Comparison of the effects of mainstream and special school on National Curriculum outcomes in children with Autism Spectrum Disorder: an archive-based analysis

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Abstract

The literature dealing with the inclusion of children with autism spectrum disorder (ASD) in mainstream schools has increased over recent years, propelled by the argument that it will improve the quality of life, educational performance, and social development of 'included' children. This area of research is currently an important one for the development of policy and practice. The literature on inclusion dealing with the inclusion of children with Autism Spectrum Disorder is limited, so the implementation of inclusion has preceded research. The current study investigated whether children in mainstream placements show enhanced performance, relative to those in specialist provisions. The study used a combination of primary and secondary data analysis to explore the impact of inclusion on children with ASD in four authorities in the south east of England. The results suggest that mainstream children have no greater academic success than children in specialist provision. The study suggests that a number of specific provisions are involved in promoting success, such as speech and language therapy, and the impact of learning support assistants, and these are also reviewed and discussed.

The inclusion of children with Autism Spectrum Disorder (ASD) into mainstream schools has been argued to improve their quality of life, educational performance, and social development (Strain, 1983; Connor, 2000; Knight, Petrie, Zuurmond, & Potts, 2009; Kurth & Mastergeorge, 2010). Mainstreaming is also thought to increase the social awareness of the other children exposed to the included children (Egel & Gradel, 1988; McGregor & Vogelsberg, 1998). In addition to these putative benefits, inclusion has been argued to relieve some of the financial strain on many external supporting agencies, such as educational, psychological and health services (Jarbrink & Knapp, 2001). Although the definitions of inclusion vary (e.g., children included for play times and meals versus children included all day), the fundamental concept is that children identified with special educational needs should be educated in the same setting as their mainstream peers (Mesibov & Shea, 1996; Norwich, 2005; Kurth & Mastergeorge, 2010; Reed & Osborne, 2014).

However, it has been argued that the promotion and implementation of this ideal has preceded research into the success of such inclusive practices, and that this is especially true concerning children with ASD (Humphrey & Parkinson, 2006; Reed & Osborne, 2014). A small number of studies have observed the effects of inclusion for children with ASD, but these studies have reported mixed results (Kurth & Mastergeorge, 2010; Reed & Osborne, 2014), a pattern which emerges in both the areas of social (Knight et al., 2010; Kurth & Mastergeorge, 2010), and academic (Ruijs & Peetsma, 2009; Smith & Matson, 2010) performance.

In terms of the social benefits of inclusion, Strain (1983; Buysse & Bailey, 1993; Boutot & Bryant, 2005) found that young children with ASD in mainstream settings exhibited more pro-social behaviours than those in special schools, and that these social skills were generalised best in integrated rather than segregated settings.

However, several other studies have shown no such pattern of gains associated with mainstream education for pupils with ASD (Durbach & Pence, 1991; Harris, Handleman, Kristoff et al., 1990; Reed, Osborne, & Waddington, 2011). Additionally, Panerai, Zingale, Trubia et al. (2009) reported greater gains in a variety of domains for pupils in special school placements compared to those in a mainstream schools (although this effect was overcome when the teaching practices of the special school were imported into the mainstream school). In fact, there is a great deal of evidence to suggest that when children with ASD lack social competence, they can experience a number of negative academic and socio-behavioural outcomes in mainstream settings (McIntyre, Blacher, & Baker, 2006; Humphrey & Symes, 2010). Myles, Simpson, Ormsbee, et al. (1993) examined the social interactions of preschool children with ASD when their non-disabled age-matched peers were either present or absent, and their results indicated that teachers interacted less with the students with ASD if their non-disabled peers were present. The children with ASD initiated very few interactions with anyone in either condition. The authors concluded that physical integration was not enough to create social interactions between children with ASD and their peers.

In terms of academic progress, there is very little evidence relating to the impact of inclusion on pupils with ASD (Reed & Osborne, 2014), although there are two reviews of the impact of inclusion on children with intellectual and/or behavioural difficulties. Ruijs and Peetsma (2009) suggest that mainstream placements offer some small advantages to children with mild intellectual disabilities, but acknowledge that there are a number of studies that report no difference between these placements. In contrast, Smith and Matson (2010) suggest that greater academic gains are made by children who displayed behaviour problems in special school.

At the very least, such a pattern of data warrants the conclusion that the ideal of inclusion is not founded on a strong evidence base (Humphrey & Parkinson, 2006; Reed & Osborne, 2014). The importance of identifying the success of this model is then paramount to the ongoing practice of inclusion in schools across the country. In fact, the importance of basing policy decisions on evidence-based practice is recognised, and is beginning to shape the delivery of educational services (Department of Health, 1998a, 1998b). The fundamental argument is that there needs to be a link between professional practice and research (Fox, 2003).

Of course, evidence highlighting best practice could come from a number of sources. Obviously, studies involving the comparison of well-matched groups undergoing different interventions are necessary (Panerai et al., 2009; Reed et al., 2011), but there are many practical constraints on the conduct of such studies (e.g., these studies take time and money that might be used for the employment of teachers). However, alternatives to such experimental and quasi-experimental designs do exist. Whilst primary data analysis uses data collected by the researchers themselves, or through trained observers, often in settings constructed as a part of the research programme, secondary data analysis uses data that have previously been collected by other investigators, often in 'naturally occurring situations', and for reasons that differ from those of the research for which they are employed in the secondary analysis. This form of research is being used increasingly as an important source of evidence, especially in the initial stages of an investigation, where it can be used to highlight which of many possible factors could be important for further investigation. In addition to being less expensive than using primary research designs, secondary data can lead to increased sample sizes; number of observations; and ecological validity (all measures coming from actual cases, rather than designed studies, thus, increasing the

ecological validity of the findings. Thus, under some conditions, secondary data analysis can be more representative (or more ecologically/environmentally valid), and offer more generalisation potential, than findings obtained from purposefully constructed research programmes.

