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Inattention in very preterm children: Implications for screening and detection

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Short title: ADHD symptoms in very preterm children

Keywords: Preterm birth; mental health; inattention; behaviour problems; special educational needs.

Abbreviations: ADHD - Attention Deficit/Hyperactivity Disorders; ASD - Autism Spectrum Disorders; IMD - Index of Multiple Deprivation; SEN - Special Educational Needs; SDQ - Strengths and Difficulties Questionnaire.

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Abstract

Objective. Children born very preterm (VP; <32 weeks) are at risk for Attention Deficit/Hyperactivity Disorders (ADHD). ADHD in VP children has a different clinical presentation to ADHD in the general population, and therefore VP children with difficulties may not come to the teacher's attention in school. We have assessed ADHD symptoms to determine whether VP children's difficulties may go undetected in the classroom.

Design. Parents and teachers of 117 VP and 77 term-born children completed the Strengths and Difficulties Questionnaire (SDQ) to assess hyperactivity/inattention, emotional, conduct, and peer problems and the Du Paul ADHD Rating Scale-IV to assess inattention and hyperactivity/impulsivity symptoms. Special Educational Needs (SEN) were assessed using teacher report. Group differences in outcomes were adjusted for socio-economic deprivation.

Results. Parents and teachers rated VP children with significantly higher SDQ hyperactivity/inattention scores, and parents rated them with more clinically significant hyperactivity/inattention difficulties than term-born controls (RR 4.0; 95%CI 1.4, 11.4). Examining ADHD dimensions, parents and teachers rated VP children with significantly more inattention symptoms than controls and parents rated them with more clinically significant inattention (RR 4.8; 95%CI 1.4, 16.0); in contrast, there was no excess of hyperactivity/impulsivity. After excluding children with SEN, VP children still had significantly higher inattention scores than controls but there was no excess of hyperactivity/impulsivity.

Conclusions. VP children are at greater risk for symptoms of inattention than hyperactivity/impulsivity. Inattention was significantly increased among VP children without identified SEN suggesting that these problems may be difficult to detect in school. Raising teachers' awareness of inattention problems may be advantageous in enabling them to identify very preterm children who may benefit from intervention.

Very preterm (<32 weeks) birth is associated with an increased risk of a cluster of mental health disorders, namely Anxiety Disorders, Autism Spectrum Disorders (ASD) and Attention Deficit/Hyperactivity Disorders (ADHD).(1) ADHD and attention problems are the most common adverse behavioural outcomes following very preterm birth(2-6). Even in the absence of diagnoses there is a generally higher level of attention difficulties amongst children born preterm; this results in a substantial number with symptoms that fall below the diagnostic threshold yet which may impact on daily activities and performance at school(7-9). In particular, a number of studies have reported a higher risk for inattention than hyperactivity/impulsivity, for both symptoms and diagnoses(3, 4, 7, 9, 10), and a lack of co-morbid conduct disorders among very preterm children(2-4, 6). These findings are suggestive of a core deficit in inattention in preterm populations.

Behaviour problems are associated with poor school performance and inattention in particular is a key predictor of academic attainment(9). It is thus unsurprising that very preterm children have poorer academic attainment than term-born peers and an increased prevalence of Special Educational Needs (SEN)(11, 12). The clinical presentation of ADHD associated with preterm birth also has specific implications for the classroom. Given the lack of comorbid conduct disorders, very preterm children may not come to the teacher's attention as having behavioural difficulties as readily as other children with ADHD who are hyperactive or disruptive in the classroom. Whilst children with hyperactivity/impulsivity may be identified as having SEN, those with 'purer' inattention problems may therefore go undetected in school.

The aims of this study were to assess the behavioural outcomes of very preterm children and to explore the relative impact of very preterm birth on symptoms of inattention versus

hyperactivity/impulsivity. We hypothesised that very preterm children would have significantly higher levels of inattention than hyperactivity/impulsivity and that there would be a significant excess of inattention among very preterm children who are not identified with SEN.

