Modelling social, emotional and behavioural development in the first three years of school: what impact do schools have?

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2 Author's Declaration

I declare that, except where explicit reference is made to the contribution of others, that this dissertation is the result of my own work and has not been submitted for any other degree at the University of Glasgow or any other institution.

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Marryat, L., Thompson, L., Minnis, H., Wilson, P., 2015, *Exploring the social, emotional and behavioural development of preschool children: is Glasgow different?* International Journal for Equity in Health, 14:3

Marryat, L., Thompson, L., Minnis, H., Wilson, P. 2014, *What is the effect of social isolation on social and emotional development in Pre-schoolers?* BMC Psychology, 2:44

Marryat, L., Thompson, L., White, J., McClung, M., & Wilson, P. 2014, *Parenting Support Framework Evaluation: Final Report*, University of Glasgow. http://www.gla.ac.uk/media/media_374977_en.pdf

Marryat, L., Thompson, L., White, J., McClung, M., & Wilson, P. 2012, *The Evaluation of the Parenting Support Framework in Glasgow City: Year 1 Report*, University of Glasgow. http://eprints.gla.ac.uk/99521/

Mabelis, J. & **Marryat, L.** 2011, *Parental service use and informal networks in the early years*, Scottish Government, Edinburgh. http://www.scotland.gov.uk/Publications/2011/05/25092504/0

Bradshaw, P., **Marryat, L.,** Corbett, J., Ferrandon, M., & Tipping, S. 2010, *Growing Up in Scotland Sweep 4 User Guide*, Scottish Centre for Social Research. http://www.esds.ac.uk/doc/5760/mrdoc/pdf/5760userguide_cohort1_sweep4.pdf (please note, this work was undertaken prior to the PhD, however data from this study have been used to carry out new secondary analysis in the PhD)

5.2 Published abstracts

Marryat, L., Thompson, L., Minnis, H., Wilson, P. 2014, Inequalities in the development of mental health problems in childhood: multilevel analysis of

routine teacher-rated individual data in Glasgow City, *Journal of Epidemiology and Community Health* 68:A21

White, JM., Barry, S., **Marryat, L.,** McClung, M., Thompson, L., Wilson, P. (2012) Assessing children's social and emotional wellbeing at school entry using the strengths and difficulties questionnaire, *Archives of Disease in Childhood* vol. 97

6 Summary

Social, emotional and behavioural aspects of development are key to children's overall development. A failure to develop normally in any one of these areas can have far reaching consequences, affecting the child's ability to learn and to develop relationships with peers, potentially leading to fewer educational qualifications, a lack of future employment, poverty and a range of other outcomes including difficulty forming relationships, mental health issues and increased criminal behaviour (Tremblay et al., 2004; Woodward & Fergusson, 2000; Ttofi, Farrington, & Lasel, 2012; Hodgins, Larm, Ellenbogen, Vitaro, & Tremblay, 2013; Pingault et al., 2013).

In Glasgow City, a large proportion of children live in disadvantaged circumstances, including living in households and areas suffering from multiple deprivation, living with parental substance misuse and witnessing domestic and community violence (Glasgow Centre for Population Health, 2013; Taulbut & Walsh, 2013). These risk factors can all impact on children's social, emotional and behavioural development (Margolin & Gordis, 2000a; Gennetian, Castells, & Morris, 2010; Chronis et al., 2003). Children also tend to be clustered in schools with other children who may share similar demographic characteristics and who have similar levels of difficulties, which may compound or ameliorate the individual's strengths or weaknesses.

This thesis aimed to explore the levels of children's social, emotional and behavioural difficulties at the start of Primary School (age 4-5) and at Primary 3 (age 7-8) in Glasgow city and to investigate the stability of these over time. Analysis was carried out using a brief behavioural screening questionnaire, Goodman's Strengths and Difficulties Questionnaire (SDQ)(Goodman, 2013b), which had been completed by nursery staff and class teachers. The thesis also aimed to examine whether Glasgow City is different in its levels of social, emotional and behavioural difficulties compared with other areas of Scotland and the UK. Clustering of difficulties within schools is analysed in order to explore the relationships between peer difficulties and demographics, individual difficulties over time and ultimately, whether schools have an effect on the development of social, emotional and behavioural difficulties during the first three years of school.