Secondary data analysis has a long history of use in education both to cut costs, and to make use of the vast amount of data collected on students. For example, secondary data analysis was used in the USA to study the trends in achievements as a function of age at admission using data collected by the National Assessment of Educational Progress in the United States (Langer, Kalk, & Searles, 1984). A further example of secondary data analysis relevant to special needs education comes from a proposed method to demonstrate accountability of decisions for students with disabilities in the USA. This study re-analysed extant data on educational performance of children with special educational needs in order to see how children with disabilities were performing both academically and non-academically as compared to their nondisabled peers (Ysseldyke, Thurlow, Langenfeld et al., 1998). For this study, all of the publicly available reports produced by state departments of education, containing student outcome data such as achievement test performance, were collected. The summary of the performance data revealed lower performance for students with disabilities compared to other students and lower rates of participation on tests compared to students without disabilities (e.g., 50-80%).

Given the need to establish evidence for the policy of inclusion for children with ASD, and given the availability of secondary data in this area, the current study proposes to use a similar methodology to Ysseldyke et al. (1998) to analyse educational provisions for children with ASD in the UK. Local Authorities responsible for the education of children in a particular area hold archive data on all

children with ASD in their local authority. This archive data could contain possible predictive and outcome measures of the success of the inclusion of the child, which could provide an invaluable source of information concerning the success of inclusion and may help identify the common factors leading to success. Consequently, such an analysis may help to improve the current provision of the participating local authorities. Additionally, the collection of this data will allow us to identify gaps where data collection needs to be improved in the participating local authorities. In particular, the current analyses focused on the impact of a wide range of factors (e.g., type of ASD diagnosis, autism severity, socio-economic status, learning support assistant time, and types of intervention given to the children, such as portage, speech and language therapy, social skills training, these interventions were chosen purely on the basis of the data which was available) on both the school placement, and the national curriculum results, of the children (see Table 3, for a description).

Method

Sample

One hundred and eight children (18 girls and 90 boys) with a diagnosis of ASD, from four local authorities in the South East of England, formed the sample for this study. The criteria for inclusion of a participant in the study were that they had a diagnosis of an ASD, made according to the DSM-IV-TR, by a Paediatrician independent from the current study prior to the start of the study, and they could not have left school more than five years before. Local authorities were contacted, and those who agreed to take part provided a list of parents.

The parents were then sent a letter outlining the aim of the study, and asking them if they would consent to their child's data being accessed from the local authority

archives. The letter stressed that no personally identifiable data (names) would be extracted from the files. A consent form was included with the letter, which could be returned to the study authors using a prepaid envelop if the parent consented. If they consented, then the data from that child was recorded from the archive without recording their name. A total of 213 parents were contacted, and 108 consent forms were returned, giving a response rate of 51%.

The distribution of the diagnosis of participants was gathered, and revealed that 72% of the participants had a diagnosis of Autism, 16% had a diagnosis of Asperger Syndrome, 7% had a diagnosis of Attention Deficit Hyperactive Disorder in addition to an ASD diagnosis, and 5% had an additional diagnosis of Tourette's syndrome, Dyspraxia, or Depression. The age of the participants ranged between 5 and 17 years old, with a mean age of 13 years.

Location

Tables 1 and 2 about here

The characteristics of the four local authorities in the South East of England that took part in the study are displayed in Table 1. These measures were obtained from the Census for each local authority. Local authorities A, B, and C had the same index of unemployment as one another, whilst local authority D had a lower index than the others. All had indices slightly lower than the mean in the UK. A total of 46 mainstream schools, four units, and 17 special schools were sampled for the study. The breakdown of the types of schools sampled per local authority (mainstream, special, etc.) is displayed in Table 2.

Measures

Archive Measures

Measures were taken from the archives concerning child outcomes, measured by national curriculum results, and by school placement. Additionally, the interventions that the child had undergone, such as access to Speech and Language Therapy, Social Skills Training, and Portage were recorded through archive analysis. The measures found in the archives for each LEA varied. There were 15 measures collected for Local Authority A, 14 measures collected for Local Authority B, 10 collected for Local Authority C, and 16 measures for Local Authority D. In addition, the measures collected were not consistent from child to child within the LEA. This was most evident in terms of the Educational Psychologists assessments for each child. Despite such inconsistencies, outcome and predictive measures were obtained for each child in all four LEAs**.** Table 3 summarises the predictive measures and their potential outcome measures taken from the archives of the four LEA's.

Table 3 about here

Questionnaires

In addition to the archive data collected, two questionnaires were sent to parents covering three areas: diagnosis, developmental, and medical history.

