the potential detriment of the normal entry group.

Longer term outcomes such as whether delayed entry causes children to drop out of school earlier or give rise to an increased incidence of behavioural difficulties are not covered in this study and would have been worthy of further exploration.

A longer term follow up of children's reading test scores and later need for special educational services of children by enrolment status is offered by Graue and DiPerna (2000). Their data was based on national test results for 8,595 pupils from 47 school districts. They found that those with delayed entry perform on par with their same age peers and that this is even the case for those with summer birthdays (ie the relatively younger children). There were more negative consequences for the retained group who were performing less well than their peers of the same age. Both the delayed and retained group showed an increased need for special educational services at a later age. The authors argued that delaying a child's school entry means that they are being deprived of an opportunity to access services that they need early on and refer to the process as a 'theft of opportunity' as opposed to a 'gift of time' that proponents of delayed entry present it as being. It is difficult to fully extrapolate these

findings to a UK context where additional support need services are available in a pre-school context and the practice of delayed entry or retention is not frequently used. In addition the authors only looked at the impact on reading and later need for services; factors such as achievement in other curriculum areas, impact on children's social and emotional development also need to be taken into account. Finally, the secondary nature of the data used means that the reasons behind a parent's decision to delay are not known and these could be interacting with final outcomes, possibly the child's development was already behind that of their peers leading to the decision to delay school entry.

The characteristics of children who are retained and their later educational outcomes are explored by some studies. For example, Guevermont, Roos and Brownell (2001) used data from a national health database in Manitoba, Canada. Their data sample was from school start in Grade 1 where children are usually aged five. They found that boys who were relatively young for their grade were most likely to be retained. For those who were retained only one in four improved their performance during their retained year and in the long term retained children were found to be three times more likely to drop out of high school early. From this data, they argued that retention increases rather than reduces children's difficulties. The secondary nature of this data means that we do not know why these children were retained or what their experiences in their retained year were. It is difficult therefore to be sure if the outcomes would have been any different if they had not been retained. The children studied were all already in a school context and therefore the retention they

experience is in a school setting which makes comparison to a Scottish model where the retained year is spent in a nursery setting more difficult. However, the children's age is approximately the same.

In trying to understand the process and impact of delay and retention we also need to explore the assumptions that underlie parents' and schools' decisions about whether a child is 'ready' to start school. Marshall (2003) reviewed existing research and looked at these assumptions in more detail. From this she describes two common sets of school readiness assumptions made by parents and teachers:

- The 'maturationist assumption' is based on the view that readiness for school is based on a child's abilities developing as they grow and mature almost along the lines of a biological time clock. This process is seen to occur without any influence from the outside; only time will help the child to reach the next stage in their development. This maturationist assumption underlies many of the arguments given as to why children should start school at an older age or spend more time in a pre-school environment.
- The 'interactionist assumption' is based on psychological models of child development as described by Piaget (as cited in March, 2005) and Vygotsky (as cited in March, 2005). The interactionist assumption sees development occurring as a result of the child's interactions with his/her environment. Vygotsky's description of child development finds that there is a need for teaching and guidance from a more capable adult or peer to help the child reach the next stage

in their thinking. Application of this model suggests that it is not the child that needs to be ready for school but the school that needs to be ready to guide and support the child from his/her current point of development to the next.

If we adopt the interactionist conception of readiness, the idea of an 'optimal starting age' is fundamentally challenged. Marshall described research carried out by Graue (as cited in March, 2005) which looked at how these different conceptions of readiness were evident in both schools and parents beliefs. Where a maturationist assumption was held by the staff of the kindergarten more parents delayed their child's school entry. Parents of the oldest and youngest children entering kindergarten were interviewed and it was found that they held maturational beliefs when they described their conception of readiness. In her review of recent research papers Marshall concluded that this maturationist assumption is not supported by the findings from research which suggest that any initial academic advantage of being older decreases over time. She quoted research by Stipek and Byler (2001), Morrison, Griffith and Alberts, Crone and Whitehurst, Smith and Dow-Ehrensberger (as cited in Marshall, 2003) which suggested that schooling effects have more impact on the development of a child's skills than simply giving child additional time to mature. She concludes that families also need to be encouraged to consider the possible negative effects of delaying children's entry into school and the learning opportunities that they may miss out on as a result.