Participants and methods

Participants

Very preterm children and term-born controls in mainstream schools aged 8-10 years were invited to participate in the Premature Infants' Skills in Mathematics (PRISM) study, a multi-centre study of educational and behavioural outcomes following very preterm birth. All children born very preterm (<32 weeks) from September 2001 through August 2003 and admitted for neonatal intensive care in two centres (University Hospitals of Leicester & University College Hospital London, UK) were invited to participate. A term-born control group was also recruited. For each very preterm child, three classmates closest in age and of the same sex were identified from which one was selected at random using established procedures(12). Controls born <37⁺⁰ weeks were excluded and a control child was not recruited where assessments were conducted at home rather than school, resulting in fewer controls than preterm children. Most children recruited to the study still lived in London and the East Midlands and all attended mainstream schools in England. Parents and children received a study information sheet and parents provided written consent. The study was approved by Derbyshire NHS Research Ethics Committee.

Measures

Parents and teachers were asked to complete study questionnaires. Children were in mainstream primary schools and therefore their main class teacher was asked to complete the

questionnaire to ensure familiarity with the child's behaviour in the classroom. Both respondents completed the Strengths and Difficulties Questionnaire (SDQ)(13), a 25-item questionnaire to screen for behavioural and emotional disorders. The SDQ yields sub-scale scores (range 0-10) for four problem domains that assess emotional difficulties, conduct problems, peer relationship difficulties and hyperactivity/inattention. An additional 5-item supplement was also used to assess the impact of problems on the child's daily life comprising impact on home life, friendships, learning and leisure activities. Scores for the four problem domains were combined to give a total difficulties score (range 0-40); higher scores indicate greater difficulties. Scores were compared to cut-off scores for classifying children with clinically significant difficulties (abnormal screens) corresponding with scores >90th percentile in the standardisation sample(13, 14).

As SDQ hyperactivity/inattention scores are a composite score reflecting problems on both dimensions, symptoms of inattention and hyperactivity/impulsivity corresponding with ADHD diagnostic criteria were further explored using the Du Paul ADHD Rating Scale-IV(15), completed by parents and teachers. Raw scores were summed for each dimension with higher scores indicating greater difficulties. Age- and gender-specific percentile scores were also derived using published norms(15) from which scores >90th percentile were used to identify children with difficulties on each dimension to correspond with SDQ cut-offs.

Children in England are identified as having SEN if they have a 'learning difficulty which calls for special educational provision'(16). Information about SEN was obtained using teacher questionnaires. Information obtained via parent report was used to classify mothers' highest educational qualification and socio-occupational status using the National Statistics Socio-Economic Classification(17). National Statistics Index of Multiple Deprivation

(IMD)(18) ranks were also derived using current postcode of residence and were used to determine whether each child lived in the least, middle, or most deprived areas of England.

Statistical Analyses

Data were double entered into two IBM SPSS Statistics v20 databases. These databases were compared and all discrepancies were verified with the original study records to ensure the accuracy of entered data. Study data were then analysed using IBM SPSS Statistics v20.

Between group differences in continuous variables were analysed using linear regression with effect sizes reported as mean differences with 95% confidence intervals (95% CI). To assess group differences in the proportion of children with abnormal screens, Poisson regressions with robust confidence intervals were used with effect sizes reported as Relative Risk (RR) with 95%CI. Given the marginally significant ($p=0.06$) association of socio-economic deprivation with group membership, all between group comparisons were adjusted for deprivation using multivariable analyses with IMD tertile entered as a covariate. Unadjusted results are presented in Appendix A and B. All p-values were 2-tailed.

Results

Study sample

Of the whole very preterm population ($n=266$), parents of 125 children responded to invitations to participate in the PRISM Study. As this study required children to participate in standardised tests of cognitive and educational attainment, 8 children were excluded (2 lived abroad, 3 attended special school and 3 had severe disability precluding them from participating in study tests) and 117 (44%) were recruited. Teacher questionnaires were returned for 98 (84%) children and parent questionnaires for 101 (86%); at least one questionnaire was returned for 112 (95%) children. There were no significant differences

between very preterm children recruited and not recruited in birthweight (mean difference - 6g; 95%CI -105g to 93g, $p=0.90$) or gestational age (-0.2 weeks, -0.1 to 0.3, $p=0.50$), and there was no association between recruitment and IMD group ($\chi^2=3.62$, $p=0.16$). Thus the sample recruited were representative of the total population in terms of key variables influencing long-term outcomes.