Autism Severity. The Autism Behaviour Checklist (ABC: Krug, Arick, & Almond, 1980) was employed to assess the severity of the autism of each child. The ABC is a 57-item checklist, grouped into five areas; *sensory*, *relating*, *body and object*

use, *language and social* and *self-help skills*. A total score of 67 or more is taken by Krug et al. (1980) to suggest *probable* autism, and scores between 55 and 67 suggest *possible* autism. The intra-rater reliability of the test is 0.94, and its validity is regarded as satisfactory (Volkmar, Cicchetti, Dykens et al., 1988). However, it is important to note that the ABC measure may not give a similar picture of the child's autism as other instruments (Shaffer, Lucas, & Richters et al., 1999). These issues tend to reflect the greater focus of the ABC, compared to other measures, on language skills. However, these issues were not regarded as a problem for the present study, because it is only used as an index of the autism symptomatology, and not as a diagnostic instrument. Additionally, the ABC was still considered useful in the present context as: (1) no special training in administration or scoring is required, and, in the current study, it was to be completed by parents, who tend, on average, to produce higher scores than teachers (Volkmar et al., 1988); and (2) it was to be used as a research tool gauging the relative effects of autism symptomatology across the participants, rather than to make absolute judgements regarding the impact of symptoms.

Child's History. The 'Parent's Questionnaire on Your Child's History' was used to collect information on the child's medical and educational history. The questionnaire consists of questions regarding initial diagnosis, medical problems (allergies), vaccinations and early intervention. In addition there were also questions about the current provision for the child (speech and language therapy or placement). This tool has previously been used in compiling background information concerning treatment integrity in studies of the outcome effectiveness of early intervention studies for ASD (Reed, Osborne, & Corness, 2007).

Procedure

The archive data sample was identified in conjunction with the LEA. Consent forms were sent out to parents. Once consent was obtained, the archive data for the children within each of the participating local authorities were accessed. The descriptive data on the children were collected, as well as possible predictors and outcome measures of success (see above). The data collection process was iterative, with repeated visits to each of the authorities' archives, in turn, impacting on the decisions taken about which measures to employ. The initial assessment identified potential measures. The measures were then refined as the data that was common to all archives across the local authorities was identified. Schools were contacted, if necessary, to obtain national curriculum results. Each provision was identified as that named in the child's statement, and was the place where each child spent the majority of the day. Mainstream provision was defined as regular school placement (i.e. not special school). Special schools were schools with specialised provisions, whilst units were specialised classrooms attached to a mainstream school. In addition to this data collection, the family of the child were also contacted, the purpose of the project explained, and the questionnaires were sent to the families.

Analysis

For the purpose of analysis there were two measures of outcome: school placement and national curriculum result. Each outcome had a set of predictors (displayed in Table 3). Each outcome measure was analysed in terms of the possible predictors in order to identify any possible relationships and interactions. When data was missing it was replaced by mean substitution. Mean substitution was deemed a more appropriate method than listwise deletion, or regression replacement, as listwise deletion would lead to heavy data loss, and the use of regression was not

applicable as there were no multiple measures available to assess related factors. Moreover, mean substitution is a very conservative and transparent method of dealing with missing data, although it does lead to a loss in variability in the data (Tabachnick & Fidell, 2007). In no cases was there more than 15% missing data, and no single measure had more than 10% missing data.

Results

Table 4 about here

Table 4 presents the mean, maximum, and minimum values for age, school year, years of statement, and hours of Learning Support Assistant (LSA) a week (given specifically to the child, and not merely the presence of an LSA in the classroom), for the 108 children in the sample. There was a wide range of variation in terms of LSA help. The number of hours of LSA per week ranged from 1 to 35 hours per week, with an average of 18 hours a week per child. In addition, the proportion of children receiving Speech and Language Therapy (SLT), Portage training, and Social Skills Training, are displayed in Table 4. Due to insufficient data, only access to, rather than amount of these interventions was recorded. Socio-economic status (SES) was measured as the percentage of free school meals at the child's school. The schools involved came from areas that presented a large variance in social economic status (as measured in percentage of free school meals) ranging from 3% to 48% of children in the school having free school meals. The average autism severity for the entire sample was 55.7, with a range of 0 – 154, on the ABC,

suggesting possible autism, and that the sample had moderate levels of autism severity.

School Placement

Table 5 about here

Table 5 displays the proportion of children with ASD placed in each of the provisions across the four local authorities. Across local authorities A and D, children were overwhelmingly more likely to be placed in mainstream schools. In local authority B, children were more likely to be placed in special school, whilst, in local authority C, children were equally placed in special school or in mainstream. Mainstream units had the lowest number of children across all local authorities. There were two children who were home educated in the sample of 108 children.

Table 6 about here

Table 6 displays the diagnosis and the severity of autism problems for children in the different forms of school placement. The proportion of children with diagnoses of ASD and Asperger Syndrome (AS) placed in each type of school placements was broadly similar to one another, and a chi square analysis did not reveal any statistically significant differences between diagnosis and placement, so children with ASD, AS, or ASD-Co-morbid were not more likely to be placed in either mainstream or special school ($x^2 = 1.41$, *NS).*

Those children placed in mainstream had an average score of 50.9 on the ABC, which was lower than the mean score for children placed in special school (64.0), but only marginally lower than that for the special units attached to Mainstream (54.0), and those educated at home (55.7). The children in special schools had statistically significantly more severe autism symptoms as measured by the total ABC score than those in mainstream settings. This difference was assessed by a nonparametric Mann Whitney test, which revealed a statistically significant difference between the scores, $z = -2.21$, $p < 0.05$). The special school group also had more severe problems with relating (Mann Whitney, $z = -2.82$, $p < 0.05$), and social skills (Mann Whitney, $z = -3.45$, $p < 0.001$) subscales of the ABC. However, there were no statistically significant differences between the mainstream children and those attending units or home educated. There were also no differences between the children in special schools and those attending units and home educated.