The results of this study indicate that, between preschool and P3, levels of Conduct Problems, Emotional Symptoms and Hyperactivity/inattention increased, whilst levels of abnormal Pro-social Behaviours decreased and Peer Relationship Problems remained relatively static. Both means and prevalence rates for children in Glasgow City demonstrated similar patterns to UK norms, though levels of Hyperactivity/inattention problems at P3 were higher than in UK 5-10 year olds.

Data from the Growing Up in Scotland study were used to investigate whether a 'Glasgow Effect' (i.e. an amount of variation that could not be explained solely by demographic differences in the population) existed in children's social, emotional and behavioural difficulties at preschool age. Children in the Glasgow sample did have higher rates of social, emotional and behavioural difficulties compared with children in the rest of Scotland. However, this difference in difficulties appeared be entirely accounted for by the difference in demographics within the populations in the different areas. There are various factors which might explain this: sampling issues, such as having to use a Greater Glasgow and Clyde sample rather than Glasgow City, may mask any Glasgow Effect, whilst it may be that differential attrition in the GUS cohort may mean that children with problems are missing from the sample. It could also be that sleeper effects are at work, which may emerge in the form of difficulties later in childhood, or that what we are seeing is a 'Scottish Effect' rather than a Glasgow Effect, given that most of the previous research in this area compared Glasgow with demographically similar English cities. At this stage however, it appears that results from Glasgow may be generalisable to other areas, once demographics are controlled for.

Multilevel modelling of Strengths and Difficulties Questionnaire (SDQ) data from Glasgow City schools was then used to explore what factors were associated with longitudinal increases in SDQ scores between preschool and P3. Results showed significant differences between schools in the unadjusted models, accounting for 11% of variance in change scores. The adjusted model found that having worsening social, emotional and behavioural difficulties in the first three years of school was associated with being male, being from a White-UK background, and having had Looked After status (been under the supervision of the state) by preschool. Being in a school with a small school roll was also associated with an increase in difficulties over this time. School effects were only reduced slightly in this final adjusted model, accounting for 9% of variance between schools, suggesting that variation in the development of social, emotional and behavioural difficulties may differ somewhat between schools during the first three years. It should be noted that numbers of pupils within schools were small in some cases, leading to wide confidence intervals and possibly reducing significance of the results.

Having social, emotional or behavioural problems at P3 (above the cut-off on the SDQ for likely difficulties) was also related to a range of factors. Again in the unadjusted model, there was a statistically significant difference in levels of difficulties between schools. The strongest predictor of such problems was having had an abnormal score at preschool. Also important was being male, having been Looked After by preschool and being in a school with a higher proportion of children eligible for free school meals, which is likely to be a proxy for income deprivation. However, once these characteristics were controlled for, there was no statistically significant difference between schools.

The ability to identify a group of children prior to the start of school who are at risk of continued social, emotional and behaviour difficulties raises questions about whether a preschool mental health screening test should be put in place. It would be hoped that this would allow children to access the support they need in order to optimise their development, with a suggestion that a universal screen for these types of problems could double or treble the traditionally low numbers of children receiving help (Goodman et al., 2000). However, there are also difficulties with a screening tool of this nature, including the potential for false identification of difficulties, the potentially negative impact of labelling children, the additional burden that this may place of services and finally the current lack of evidence around a potential effective intervention for children of this age (Goodman et al., 2000; Sayal et al., 2010; Wichstrom et al., 2012).

In conclusion, children in Glasgow City have similar prevalence rates of social, emotional and behavioural difficulties at preschool, compared with children in the rest of the UK, but these difficulties are markedly worse in Glasgow City by the third year of school. However, the difference in these scores may just be due to Glasgow City having a more disadvantaged population, which in turn impacts on levels of difficulties. Whilst schools were found to make a difference in relation to children moving up or down the spectrum of difficulties in the first three years of school, there was no evidence that schools contributed to the likelihood of children having an ‘abnormal’ score at P3, though again, this lack of significance could be related to the small numbers of pupils within some schools, as well as the over-riding impact of having difficulties earlier in life.