Marshall reported that she had applied strict criteria of validity and reliability to the papers included in this review. However, a descriptive rather than critical approach is taken. The difficulty of extrapolating from an American context to a UK one remains an issue with these findings. The interactionist approach is a useful model to take. However, it could still be argued that a UK pre-school setting offers a better learning environment for children of a certain age than a school one. The additional element of a suitable curriculum is not explored in this paper though the recommendation of a more flexible and adaptable school system is one we would share in the UK.

Studies from other international contexts

Some of the international research focuses on factors that will predict later retention. For example Liddell and Rae (2001) carried out a longitudinal study of 150 pupils in rural South Africa to try to identify these factors. The measures they looked at were academic achievement, nutritional status, parental education, socio-economic status, behavioural and cognitive scores. From all of these factors the only emerging predictor was children's academic performance at the end of grade one. This study is interesting in its longitudinal design and the range of factors considered. However, it is difficult to extrapolate to our UK context. The children in this study started school at the age of eight with no pre-school experience and are educated in a system where retention is common (Liddell and Rae reported that 25% of South African children are retained at some point in their school career). One interesting factor is that starting

school at the much older age of eight did not seem to prevent later educational difficulty for many of these children.

The other international research focused on the longer term impact of experiencing delayed school entry or retention in an early years setting. McEwan and Shapiro (2008) used administrative data for children in Chile which gives exact dates of birth linked to administrative test scores for some children in fourth grade, they also draw on some data from the 1999 Trends in Mathematics and Science Study (TIMMS). They used this data to estimate what the long term impact of delayed school entry might be. They concluded that a one year delay in school entry reduced the probability of repeating first grade and increased a delayed child's average test score by 0.3 of a standard deviation. They found this effect was larger for boys. However, a closer examination of the data and methods leads me to question the reliability and validity of their findings. The data set is secondary in nature so we do not know the reasons behind a child's delay and indeed this is predicted on the basis of date of birth alone not parental or school report. Test scores for only a subset of the original sample were known and therefore conclusions based on the entire sample cannot really be made. Children who, on the basis of their date of birth, looked like they might have been retained were also excluded from the later analysis. TIMMS data only applied for one cohort of children and a different set of information was used from the other data. This will again distort the overall pattern of the results. Finally the author's write from an economic perspective and although they make links to

educational research this is done without specific or detailed references and broad assumptions are made for example:

“ *Some psychologists* argue that older children acquire greater “readiness” for learning, and can acquire skills more quickly.” (McEwan and Shapiro, 2006, p. 3)

A second study by Wils (2004) aimed to look at long term effects of delayed school entry and used data from a Mozambique Ministry of Education population census in 1997 to try and look at the impact of age of school entry and how long a pupil remains in school. In Mozambique the official school entry age is 6 years but in fact some children start school at age 5 and others as late as age 11. From the data set Wils compared age of school entry to length of time spent in education and whether children complete all possible grades. She found that those starting at an earlier point (5-7 years) completed all 8 grades however those starting later spent less time in school overall and didn't complete all grades. Wils does not offer an exploration or explanation of why older children would drop out earlier. In fact if the length of time in school is added to the school starting age all children appear to finish at age 12 or 13. In this developing world context this could suggest that there may be ‘pull’ factors such as a need to contribute to the family income rather than ‘push’ factors of school starting age which are affecting these results. It is therefore difficult to argue from this that it is school starting age alone that is having an impact. Wils acknowledged that the data set is patchy due to civil unrest and war so this makes drawing a full conclusion difficult.