As described above, one randomly selected classmate for each very preterm child was invited to participate in the study. In total, 78 control children were recruited, of which one was later excluded due to preterm birth. The full sample thus comprised 77 term-born controls. Teacher questionnaires were returned for 72 (94%) and parent questionnaires for 66 (86%) children; at least one questionnaire was returned for 76 (99%) children. Characteristics of very preterm children and controls for whom questionnaires were obtained are shown in Table 1. Given the marginally significant difference in socio-economic deprivation between the groups, all analyses were adjusted for IMD group.

TABLE 1

Prevalence of behaviour problems

After adjustment for socio-economic deprivation, parents rated very preterm children with significantly higher mean scores than controls for conduct problems, hyperactivity/inattention and total difficulties. Teachers rated very preterm children with significantly higher emotional, hyperactivity/inattention problems and total difficulties. Teachers also rated very preterm children with higher impact scores indicating a greater frequency of problems that affected very preterm children's daily activities (Table 2). Using published cut-offs for identifying children with clinically significant difficulties, parents rated very preterm children with 4 times increased risk for hyperactivity/inattention problems, but teacher ratings were not

significantly different from controls. There was no significant difference in other domains as rated by parents and teachers, but both respondents rated preterm children with problems that had a significantly greater impact on their daily life (Table 2).

TABLE 2

ADHD symptoms

Both parents and teachers rated very preterm children with significantly higher mean inattention scores than controls with a difference of 3 points. In contrast, neither parents nor teachers rated very preterm children with a significant excess of hyperactivity/impulsivity symptoms (Table 2; Figure 1a). Repeated measures t-tests were used to explore the difference in inattention and hyperactivity/impulsivity ratings within both groups. Among very preterm children, both parents (mean difference 2.57, 95%CI 1.77 to 3.37, $p<0.001$) and teachers (3.91, 2.75 to 5.09, $p<0.001$) rated them with significantly higher inattention than hyperactivity/impulsivity. In contrast, there was no significant difference in parents' ratings of inattention vs. hyperactivity/impulsivity among control children; teachers reported significantly higher scores for inattention than hyperactivity/impulsivity among controls (0.97, 0.24 to 1.70, $p=0.010$), but this difference was significantly smaller than for VP children (i.e. no overlap in confidence intervals). To further explore interaction effects, difference scores (inattention minus hyperactivity/impulsivity) were calculated for each child for both parent and teacher ratings. Using linear regression with difference scores as a dependent variable, group was a significant predictor for both parent ($p=0.009$) and teacher reports ($p<0.001$), with VP children displaying significantly larger mean difference scores than control children for both parent (VP: Mean 1.92, SD 3.45; Control: Mean 0.40, SD 3.42) and teacher ratings (VP: Mean 1.91, SD 3.27; Control: Mean 0.36, SD 2.11). Using scores

>90th percentile, parents rated very preterm children with almost 5 times increased risk for clinically significant inattention problems but there was no significant excess of hyperactivity/impulsivity; teachers ratings were not significantly different between groups (Table 2).

FIGURE 1

Behaviour problems in children without identified SEN

Overall, 41 (42%) very preterm children and 13 (18.3%) controls had identified SEN (adjusted RR 2.3, 95% CI 1.3 to 3.9, $p=0.003$). When children with SEN were excluded from the analyses, parents still rated very preterm children with significantly higher SDQ conduct problems and hyperactivity/inattention scores than controls, and teachers rated them only with significantly higher hyperactivity/inattention. As children with SEN were excluded, we did not find an excess of clinically significant problems as expected (Table 3).

TABLE 3

ADHD symptoms in children without identified SEN

After excluding children with SEN, very preterm children still had significantly higher inattention scores than controls as rated by both parents and teachers; in contrast, there was no significant excess of hyperactivity/impulsivity in either parent or teacher ratings (Table 3, Figure 1b). There was no excess of clinically significant ADHD symptoms once children with SEN were excluded from the analyses.