More research is required with larger numbers of students within schools in order to see if the lack of variance seen between schools at P3 is real or whether it is a sampling issue related to small numbers and therefore wide confidence intervals within schools. Qualitative work around the outliers and some of the unusual findings, e.g. that children in smaller schools appear to fare worse, would be beneficial in interpreting the findings. It would also be of great benefit to follow these children up to the next stage of data collection at P6, in order to explore what happens to children’s social, emotional and behavioural difficulties by the end of Primary school.

7 Introduction

This research aimed to explore the impact of schools on the social, emotional and behavioural development of children in their first three years of school in Glasgow City.

The study had the following four objectives:

1) To explore the prevalence of social, emotional and behavioural difficulties for children in Glasgow City at school entry and the changes that take place by Primary 3;
2) To investigate whether prevalence of such difficulties in Glasgow City are at a higher level than those in the rest of the UK and to explore the existence of a 'Glasgow Effect' in early childhood;
3) To analyse any impact that schools may have on the development of social, emotional and behavioural difficulties during the first three years of school;
4) To explore what other factors contribute to an increase in these difficulties between preschool and P3 and which factors ultimately lead to having an abnormal score at P3.

7.1 Why is it important?

Social, emotional and behavioural difficulties in childhood can have life-long consequences, such as poorer academic achievement, future mental health problems, increased criminality, risky sexual behaviours, poorer relationships and unemployment to name but a few (Hodgins et al., 2013; Nagin & Tremblay, 1999a; Pingault et al., 2013; Tremblay et al., 2004; Odgers et al., 2008; Fergusson & Woodward, 2000) . However, if identified early enough, there is evidence that some of these problems, or at least their impact, can be moderated through interventions which address some of the root causes and moderators, such as parenting and attachment (Barlow & Parsons, 2003). In order to make this as effective as we can, research needs to be conducted to identify which factors are pertinent in the development of social, emotional and behavioural difficulties in this age group.

Almost all children attend school, which makes it a key location at which to identify children in need of additional support and to provide services accordingly. Previous studies have reported that school is the most common access point to mental health services, followed by the youth justice system in adolescence (Farmer, Burns, Phillips, Angold, & Costello, 2003), which makes it an ideal place to screen children for such difficulties. Recent evidence suggests that as few as 5% of preschool aged children with mental health problems receive any help for these difficulties (Wichstrom et al., 2012). Studies of older children (aged 9-16) in the US suggest that 21.6% of children with both a psychiatric diagnosis and an impairment accessed speciality mental health services in the three months prior to interview (Burns et al., 1995). Fifty-seven percent of Looked After children (under the provisions of the Children (Scotland) Act 1995, 'Looked After Children' are defined as those in the care of their local authority) in a Scottish sample had likely difficulties on the Total Difficulties scale of the SDQ, however only 18% of Looked After children had seen a child psychologist or psychiatrist. The study found that children with mental health difficulties were no more likely to have seen a psychiatrist or psychologist than children without difficulties (Minnis, Everett, Pelosi, Dunn, & Knapp, 2006). It seems important therefore that we find a way of accurately identifying these children and try to get them any additional support that they need.

Previous research has indicated that mental health difficulties are frequently associated with adversity in early childhood, including poverty, being in care, and witnessing violence (Costello, Keeler, & Angold, 2001; Gershoff, Aber, Raver, & Lennon, 2007a; Ford, Vostanis, Meltzer, & Goodman, 2007a; Margolin & Gordis, 2000a). Glasgow City has a distinct demography in Scotland and the UK, suffering from high rates of unemployment, poverty and violence (Glasgow Centre for Population Health, 2013). It has a health profile to match, gaining it the title of the ‘sick man of Europe’. However, little research exists on the effect of this on children growing up in Glasgow City. It could be that children in Glasgow City have higher levels of social, emotional and behavioural difficulties, compared with children in the rest of Scotland and the UK. It is therefore important to establish the prevalence of social, emotional and behavioural difficulties in Glasgow City, and to compare this with national norms. The work is in part inspired by the research of Clyde Hertzman and colleagues in Canada, who developed a tool called the Early Development Instrument for assessing child development at a population level and translating this into policy actions. Hertzman's team concluded that:

'The value of an instrument that collects data on the developmental status of young children in a way that is feasible, reliable, and valid for populations thus might not only create a more profound understanding of child development, and provide better grounds for prevention and intervention, but it might also increase public ownership of the issue, because results are based on all children in a given community, rendering the data more apt for translation into practice and policy' (Guhn, Janus, & Hertzman, 2007).