As can be seen in this section two distinct groups of children starting formal schooling at an older age emerge:

Delayed entry group

The delayed entry group are usually younger boys with better educated parents who decide that they will hold their child out of school for an additional year (NCES,2000). The motivation for this may be linked to maturationist beliefs about school readiness and/or the knowledge that older children in a year do achieve slightly better academically than their younger peers. This group of children would seem to match Scottish children experiencing ‘deferred’ entry. It would be interesting to look at the characteristics of this Scottish group to see if a similar parental, age and gender profile emerge. In line with the patterns of advantage already identified for relatively older children earlier in the review, the delayed group do make faster progress in reading at an early stage and seem to be more confident in their relationship with their teachers. However, long term difficulties such as dropping out of secondary school earlier, late access to additional support needs services, an increased possibility of later behavioural difficulties and a possible alteration to the curriculum delivered as the result of having much older children in the group are identified.

Retained group

The retained group are again usually boys but usually have parents with less education (NCES,2000). They tend to receive a diagnosis of developmental delay later on in their school career but in a North American context miss out on receiving appropriate services early on because of their retention (Graue and DiPerna, 2000). For these children, having a retained year does not raise their academic performance to that of their younger peers. All studies find that retained children have lower reading and maths scores than their peers entering school at the usual time. It could be argued that this might still be the case had they entered school at the appropriate age. A study by Wu, West and Hughes (2008) not included in the discussion above because the children concerned were in first grade not kindergarten challenges this. They compared the performance of matched pairs of children retained in Grade 1 and those identified for retention but who went on to the next grade. They find that this second group made better progress academically. The same long term risks of earlier high school drop out, access to additional support need services and increased possibility of later behavioural difficulties apply to this group. This group of children would seem to match the group of children who are retained in a Scottish context. Given the range of negative impacts that have emerged from this review of the research it seems important to evaluate the impact of retention in our own local setting.

As can be seen from the discussion above part of the decision making process behind whether a child should have their school entry delayed seems to be based on different models of 'school readiness' held by the range of adults involved with a child.

Marshall (2003) described two of these as ‘maturationist’ and ‘interactionist’. Those holding a maturationist perspective were more likely to recommend delaying school entry. It would be useful to look at the arguments and models of readiness that are applied to decisions to delay children’s school entry in a Scottish context. Hannah and Myant (2004) offered an overview of the UK and international research already discussed earlier in this review. They then applied these findings to a Scottish context and suggested that there are three key areas of issue and possible future research for Educational Psychologists; establishing what the most effective early years curriculum is for the wide range of needs pupils have, identifying the most effective way to support the transition from pre-school settings to primary one and moving away from a ‘within child’ checklist method to identifying a child’s readiness for school to a more contextually based assessment approach.

Discussion and Conclusions

From this review of papers it is apparent that all countries have a set school entry age; although varying flexibility operates around how strictly this is applied and complied with. Inevitably this means that across a year group there is up to 11 months variation in children’s age and this increases further in places where children’s school entry is delayed or children are retained at a pre-school stage. When the progress of children is compared by age either continuously or by looking at the performance of the oldest and youngest children, the older children do generally seem to perform better initially always in literacy and sometimes in maths. This effect is most evident when raw

scores are used and may also explain children's differing performance on SATs. Findings vary in terms of how long this effect persists for; some studies find it is no longer evident by the end of primary school whereas others find some impact at a further education level with younger children in a year group being less likely to continue onto education at this level. No matter what age children start school at, there is a continuing debate about whether this is too early or too late.

The findings about whether younger children are more vulnerable to social and emotional behavioural difficulties are more mixed. Some studies find no effect, whereas others find an impact. Where an impact is found, caution is needed in interpreting this as often this is based on teacher/ parental ratings rather than direct observations of a child's behaviour. Some studies find that relatively younger children are more likely to be registered as having Special Educational Needs, referred to Psychological Services or diagnosed as having ADHD. Again, this needs to be interpreted with caution as when children's actual performance is looked at more closely there are often other factors such as teacher bias and length of schooling playing a role.