Table 7 about here

Table 7 shows the characteristics of the provision that the children in each placement had received. For the purpose of analysis, the children educated at home were removed due to insufficient numbers. There was no difference between placements in terms of whether the child had access to speech and language therapy, $p > 0.05$. Children in all placements had learning support assistants, and there were no statistically significant differences between the placements and the amount of learning support hours received, all ps > 0.05. Having Portage as an early intervention did not have a statistically significant impact on subsequent school placement, $p > 0.05$ (although it is important to note that the number of children who

had Portage was small and conclusions need to be taken cautiously). The results also suggest that children across both mainstream and special were getting the same access to Social Skills Training, $p > 0.05$. Finally, there were no statistically significant differences between the provisions in free school meals, $p > 0.05$.

Academic Success

In order to determine whether the children included in mainstream schools were more or less successful academically than those not fully included (i.e. those in special units and special schools), the mean scores for their performance on National Curriculum Tests were assessed. No significant correlations were found between the overall ABC scores and National Curriculum outcomes. These correlations suggest little direct relationship between autism severity and outcome.

Figure 1 about here

Figure 1 displays the National Curriculum results for children in mainstream and special provisions (special schools, units, and home tuition). In order for the data on National Curriculum results to be comparable across students, all the levels were recoded so that: P-level 1 = 1, P-level 2 = 2, P-level 3 = 3, and so on up to P-level 8 = 8, the Level 1 = 9, Level 2 = 10, and so on. The results suggest the mean performance level across both mainstream and special schools is low (around P8). Despite the mean age of the current sample being 12.9 years, a performance at P8 level is below that which would normally be expected from this age group – i.e. Level 4/5 (or Key Stage 3).

Due to the violation of the assumption of normality (tested by the Kolmogorov-Smirnov statistic), nonparametric tests were used to statistically analyse these data. These tests revealed that the children in specialist provision did statistically significantly better in English than those in mainstream provision (Mann Whitney, $z = 2.26$, $p < 0.05$). The means for the rest of the national curriculum outcomes were similar to one another, and Mann-Whitney tests failed to note any statistically significant differences between the provisions, all zs < 1. As a number of tests were conducted, so caution is needed in interpreting a significance level of $p < 0.05$.

Relationship between school factors and academic success

To further determine if any aspect of the provisions that the children had previously received were associated with academic success, a series of correlations and partial correlations were performed between the school factors, autism severity, and academic outcomes. All correlations were calculated using a nonparametric correlational procedure (either a Kendall correlation or a Kendall partial correlation test). These results have been broken down for mainstream placements, and special placements (special schools and units), and for the sample as a whole, and all are reported in Table 8.

Table 8 about here

There were no correlations between SES and autism severity, SES and academic outcomes, nor between hours of LSA support and autism severity, suggesting that those children who have more hours of LSA are not more severe than those children who have less hours of LSA. There were several significant negative

correlations between LSA support hours and outcome for the sample as a whole and for pupils in mainstream provisions. In contrast, for children in special schools, hours of LSA were not significantly correlated with outcomes.

Figure 2 about here

Figure 2 displays the mean academic outcomes for children who did, and who did not, have access to Portage, Social Skills Training, and speech and language therapy. A Mann-Whitney test revealed no significant differences between academic outcomes depending on whether a child had had access to Portage, $p > 0.10$. Kendall's correlations between Portage and academic outcomes also revealed no significant correlations between access to Portage and outcomes for pupils in mainstream schools, special schools, or combined across the whole sample. There was no significant correlation between autism severity and Portage, $p > 0.10$, and Kendall's partial correlations between Portage and academic outcomes, with autism severity controlled, revealed that there were actually negative correlations between access to Portage and outcomes for the mainstream group: English ($T = -0.21$, $p < 0.05$), Reading ($T = -0.21$, $p < 0.05$), Writing ($T = -0.23$, $p < 0.05$), Science ($T = -0.18$, $p < 0.05$), and Math ($T = -0.26$, $p < 0.01$). Again, these conclusions need to be taken very cautiously, due to the small number of children who had access to Portage.

A Mann-Whitney analysis displayed significant differences between the outcomes of those children in mainstream accessing Social Skills Training and those who did not have such access. Children who accessed Social Skills Training had statistically significantly lower grades in English ($z = 2.50$, $p < 0.05$), Reading ($z =$

2.80, $p < 0.01$), Writing ($z = 2.42$, $p < 0.05$), Science ($z = 2.40$, $p < 0.05$), and Maths ($z = 2.90$, $p < 0.01$). In addition, a Kendall's correlation revealed statistically significant negative correlations between access to Social Skills Training and poorer outcomes for children in mainstream schools: English (T = - 0.37, $p < 0.001$), Reading (T = - 0.38, $p < 0.001$), Writing ($T = -0.34$, $p < 0.01$), Science (T = - 0.33, p < 0.01), and Math ($T = - 0.35$, $p < 0.001$). However, there was no statistically significant correlation between Social Skills Training and autism severity in the mainstream group, $p > 0.10$. This negative relationship between Social Skills Training and outcomes was not present in children in special schools in both correlations and partial correlations, all *p*s > 0.10. In addition, there was no correlation between severity and access to social skills for those children in special school, all *ps* > 0.10. However, the negative correlation between Social Skills Training and outcome was present when the two groups were combined: English ($T = - 0.21$, $p < 0.01$), Reading ($T = - 0.24$, $p < 0.01$), Writing ($T = - 0.21$, p < 0.01), Science ($T = - 0.21$, p < 0.01), and Math ($T = - 0.24$, $p < 0.01$). As with the sub-group analyses, there was no correlation between autism severity and Social Skills Training in the combined group, $p > 0.10$. A partial correlation between Social Skills Training and outcomes, revealed that, even when autism severity was partialled out, access to Social Skills Training remained negatively correlated with outcomes in: English ($T = - 0.37$, p < 0.001), Reading ($T = -0.38$, $p < 0.001$), Writing (T = - 0.34, p < 0.001), Science ($T = - 0.33$, p < 0.001), and Math ($T = - 0.35$, $p < 0.001$).