Discussion

This study advances our understanding of the nature of ADHD symptoms among children born very preterm and provides further evidence that these are associated with a core deficit in inattention. Commensurate with previous studies, hyperactivity/inattention problems were most consistently elevated among very preterm children.(3, 5, 19) Although respondents differed in their ratings of emotional symptoms and conduct problems, both parents and teachers rated very preterm children with significantly higher hyperactivity/inattention scores than controls; parents also rated them with a 4-fold increased risk of clinically significant difficulties in this domain. In terms of risk ratios these results are similar to those of previous studies(1).

The SDQ hyperactivity/impulsivity scale assesses problems associated with both hyperactivity/impulsivity (3 items) and inattention (2 items). Scores may therefore reflect an excess of symptoms on either dimension, potentially masking differences in the profile of symptoms among clinical populations. Previous studies of extremely preterm children (<26 weeks) or those born with extremely low birthweight have indicated that ADHD among preterm children may be associated with a specific risk for inattention in terms of both symptoms and disorders(3, 4, 7, 9). Using a more detailed analysis of ADHD symptoms along separable dimensions we found that very preterm children had significantly higher inattention than hyperactivity/impulsivity scores and, compared with term-born controls, were at increased risk only for inattention symptoms. Our results thus provide further evidence that inattention is a core deficit among this population.

In addition to these findings, it is becoming increasingly evident that ADHD symptoms and disorders are rarely associated with comorbid conduct disorders among children born very

preterm(4). Thus, unlike children in the general population with ADHD or other externalising behaviours, very preterm children are less likely to be disruptive in school and may be less likely to come to the teacher's attention as having difficulties. In fact, we have shown that even after excluding children with identified SEN in school, very preterm children still had significantly higher SDQ hyperactivity/inattention scores than term-born peers. Scores on the ADHD rating scale showed this increase was specific to inattention rather than hyperactivity/impulsivity.

Taken together these findings support our hypothesis that very preterm children with hyperactivity/impulsivity are more readily identified with SEN than those who have only inattention difficulties, and that an excess of inattention may still be present among those not receiving support in the classroom. This may reflect a general tendency for problems associated with preterm birth to go undetected in school. It has been argued that very preterm children are part of a growing generation of children with complex learning difficulties and disabilities that differ from those of previous generations and for which new approaches to screening and intervention are needed(20). It has been shown that teachers lack knowledge of the cognitive and behavioural outcomes and educational needs of children born preterm and that less than 10% feel they have received sufficient training in this area(21). This lack of knowledge may impact on teachers' awareness of the types of difficulties that very preterm children may present with and thus their ability to readily identify those children who have such problems in the classroom. Improving education professionals' awareness of the special constellation of cognitive and behavioural sequelae following preterm birth may therefore aid them in detecting inattention in the classroom and in providing appropriate support for very preterm children with these difficulties.

A significant increase in SDQ scores among very preterm children without SEN is a notable finding because even 1-point increases in total difficulties scores are associated with an increased risk of psychiatric disorders(22). Moreover, the significant excess of inattention is concerning as this is a key predictor of long-term academic attainment(9). Inattention symptoms have been associated with poor working memory in very preterm children (23, 24), and inattention and working memory are important factors influencing academic attainment in both preterm and general population samples(9, 25, 26). Routine screening for inattention in educational settings may therefore help in targeting the provision of SEN support and in identifying very preterm children with subtle, sub-clinical difficulties. The results of this study are thus useful for informing policy for screening and referral in this population.

In total, parents' and teachers' rated 21% of very preterm children with abnormal total difficulties scores and 23%-24% of very preterm children with difficulties that impacted on their daily living. Our results are thus similar to the ~25% prevalence of psychiatric disorders reported in various preterm populations(1, 27). Consistent with previous studies(5, 28, 29), teachers generally rated children with fewer difficulties than parents. Teachers' views of children's behaviours may be influenced by the school environment and by a different perspective arising from the observation of greater numbers of children. Given the known effects of report source bias(5, 30), we solicited ratings from both parents and teachers to provide multi-informant data.