Part of the debate about optimal school starting age seems to be driven by the fact that many parents and teachers hold strong beliefs about the importance of age in determining school readiness. This belief is challenged by studies that look at a range of other factors such as socio-economic and/ or ethnic background of parents, length and quality of pre-school education, length of schooling etc. and find that these

factors actually hold greater importance in determining the progress a child makes. Following up on these beliefs about the importance of age, different approaches to conceptualising school readiness emerge, in this review two are discussed; a maturationist and an interactionist model (Marshall, 2003). In arguments given for delaying children's school entry the maturationist argument is often presented. However most of the papers reviewed here suggest that relatively older children consistently make better initial progress than their relatively younger peers whether the school start age is 4 or 7 years this implies that age alone does not solely govern the progress children make in school. Based on this maturationist model adults hope that delaying a child's school entry or retaining them in an early years setting will maximise their later progress. Follow up of delayed entry children suggests that they make better progress initially but not always significantly so. The retained group do not appear to make better progress. Studies confirm that both delayed and retained children are at risk of leaving secondary education before their education is complete and could also be at more risk of emotional, social and behavioural difficulties. The interactionist approach offers a more effective model for conceptualising children's school readiness and planning for and supporting children's entry into school.

In a UK context three hypotheses are presented as to why English and Welsh 'summer born' children consistently perform less well. These can be summarised as follows:

- Because they have experienced different lengths of schooling.

- Because they are relatively younger than their peers and therefore perform less well.
- Because being born in the Summer or conceived in the Autumn has had an impact on their brain/overall development.

Where younger children started school at the same time as their older peers, they made better progress than their same age counterparts who had less time in school (Crawford, Dearden & Meghir, 2007) but they still made slower progress than their relatively older peers. This would suggest that although length of schooling has some impact it does not explain all of the differences that occur. Lawlor et al. (2006) found that ambient temperature at the time of birth did not seem to have had an impact. In addition where summer born children were amongst the older ones in a cohort, as was the case in Northern Ireland and Scotland, they did have better achievements than their younger peers. Therefore, this hypothesis also does not seem to be supported by the evidence. The hypothesis that seems to have the greatest support is that of 'relative age'. The range of international studies reviewed here show that this effect is evident whether children start school at age 4 or at age 7. It seems to occur because of the way the school system is set up. It would, therefore, seem that there is no one optimal age for starting school but instead a variation in performance by age that may reduce by the end of primary school or possibly persist into higher education.

Increasing or reducing the age that children start school is not likely to remove the effect but will instead shift it to a different group of children. It would seem in fact that it is this relative age effect that we should be more concerned about finding ways to reduce or support rather than hunting for an 'optimal school starting age.' In

addition to this March (2005) identified a potential unforeseen impact of delayed school entry on the curriculum presented to children and teacher expectations of the 'age appropriate' element in a class. This difficulty does not seem to be acknowledged by proponents of delayed school entry.

Implications for practice

From this review no one 'optimal' school starting age has emerged. Instead it is evident that regardless of the age they start at, children who are relatively older in a year group generally do slightly better than their younger peers initially but most studies find that this effect reduces over time. Other factors such as children's pre-school experiences and parental background emerge as being more important determinants of a child's later progress. When deciding if a child is ready to make the transition to school adults may adopt a 'maturationist' perspective and argue that more time is needed to allow the child to mature and 'be ready'. Those working in this area need to be wary of this argument and ensure that any assessment and decision making process about a child's readiness for school is widened out to take into account the educational environment they are most likely to benefit from and how this can be adapted to support their unique needs. EP's, with their knowledge of child development and expertise in supporting educational settings in developing appropriate interventions, are in a strong position to meet this challenge and help educational settings and families in resolving any difficulties. It is important to explore both the benefits and possible negative consequences of delayed entry and

how these will be addressed. When a child is presenting with additional support needs practitioners should consider all the potential factors impinging on this, including length of pre-school and school experience, the child's age in relation to his/her peers and what expectations their teachers have of them. Teachers need to be made aware that in the early years of school, children's performance may vary in relation to their age. They should take this into account when planning learning opportunities for the children in their class and making judgements about their progress, and social and emotional development. EPs have a role here in helping teachers conceptualise and understand the factors that are contributing to a child's difficulties.