Finally, a Mann-Whitney test revealed that those children who had access to speech and language therapy were performing statistically significantly better at English ($z = 2.84$, $p < 0.01$), Reading ($z = 2.80$, $p < 0.01$), Writing ($z = 2.73$, $p < 0.01$), Science ($z = 2.51$, $p < 0.05$), and Maths ($z = 2.71$, $p < 0.01$). The positive

impact of speech and language therapy (SLT) on outcomes was confirmed by a series of Kendall correlations. In both mainstream and special schools, there were no significant correlations between speech and language therapy and academic outcomes. However, when the groups were combined, statistically significant correlations emerged. Children in the combined group who had previously accessed speech and language therpay did better in English ($T = 0.32$, $p < 0.01$), Reading ($T = 0.30$, $p < 0.01$), Writing ($T = 0.30$, $p < 0.01$), Science ($T = 0.28$, $p < 0.05$), and Math ($T = 0.30$, $p < 0.01$). A partial correlation between access to speech and language therapy and outcomes, with autism severity partialled out, revealed that there were statistically significant correlations between access to speech and language therapy and outcomes in: Reading (T = 0.18, $p < 0.05$), and Writing ($T = 0.18$, $p < 0.05$), for those children in mainstream. For those children in special school, a partial correlation revealed statistically significant correlations between speech and language therapy and outcomes in English ($T = 0.33$, $p < 0.001$), Reading ($T = 0.33$, $p < 0.001$), Writing ($T = 0.32$, $p < 0.001$), Science ($T = 0.32$, $p < 0.001$), and Math ($T = 0.32$, $p < 0.001$).

Discussion

The recent debates over governmental policies regarding inclusion make investigating the success of inclusion an important area for research and practice. The current study was concerned with identifying, whether an archive-based analysis could identify whether children with ASD in mainstream do better than those in specialist provision, and whether there were any factors involved in mediating the outcome. The results suggest that children in mainstream are not more academically

successful than those in specialist placements, but, instead, a range of alternative factors are associated with success.

The archive data suggest a pattern of practice that is not entirely in accordance with the 'green paper', in that children with ASD were just as likely to be placed in special school as in a mainstream school. In this respect, inclusion in mainstream appears to be at about the same level as ten years ago, when Barnard, Prior, and Potter (2000) noted that about 50% of such pupils were included in mainstream classes. The current report finds that mainstreaming practice varied across local authorities. However, there were significant differences in the severity of ASD across the school placements. Those children in special school generally had more severe ASD, and had poorer social relating, and social skills, than those children placed in mainstream schools. This suggests that children are being placed in the different provisions as a function of their ASD severity. There were no differences in the SES of the children and their placement. In terms of provision received by the children in either type of placement, there were no differences in the access to interventions between the different school placements in terms of Social Skills Training, speech and language therapy, and LSA support.

The academic performance of children on National Curriculum levels in mainstream and specialist provision was analysed in order to identify whether included children were more or less successful than those in special units or special schools. Children in special school performed better in English than those in mainstream, however, there were no further differences in the academic performance across the provisions, suggesting that inclusion in itself does not have a significant impact on academic success. The current study did not find that autism severity had an impact on National Curriculum outcomes. The reason why no correlations

between autism severity and outcomes were identified may be because children in the current study were performing at low levels overall on the National Curriculum, performing significantly below the average level.

The impact of a variety of different factors, and different provisions (rather than school placement) on National Curriculum results, also were analysed. It is worth noting that children with more hours of LSA were not more severely autism than those who had fewer hours of LSA. Of course, LSA support might not be allocated solely on the basis of severity of ASD (e.g. ability might be an additional consideration in allocation of LSA support). The rationale for providing such support needs to be further explored.

Hours of access to LSAs were negatively correlated with academic outcomes for those children placed in mainstream schools. Such findings have been found previously, and have formed the basis of a number of criticisms regarding the use of LSA support. For example, Ainscow (2000; Osborne & Reed, 2011) suggests that having an LSA can create a barrier between students and their classmates, and can stall pupil's progress by consistently decreasing the challenges of the work in the classroom. Ainscow (2000) also raises a concern that having an LSA means that the teacher is less involved with the student. This in turn may mean that the child with SEN is benefiting less from their teacher's expertise than other pupils in the class. In addition, the differentiation process may indirectly affect the impact of the LSA on performance. Tasks are often differentiated in mainstream classrooms to accommodate the range of needs and abilities of the pupils. The problem with differentiation is that it can also lower the expectations on the child (Ainscow, 2000), which may in turn lead to lower outcomes. In order to identify whether teaching targets have an impact on outcomes, children's targets would need to be identified

and assessed in conjunction with their abilities, in order to identify whether children are underperforming. It should also be noted that factors like the ability of the child may also play a role in these findings of negative relationships between LSA support and outcomes. Support from an LSA may be allocated on the basis of enhanced needs, meaning that the child with LSA support may start from a lower level of achievement to begin with, making the final outcome likely to be lower. Hence, the negative relationship between LSA support and outcomes may be a product of greater allocation of LSAs to those with poorer ability, rather than the LSA intervention producing a worse outcome. In addition, there are a number of LSA factors that have been identified as promoting their impact on the included child with ASD (Symes & Humphrey, 2011).