The strengths of this study lie in the recruitment of a sample of very preterm children who were representative of the whole population. We used a validated rating scale to explore ADHD symptoms along separable dimensions to allow a more detailed exploration of the nature of these difficulties among very preterm children. The 18.3% prevalence of SEN

among the term-born controls is remarkably similar to the 18.8% prevalence of SEN in the general population (31), providing assurance that our control sample was representative of the general population in terms of academic and behavioural difficulties. Children with significant disabilities and those attending special schools were excluded, and therefore our findings may underestimate the true prevalence of behaviour problems and SEN in the very preterm population. Although the classification of SEN differs between education systems, there is cross-cultural consistency in behavioural outcomes across preterm and low birthweight populations(32). Thus, the potential for very preterm children with inattention to be missed in school is likely to be universal and warrants further investigation.

Conclusion

ADHD symptoms in very preterm children are associated with a core deficit in inattention. Given the constellation of behavioural outcomes following preterm birth, very preterm children with inattention may not be readily identified as having problems in the classroom. If such problems are undetected these may have a detrimental impact on very preterm children's learning and attainment at school. Enhancing teachers' awareness of the behavioural outcomes of this vulnerable population and screening for inattention may be beneficial in identifying very preterm children with subtle difficulties that may otherwise go undetected.

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Authors contributions:

1) Ellen Brogan contributed to data entry, analysis and interpretation, drafted the manuscript and approved the submitted version. 2) Lucy Cragg conceptualised and designed the study, revised the manuscript for intellectual content and approved the submitted version. 3) Camilla Gilmore conceptualised and designed the study, revised the manuscript for intellectual content and approved the submitted version. 4) Neil Marlow conceptualised and designed the study, revised the manuscript for intellectual content and approved the submitted version. 5) Victoria Simms acquired the data, contributed to data analysis and interpretation, revised the manuscript for intellectual content and approved the submitted version. 6) Samantha Johnson conceptualised and designed the study, revised the manuscript for intellectual content and approved the submitted version.

What is already known about this topic:

- Children born very preterm are at increased risk for poor mental health outcomes, especially ADHD.
- It has been suggested that inattention is a core deficit among very preterm children with ADHD symptoms.
- Inattention is a key predictor of poor performance at school.

What this study adds:

- Very preterm children's ADHD symptoms are underscored by a core deficit in inattention.
- Among children without identified special educational needs, very preterm children had significantly higher levels of inattention than their term-born classmates.
- Raising teachers' awareness of inattention problems may enable them to identify very preterm children who may benefit from educational intervention.

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Table 1. Characteristics of children and their mothers who participated in the study.

Characteristic	Controls n=76	Very Preterm n=112	<i>p</i>
Gestational age (weeks), median (IQR)	-	28.6 (1.9)	-
Birthweight (g), mean (SD)	-	1218 (362)	-
Male sex, n (%)	40 (53%)	62 (55%)	0.7
Age at assessment (years), mean (SD)	9.5 (0.7)	9.7 (0.7)	0.09
Mothers age (years), mean (SD)*	40.1 (6.0)	40.3 (5.5)	0.8
Index of Multiple Deprivation tertile**:			0.06
High deprivation	37 (49%)	43 (37%)	
Middle deprivation	18 (24%)	20 (18%)	
Low deprivation	20 (27%)	49 (45%)	
Socio-occupational class:			0.6
Professional & managerial	25 (33%)	40 (36%)	
Intermediate & technical	27 (36%)	30 (27%)	
Routine and semi-routine	6 (8%)	12 (11%)	
Never worked/ unemployed	8 (11%)	18 (16%)	
<i>Not known</i>	10 (13%)	12 (11%)	
Maternal highest level of education:			0.8
Less than degree	46 (61%)	72 (64%)	
Degree or higher	20 (26%)	28 (25%)	
<i>Not known</i>	10 (13%)	12 (11%)	

*Control= 64, Very preterm= 95; ** Control= 75

Table 2: SDQ and ADHD Rating Scale scores for very preterm children and term-born controls adjusted for IMD tertile.