Areas for future research

Scotland is in a unique position within the UK as children start school at an older age than their English, Welsh and Northern Irish counterparts, and Scottish parents have more flexibility in deciding when their child will start school. Many parents do choose to delay their child's school entry and psychologists are also involved in the process of retaining some older children in a nursery setting for a further year. However, this review has not found any direct research carried out in a Scottish context looking at the impact of this on children's later progress (the matter is briefly touched on by Tymms et al., 2005). Research from the USA suggests that the 'maturationist' argument that is applied to the benefits of delayed entry may be a faulty one and that there are negative factors associated with delayed and retained entry that also need to be taken into account. This review suggests that children experiencing delayed entry do seem to make similar progress to the relatively older

cohort in the class. The most negative consequences appear to be for the retained group who do not make accelerated progress as a result of their additional time in an early years setting and indeed on entry to school seem to make slower progress than their younger peers. In the author's authority EPs are directly involved in the decision making process for retention and this is the area that causes the most anxiety in my service. In terms of specific future research in the author's own context it therefore seems important to look more closely at retention. Here are some questions that have arisen from this literature review:

- What information is used and what factors are taken into account when deciding whether a child will benefit from an additional retained year in nursery?
- How does this data fit with contemporary models of school readiness?
- What are the benefits and issues of an additional retained year in nursery in terms of:
 - progress the child makes both during their additional time in nursery and once they have started school?
 - social and emotional development of the child?
 - perceptions of the child?
 - perceptions of staff?
 - perceptions of parents?
 - transition to the first year of primary school?
- Are there any particular groups of children who benefit from an additional retained year in nursery?

- What is the impact of retention further on into primary school and beyond?
- How can we develop a flexible and contextually appropriate way of assessing if a child will be able to successfully make the transition to school?
- What are the most effective ways for supporting the transition from pre-school settings to school for all children?

Work on the next modules will aim to address some of these questions in the author's own local context.

References

Alton, A. and Massey, A. (1998). Date of birth and achievement in GCSE and GCE A-level. *Educational Research*, 40 (1), 105-109.

Bedard, K. and Dhuey, E. (2006). The Persistence of Early Childhood Maturity: International Evidence of Long-Run Age Effects. *Quarterly Journal of Economics*, 121, 1437-1472.

Crawford, C., Dearden, L. and Meghir, C. (2007). *When You Are Born Matters: The Impact of Date of Birth on Child Cognitive Outcomes in England*. Retrieved November 24th, 2008 from http://www.ifs.org.uk/docs/born_matters_summary.pdf

Daniels, S., Redfern, E. and Shorrocks, T. D. (2000). Can starting summer-born children earlier at infant school improve their national curriculum results? *Oxford Review of Education*, 26 (2), 207-220.

Datar, A. (2006). Does delaying kindergarten entrance give children a head start? *Economics of Education Review*, 25, 43-62.

DfEE (1997). *The National Literacy Strategy*. Retrieved November 24th, 2008 from <http://www.literacytrust.org.uk/Policy/strat.html>

DfEE (1998). *The National Numeracy Strategy*. Retrieved November 24th 2008 from <http://www.standards.dfes.gov.uk/primaryframework/mathematics>

DfEE (2000). *Curriculum Guidance for the Foundation Stage*. Retrieved November 24th, 2008 from http://www.standards.dfes.gov.uk/eyfs/resources/downloads/5585_cg_foundation_stage.pdf

Dobkin, C. and Ferreira, F. (2007). *Do School Entry Laws Affect Educational Attainment Labor Market Outcomes*. Retrieved August 27th, 2008 from <http://ssrn.com/abstract=1007492>

Edinburgh City Council (2007). *Is your child ready for Primary School?* Edinburgh City Council: Children and Families Department.