Those children who attended Social Skills Training in mainstream schools did worse across the National Curriculum subjects than those who did not attend Social Skills groups, even when ASD severity was controlled. However, this association was not present for those children who were in special schools. The results did not suggest a difference in ASD severity between those children in mainstream school who were attending Social Skills Training and those who were not attending such training. Of course, children who attended Social Skills Training may have difficulties in communication and language other than those measured by the ABC therefore, it follows that these children would perform worse than those that were not in need of Social Skills Training.

Access to speech and language therapy had significant positive impacts on academic success across all of the subjects (even with ASD severity controlled). Communication interventions can lead to decreased challenging behaviours, when individuals with autism are taught specific language skills to serve the same

communicative function as the challenging behaviour (Carr & Durrand, 1985; Durrand & Carr, 1987; 1992). The decrease of inappropriate behaviours in children with ASD may affect their academic achievement, as it does with children with challenging behaviour (Luiselli, Putnam, Handler et al., 2005). In addition, speech and language therpay may improve social competence by targeting reciprocal interactions and peer initiations (McGee, Almeida, Sulzer-Azaroff et al., 1992), and social behaviour (Goldstein, Kaczmarek, Pennington et al., 1992). This may lead to improved academic outcomes as research suggests that children lacking social competence go on to develop a number of negative academic outcomes (Kupersmidt & DeRosier, 2004). In order to identify how speech and language therapy works best, future investigations will need to identify specific nature of treatment and the effects of intensity on outcomes.

There are limitations concerning the present study that do need to be mentioned in order to allow these findings to be viewed with appropriate caution. Firstly, the findings are not based on an experimental or a quasi-experimental approach, which means that any interpretation given about the causal structure of these data should be made with caution. Any of the findings reported here could imply any one of a number of causal structures between the variables. However, the current relationships do suggest a number of places to start in order to explore the structure of potentially important relationships; such as further exploration of the impact of LSA support, and early interventions, on outcomes (Osborne & Reed, 2011). Secondly, in any such analysis there should be caution taken regarding the validity of the measures used, the present measures (e.g., the ABC score for autism severity, national curriculum results for academic achievement) have reasonable reliability for research purposes, but are rather more suited to exploring relative effects of the

measures, rather than the impact of the absolute level on these measures. Thirdly, in any such archive-based analysis there are missing data, which will impact on the analyses that are performed. In the present case, the levels of missing data were relatively small (under 10% for any measure), and the treatment was conservative (tending to reduce variance, and so reduce correlational values).

However, the main limitation to the study was inconsistencies in the archive material. Additionally, as with all secondary data analysis, one cannot be sure of the quality of the data. Nevertheless, it was one of the purposes of this study to use extant data to establish an evidence based practice which could be used in the future for accountability. Additionally, the use of secondary data analysis in this case has led to more representative data, and generalisation potential, than findings obtained from primary research programmes, due to the number of children and local authorities involved. In order for evidence-based practice to be incorporated into LEA's, archives need to include up to date information on the children as well as National Curriculum results, and educational psychologist reports and assessments. It would also be important to have consistent educational measures for the children within and across local authorities to help assess progress and accountability of placement.

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Figure Captions

Figure 1: National curriculum results for children in mainstream and specialist provision (P-level 1 = 1, P-level 2 = 2, P-level 3 = 3, and so on, up to P-level 8 = 8, then Level 1 = 9, Level 2 = 10, and so on).

Figure 2: Relationship between intervention (present = yes; absent = no) and academic success measured in terms of p values (P-level 1 = 1, P-level 2 = 2, P-level 3 = 3, and so on, up to P-level 8 = 8, then Level 1 = 9, Level 2 = 10, and so on).