Measure	Control Mean (SD)	Very preterm Mean (SD)	Adjusted Mean difference (95% CI) ^a	p	Control n (%) abnormal	Very Preterm n (%) abnormal	Adjusted RR (95% CI) ^a	p
Strengths and Difficulties Questionnaire: PARENT RATING (Control n=65; Very preterm n=101)								
Emotional*	1.9 (2.2)	2.3 (2.4)	0.3 (-0.4 to 1.1)	0.4	8 (12%)	20 (20%)	1.6 (0.7 to 3.6)	0.2
Conduct	1.0 (1.4)	1.7 (1.7)	0.6 (0.1 to 1.1)	0.03	4 (6%)	12 (12%)	1.7 (0.5 to 5.3)	0.4
Peer	1.2 (1.5)	1.7 (2.1)	0.4 (-0.3 to 1.0)	0.3	5 (8%)	16 (16%)	1.9 (0.7 to 5)	0.2
Hyperactivity/inattention	2.7 (2.4)	4.3 (2.9)	1.5 (0.6 to 2.4)	0.001	4 (6%)	26 (26%)	4.0 (1.4 to 11.4)	0.009
Total difficulties*	6.7 (5.4)	9.9 (7.3)	2.6 (0.5 to 4.7)	0.01	5 (8%)	16 (16%)	1.9 (0.7 to 5.2)	0.2
Impact**	0.4 (1.5)	0.9 (1.7)	0.4 (-0.1 to 0.9)	0.1	5 (8%)	23 (23%)	2.8 (1.1 to 7.3)	0.03
Strengths and Difficulties Questionnaire: TEACHER RATING (Control n=71; Very preterm n=97)								
Emotional	1.2 (1.7)	2.0 (2.4)	0.7 (0.0 to 1.4)	0.04	2 (3%)	10 (10%)	3.5 (0.8 to 15.7)	0.06
Conduct	0.5 (1.1)	0.6 (1.1)	0.1 (-0.3 to 0.4)	0.8	2 (3%)	3 (3%)	1.3 (0.2 to 8.7)	0.8
Peer	0.9 (1.2)	1.4 (2.1)	0.4 (-0.1 to 1.0)	0.2	1 (1%)	10 (10%)	6.4 (0.7 to 52.7)	0.08
Hyperactivity/inattention	2.0 (2.8)	3.2 (2.6)	1.0 (0.2 to 1.8)	0.02	8 (11%)	13 (13%)	1.1 (0.5 to 2.5)	0.9
Total difficulties	4.7 (4.8)	7.2 (6.0)	2.2 (0.5 to 3.9)	0.01	2 (3%)	11 (11%)	3.5 (0.8 to 15.5)	0.09
Impact***	0.1 (0.4)	0.8 (1.3)	0.6 (0.3 to 1.0)	<0.001	2 (3%)	22 (24%)	7.7 (1.8 to 32.1)	0.005
Du Paul ADHD Rating Scale IV: PARENT RATING (Control n=65; Very preterm n=102)								
Inattention	4.3 (4.6)	7.7 (6.8)	3.3 (1.4 to 5.3)	0.001	3 (5%)	23 (23%)	4.8 (1.4 to 16.0)	0.01
Hyperactivity	3.4 (4.0)	5.1 (5.5)	1.6 (-0.0 to 3.2)	0.05	4 (6%)	12 (12%)	2.1 (0.6 to 6.9)	0.2
Du Paul ADHD Rating Scale IV: TEACHER RATING (Control n=71; Very preterm n=98)								
Inattention	3.0 (4.7)	6.6 (6.8)	3.2 (1.3 to 5.0)	0.001	0 (0%)	1 (1%)	-	-
Hyperactivity	2.1 (4.1)	2.6 (4.0)	0.4 (-0.9 to 1.6)	0.6	2 (3%)	1 (1%)	0.4 (0.0 to 5.1)	0.5

Bold p values denote significance at p<0.05 level. *Very preterm= 100; ** Control n= 64; *** Control= 70, Very preterm= 93

Table 3: SDQ and ADHD Rating Scale scores for children without identified special educational needs adjusted for IMD tertile.