Elder, T. and Lubotsky, D. (2006). *Kindergarten Entrance Age and Children's Achievement: Impacts of State Policies, Family Background, and Peers*. Retrieved August 27th, 2008 from <http://ssrn.com/abstract=916533>

Ford, J. and Gledhill, T. (2002). Does Season of Birth Matter? The relationship between age within the school year (season of birth) and educational difficulties among a representative general population of children and adolescents (aged 5-15) in Great Britain. *Research in Education*, 68, 41-47.

Fredrickson, P. and Ockert, B. (2005). *Is Early Learning Really More Productive? The Effect of School Starting Age on School and Labour Market Performance*, Institute for the study of labour (IZA) Discussion Paper No.1659. Retrieved November 24th, 2008 from <http://ssrn.com/abstract=760728>

Goodman, R., Gledhills, J. and Ford T. (2003). Child psychiatric disorder and relative age within school year: cross sectional survey of large population sample. *British Medical Journal*, 327, 472-475.

Graue, M. and DiPerna, J. (2000). Redshirting and Early Retention: Who Gets the 'Gift of Time' and what are the outcomes? *American Educational Research Journal*, 37 (2), 509-634.

Grissom, J. (2004). Age and Achievement. *Education Policy Analysis Archives*, 12 (49), Retrieved November 24th 2008 from <http://epaa.asu.edu/epaa/v12n49/>

Guevermont, A., Roos, N. and Brownwell, M. (2001). Predictors and Consequences of Grade Retention-Examining Data from Manitoba Canada. *Canadian Journal of School Psychology*, 22 (1), 50-67.

Hamari, S. (2007). *The effect of school starting age on academic performance in Hungary*. Retrieved November 24th 2008 from <http://www.econ.core.hu/doc/bwp/bwp/bwp0702.pdf>

Hannah, B. and Myant, M. (2004). What's the Hurry? Deferring School Entry. *Educational Psychology in Scotland*, 6 (3), 22-23.

Hutchison, D. and Sharp, C. (1999). *A Lasting Legacy? The Persistence of Season of Birth Effects*. Retrieved November 24th, 2008 from http://www.nfer.ac.uk/publications/other-publications/conference-papers/pdf_docs/000001095.PDF

Katz, L. (2000). *Academic Redshirting and Young Children*. Retrieved 24th November 2008 from <http://ceep.crc.uiuc.edu/ecearchive/digests/2000/katzred00.pdf>

Kawaguchi, D. (2006). *The Effect of Age at School Entry on Education and Income*. Retrieved November 24th, 2008 from http://www.esri.go.jp/jp/archive/e_dis/e_dis170/e_dis162.pdf

Keaney, M., Doherty, F., Johnstone, K., Malone J., Miller, E. and Young, D. (2006). School entry age and attainment. *Educational Psychology in Scotland*, 8 (1), 6-10.

Lawlor, D., Clark, H., Ronalds, G. and Leon, D. (2006). Season of birth and childhood intelligence: Findings from the Aberdeen Children of the 1950s cohort study. *British Journal of Educational Psychology*, 76 (3), 481-499.

Liddell, C. and Rae, G. (2001). Predicting early grade retention: A longitudinal investigation of primary school progress in a sample of rural South African children. *British Journal of Educational Psychology*, 71, 413-428.

Macmillan, A. (2006). *Call to scrap set age for school entry*. Scotland on Sunday, 2nd July 2006.

Malone, L., West, J., Flanagan K. and Park, J. (2006). *The Early Reading and Mathematics Achievement of Children Who Repeated Kindergarten or Who Began School a Year Late*. Retrieved November 24th, 2008 from <http://nces.ed.gov/pubs2006/2006064.pdf>

March, C. (2005). Academic redshirting: Does withholding a child from school entrance for one year increase academic success [Electronic Version]. *Issues in Educational Research*, 15 (1), 69-85.