Figure 1

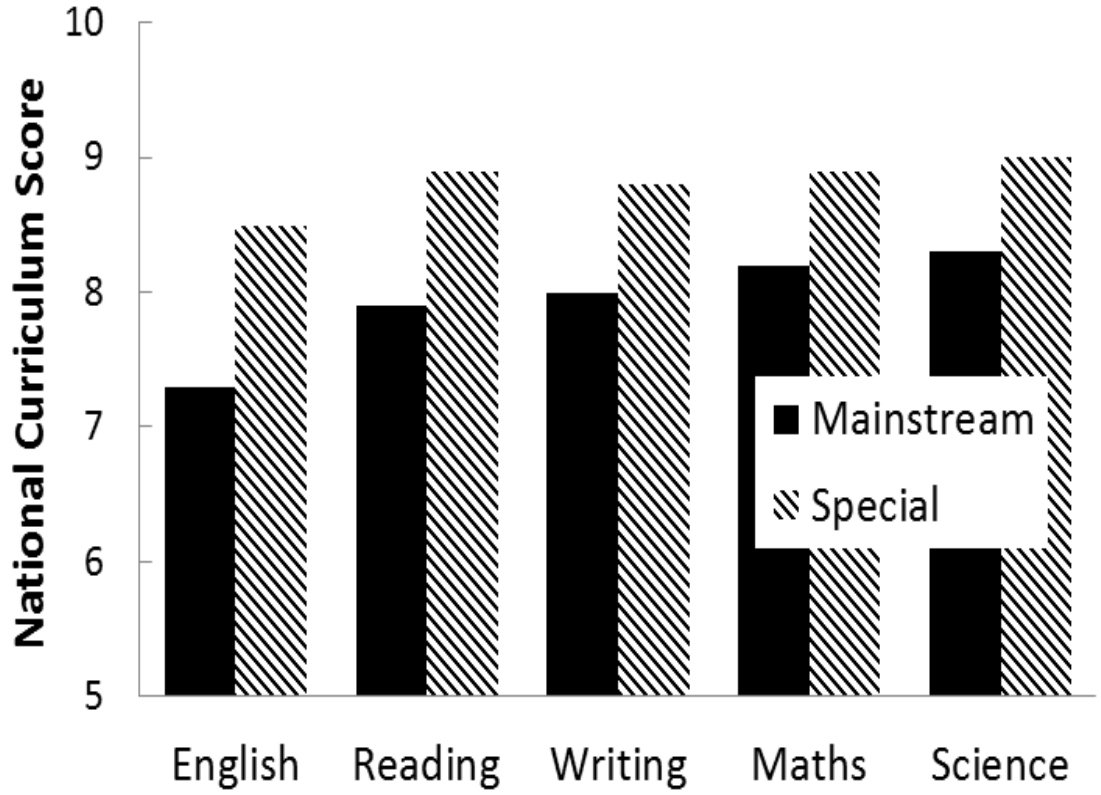
National Curriculum Score
10
9
8
7
6
5
Mainstream
Special
English
Reading
Writing
Maths
Science

Figure 2

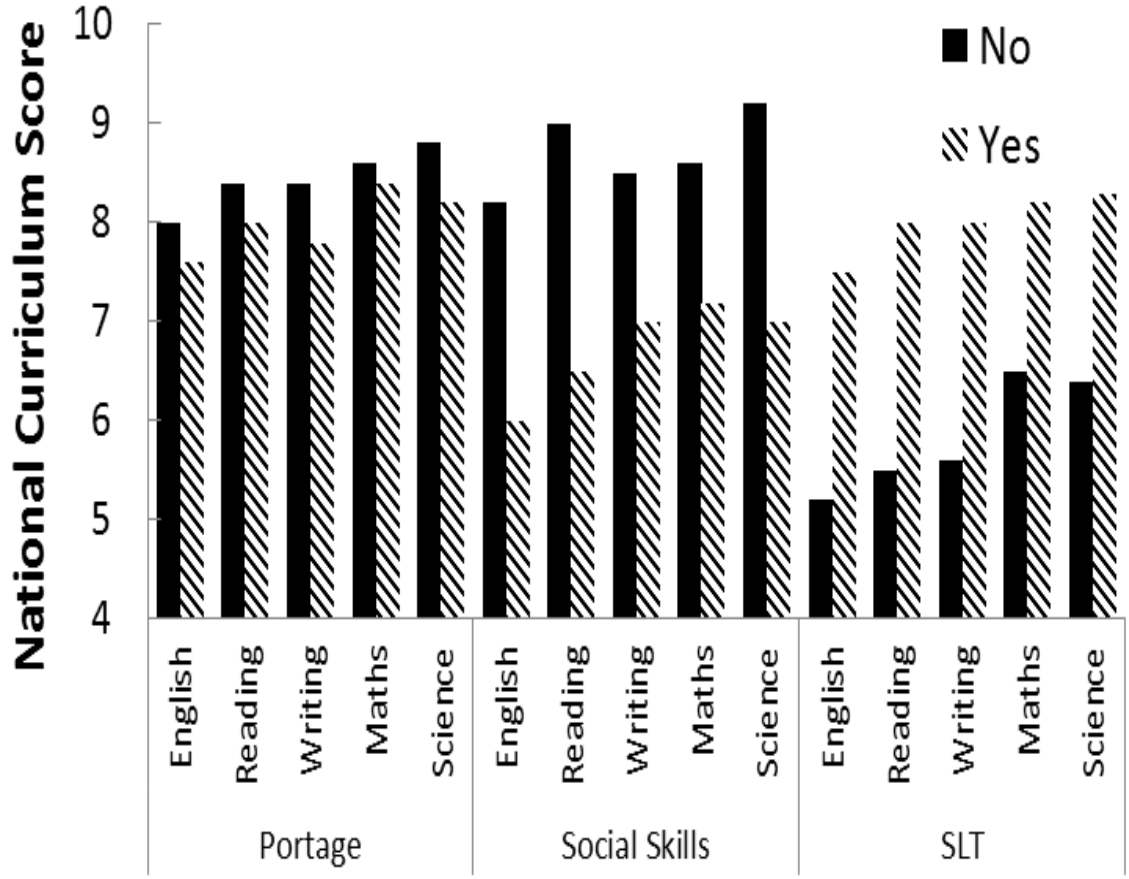
National Curriculum Score
10
9
8
7
6
5
4
No
Yes
English
Reading
Writing
Maths
Science
English
Reading
Writing
Maths
Science
English
Reading
Writing
Maths
Science
Portage
Social Skills
SLT

Table 1: Characteristics of the participating local authorities in terms of population, ethnicity and socio-economic status (unemployment)

Local authority	**Population**	**Ethnic Make-up**	**Index of unemployment (percentage of available workforce not employed)**
A	211,600	59% white British 41% non-white	3 %
B	185, 131	88% white British 12% non-white	3 %
C	372,000	94% white British 6% non-white	3 %
D	150,229	94% white British, 6% non-white	1.5%
UK	58,789,194	80% white British, 20% non-white	5%