	Control Mean (SD)	Very Preterm Mean (SD)	Adjusted Mean difference (95% CI) ^a	p	Control n (%) abnormal	Very Preterm n (%) abnormal	Adjusted RR (95% CI) ^a	p
Strengths and Difficulties Questionnaire: PARENT RATING (Control n=52; Very preterm n=52)								
Emotional	1.8 (2.0)	1.6 (2.0)	-0.3 (-1.1 to 0.5)	0.4	5 (10%)	6 (12%)	1.1 (0.3 to 3.5)	0.9
Conduct	0.7 (1.1)	1.4 (1.5)	0.6 (0.1 to 1.1)	0.02	2 (4%)	5 (10%)	1.8 (0.3 to 9.6)	0.5
Peer	1.1 (1.3)	1.0 (1.5)	-0.2 (-0.7 to 0.4)	0.5	3 (6%)	4 (8%)	1.3 (0.3 to 5.4)	0.7
Hyperactivity/inattention	2.0 (2.0)	3.1 (2.3)	0.9 (0.1 to 1.8)	0.03	1 (2%)	5 (10%)	4.6 (0.6 to 34.8)	0.1
Total difficulties	5.5 (4.3)	7.2 (5.3)	1.1 (-0.8 to 2.9)	0.2	2 (4%)	3 (6%)	1.2 (0.2 to 6.9)	0.9
Impact [*]	0.1 (0.5)	0.3 (0.9)	0.1 (-0.2 to 0.4)	0.4	2 (4%)	5 (10%)	1.9 (0.4 to 8.9)	0.4
Strengths and Difficulties Questionnaire: TEACHER RATING (Control n=57; Very preterm n=55)								
Emotional	1.1 (1.6)	1.3 (1.8)	0.1 (-0.6 to 0.7)	0.8	2 (4%)	1 (2%)	0.4 (0.0 to 3.5)	0.4
Conduct	0.4 (0.9)	0.5 (1.1)	0.1 (-0.3 to 0.5)	0.7	1 (2%)	2 (4%)	2.8 (0.3 to 27.7)	0.4
Peer	0.8 (1.2)	0.8 (1.7)	-0.1 (-0.7 to 0.4)	0.7	1 (2%)	2 (4%)	1.3 (0.4 to 4.2)	0.7
Hyperactivity/inattention	1.3 (2.1)	2.4 (2.4)	1.0 (0.1 to 1.9)	0.02	2 (4%)	5 (9%)	2.4 (0.5 to 10.7)	0.3
Total difficulties	3.7 (4.1)	5.1 (5.0)	1.1 (-0.7 to 2.7)	0.2	1 (2%)	3 (6%)	2.8 (0.4 to 21.5)	0.3
Impact ^{**}	0.0 (0.2)	0.2 (0.8)	0.1 (-0.1 to 0.4)	0.2	0 (5%)	3 (6%)	-	-
Du Paul ADHD Rating Scale IV: PARENT RATING (Control n=52; Very preterm n=52)								
Inattention	3.2 (3.8)	4.9 (5.0)	1.8 (0.5 to 3.5)	0.04	1 (2%)	4 (8%)	4.6 (0.6 to 38.0)	0.2
Hyperactivity	2.9 (3.7)	3.0 (3.4)	-0.0 (-1.4 to 1.4)	1.0	3 (6%)	2 (4%)	0.7 (0.1 to 5.0)	0.7
Du Paul ADHD Rating Scale IV: TEACHER RATING (Control n=57; Very preterm n=56)								
Inattention	1.7 (3.2)	3.9 (4.6)	1.9 (0.4 to 3.4)	0.01	0 (0%)	0 (0%)	-	-
Hyperactivity	1.4 (3.1)	2.0 (3.8)	0.4 (-0.9 to 1.8)	0.5	2 (4%)	0 (0%)	-	-

Bold p values denote significance at p<0.05 level. *Control= 51, Very preterm n=51; ** Very preterm=52.

Figure caption

Figure 1. Mean difference (95% confidence interval) in z-scores for teacher- and parent-rated inattention and hyperactivity/impulsivity symptoms between very preterm children and term-born controls adjusted for socio-economic deprivation. Figure 1a shows data for all children. Figure 1b shows data for children without identified special educational needs (SEN). Higher z-scores indicate a higher level of symptoms in each domain.