Marshall, H. (2003). Opportunity Deferred or Opportunity Taken? An Up-dated Look at Delaying Kindergarten Entry [Electronic Version]. *Young Children*, 58 (5), 84-93.

McEwan, P. and Shapiro, J. (2008). The Benefits of Delayed Primary School Enrollment-Discontinuity Estimates using Exact Birth Dates. *The Journal of Human Resources*, 43 (1), 1-29.

Menet, F., Eakin, J., Stuart, M. and Rafferty, H. (2000). Month of Birth and Effect on Literacy, Behaviour and Referral to Psychological Service. *Educational Psychology in Practice*, 16 (2), 225-233.

National Center for Education Statistics (NCES) (2000). *Children Who Enter Kindergarten Late or Repeat Kindergarten: Their Characteristics and Later School Performance*. Retrieved November 24th, 2008 from <http://nces.ed.gov/pubs2000/2000039.pdf>

NFER (2007). *Compulsory age of starting school in European Countries, 2007 Eurydice at NFER, Unit for England, Wales and Northern Ireland*. Retrieved August 22nd, 2008 from <http://www.nfer.ac.uk/eurydice/briefingseurope/school-starting-ages.cfm>

National Institute of Child Health and Human Development (NICHD) (2007). Age of Entry to Kindergarten and Children's Academic Achievement and Socioemotional Development [Electronic Version]. *Early Education and Development*, 18 (2), 337-368.

Puhani, P. and Weber, A. (2005). *Does the Early Bird Catch the Worm? Instrumental Variable Estimates of Educational Effects of Age of School Entry in Germany*. IZA Discussion Paper 1827, Retrieved November 24th, 2008 from <http://ideas.repec.org/p/iza/izadps/dp1827.html>

Scottish Executive (2004). *Education (Additional Support for Learning) (Scotland)*. Retrieved November 24th, 2008 from http://www.opsi.gov.uk/legislation/scotland/acts2004/asp_20040004_en_1

Sharp, C. (2002). *School Starting Age: European Policy and Recent Research*. Retrieved November 24th, 2008 from <http://www.nfer.ac.uk/publications/other-publications/conference-papers/school-starting-age-european-policy-and-recent-research.cfm>

Stipek, D. (2002). At What Age Should Children Enter Kindergarten? A question for Policy Makers and Parents [Electronic Version] *Society for Research in Child Development Social Policy Report*, 16,1-20.

Stipek, D. and Byler, P. (2001). Academic achievement and social behaviours associated with age of entry into kindergarten. *Applied Developmental Psychology*, 22, 175-189.

Sylva, K., Melhuish, E., Sammons, P. and Siraj-Blatchford, I. (2003). *The Effective Provision of Pre-School Education Project: A Longitudinal Study funded by the DfEE, 1997-2003*. Retrieved November 24th, 2008 from

<http://www.ioe.ac.uk/schools/>

[ecpe/eppe/eppe/eppepdfs/TP10%20Research%20Brief.pdf](http://www.ioe.ac.uk/schools/ecpe/eppe/eppe/eppepdfs/TP10%20Research%20Brief.pdf)

Tymms, P., Jones, P., Merrell, C., Henderson, B. and Cowie, M. (2005). *Children starting school in Scotland*. Retrieved June 1st, 2008 from

[http://www.scotland.gov.uk/ Publications/2005/02/20634/51601](http://www.scotland.gov.uk/Publications/2005/02/20634/51601)

Wils, A. (2004). Late entrants leave school earlier: Evidence from Mozambique. *International Review of Education*, 50 (1), 17-37.

Wilson, G. (2000). The Effects of Season of Birth, Sex and Cognitive Abilities on the Assessment of Special Educational Needs. *Educational Psychology*, 20 (2), 153-166.

Wu, W., West, S. and Hughes, J. (2008). Short-term effects of grade retention on the growth rate of Woodcock Johnson III broad math and reading scores. *Journal of School Psychology*, 46, 85-105.