Table 2: Breakdown of types of school and number sampled per local authority

Local Authority	Mainstream	Unit	Special
A	**13**	**0**	**0**
B	**13**	**2**	**11**
C	**6**	**2**	**3**
D	**14**	**0**	**3**

Table 3: Identified measures from the archive data broken down into predictor variables and potential outcome measures

Predictors	**Outcome**
○ Diagnosis ○ Portage ○ Hours of Learning Support Assistant ○ Speech and Language Therapy ○ Social Skills training ○ Socio-economic status ○ Autism severity	➢ School placement
○ Diagnosis ○ Portage ○ Years of statement ○ Hours of Learning Support Assistant ○ Speech and Language Therapy ○ Social Skills training ○ Socio-economic status ○ Autism severity	➢ National Curriculum results

Table 4: *Descriptive statistics of selected variables for the total sample of students*

Variable	**N**	**Minimum**	**Maximum**	**Mean**	**SD**
Age (years)	108	5	18	12.9	3.2
School Years	108	0	13	7.3	3.0
Years of Statement	108	0	15	6.1	3.6
Hours of LSA	108	1	35	18.6	7.1
Visits of SLT (Yes/No)	67	0	1	N/A	N/A
Portage (Yes/No)	108	0	1	N/A	N/A
Social Skills Training (Yes/No)	108	0	1	N/A	N/A
Free School Meals (percentage)	108	3	48	18.3	7.5
Autistic severity	108	0	154	55.7	22.8
Parental coping	108	61	115	91.7	6.7

Table 5: Provision across the four local authorities

Local Authority	**Mainstream**	**Special**	**Unit**	**Home**
A	94% (16)	0% (0)	0% (0)	6%(1)
B	36% (16)	48% (21)	14% (6)	2% (1)
C	45% (10)	45% (10)	5% (2)	0% (0)
D	70% (19)	30% (6)	0% (0)	0% (0)

Table 6: *Autistic severity and school placement*

		School Placement			
		Mainstream	**Special**	**Unit**	**Home***
Diagnosis	ASD	59% (46)	35% (27)	6% (5)	0% (0)
	AS	61% (11)	28% (5)	11% (2)	0% (0)
	ASD/co-morbid	33% (4)	42% (5)	8% (1)	17% (2)
Mean ASD severity (Standard deviations)	Total ABC (31 – 155)	50.9 (2.5)	64.0 (4.6)	54.0 (1.8)	55.7 (0.0)
	Sensory subscale (0-27)	7.9 (0.5)	9.4(0.9)	8.1(0.3)	8.4 (0.0)
	Relating subscale (4-38)	15.1(0.7)	19.3 (1.2)	16.6 (0.1)	16.7 (0.0)
	Body and object use subscale (0-38)	8.9 (0.6)	11.2 (1.2)	9.6 (0.2)	9.8 (0.0)
	Language subscale (0-31)	8.5 (0.6)	10.3 (1.1)	8.0 (1.1)	9.1 (0.0)
	Social and self help skills subscale (6-25)	10.4 (0.5)	14.0 (0.8)	11.6 (0.1)	11.7 (0.0)

*Note: * There were only 2 participants therefore it is not possible to compute the standard deviation.*

Table 7: *Descriptive data on predictor variables*

		School Placement (number in brackets)			
		Mainstream	**Special**	**Unit**	**Home**
SLT	Yes	78% (32)	88%(14)	88%(7)	No data
	No	22%(9)	12%(2)	12% (1)	No data
LSA	Mean Hours (1-35)	18	19	19	19
	Percentage receiving	100%	100%	100%	100%
Portage	Yes	8% (6)	8% (2)	33% (4)	0%
	No	92%(65)	91%(21)	66%(8)	100%(2)
Social Skills Training	Yes	27% (19)	35%(8)	42% (5)	0% (0)
	No	73% (52)	65% (15)	58% (7)	100% (2)
SES	(3-48%)	19%	17%	20%	15%

Table 8: *Correlation matrix of predictor and outcome measures in the sample.*

Outcome / Predictors	Provision	ABC	NC English	NC Reading	NC Writing	NC Science	NC Maths
SES	**Mainstream**	*K =.12 NS*	*K = .04 NS*	*K = .10 NS*	*K = .14 NS*	*K = .15 NS*	*K = .10 NS*
	Special	*K=.11 NS*	*k= -.02 NS*	*k=.02 NS*	*K=.14 NS*	*K=.15 NS*	*K=.10 NS*
	Combined	*K=.10 NS*	*K=.10 NS*	*K = .06 NS*	*K = .10 NS*	*K = .11 NS*	*K = .10 NS*
LSA hours per week	**Mainstream**	*K= -.17 NS*	*K= -.30 P<0.01*	*K= -.27 P<0.01*	*K= -.29 P<0.01*	*K= -.32 P<0.01*	*K= -.28 P<0.01*
	Special	*K = -.22 NS*	*K=.023 NS*	*K=.08 NS*	*k=.08 NS*	*k=.11 NS*	*k=.06 NS*
	Combined	*K = -.10 NS*	*R= -.16 P<0.05*	*R= -.12 NS*	*R= -.15 NS*	*R= -.16 P<0.05*	*K = -.15 NS*

Combined = Mainstream and Special (special school and units) combined together; SLT = speech and language therapy; SES = socio-economic measure (number of free school meals); NC = National Curriculum.