Alongside describing the prevalence of social, emotional and behavioural difficulties in Glasgow City, this study also intended to explore which factors may make a difference to the development of social, emotional and behavioural difficulties. Further to individual child characteristics, the study made explicit reference to school-level variables. There has been much debate about whether schools can make a difference to child development, above the impact of the characteristics of children entering the school. In the last 30-40 years, a range of studies such as the London studies of school effectiveness and Project STAR in Tennessee have attempted to tackle this question, with often contradictory results. The major commonality to both of these studies was the agreement that schools *can* make a difference to child outcomes (Finn & Achilles, 1999; Rutter & Maughan, 2002). Although the primary focus has been on academic gains in such research, there has also been some evidence produced around the development of behavioural problems and, to a lesser extent, social difficulties. The present study provided an exciting opportunity to advance our knowledge of the development of social, emotional and behavioural difficulties in the first three years of school though exploring school effects, using population level routine monitoring data. The findings should make an important contribution to the field of educational psychology by contributing to our understanding of this early development of mental health problems. This study is important to help Glasgow City Education Services, and educationalists and psychologists beyond this, to understand the prevalence of social, emotional and behavioural difficulties in the first few years of school, in a highly disadvantaged geography, and to understand the factors contributing to poorer and better scores. The knowledge gained may help to determine the point at which intervention should occur, in order to give children the best possible chances in school and beyond, and to identify, and therefore be able to potentially target, children who are likely to continue to have substantial difficulties. The study offers some important insights into where schools are doing better in helping children develop, which may direct education services to improving schools which are performing not so well. Ultimately this study is about understanding the specific problems facing children in the first few years of school and helping them to get the best start in life that they can.

8 Background

8.1 The social, emotional and behavioural development of children in early to middle childhood

8.1.1 What do we mean by social, emotional and behavioural difficulties in early to middle childhood?

In order to investigate what is meant by social, emotional and behavioural difficulties, we must first address what is 'normal' social, emotional and behavioural development of children. A primary concern of developmental research to date has been to explain patterns of development and to explore what drives change throughout childhood. Whilst some studies have focused on natural processes of maturation in children's development, others have emphasised the environmental context and the impact that this may have on the developing child. More recently these different theoretical backgrounds have been drawn together to explain normal and abnormal development. The pathology of social, emotional and behavioural development tends to be looked at from two broad angles: internalising symptoms, which include emotional functioning such as depression and anxiety, and externalising behaviours, such as conduct or behavioural difficulties and hyperactivity. However, both areas have affective and behavioural elements, and furthermore, there is substantial overlap between the two (Zahn-Waxler, Klimes-Dougan, & Slattery, 2000). The majority of normally developed children will not experience substantial difficulties in any of these areas for any length of time. At certain ages however, children will tend to be more aggressive or more hyperactive, for example, as part of their natural development. Multi-cohort longitudinal analyses of normative aggressive and delinquent behaviour found that both aggressive and delinquent behaviours declined between the ages of 4 and 18 (Stanger, Achenbach, & Verhulst, 1997; Bongers, Koot, Van Der Ende, & Verhulst, 2003), with boys starting with a higher level of problems and declining more rapidly than girls. In contrast, internalising symptoms have been found to be generally stable in the population between ages 5 and 12 , though other studies have found an increase in symptoms in girls up to the age of 18, particularly for somatic complaints and being withdrawn (Bongers et al., 2003). Attentional problems in the normative population have been found to increase up to the age of ten and then decrease from age eleven, whilst social problems have been evidenced to increase up to age nine and then decrease from age ten (Bongers et al., 2003).

However, for some children, they will experience heightened difficulties in one or more of these areas. There are different levels of difficulty. At the highest level, children may be diagnosed with a mental health disorder, determined by a clinical diagnosis. The Diagnostic and Statistical Manual of Mental Disorders Version Five (DSM-V) defines mental disorders through a variety of concepts, including distress, dyscontrol (the inability to control one's behaviour), disadvantage, disability, inflexibility, irrationality, syndromal pattern, etiology and statistical deviation. The disorder cannot just be an expected reaction to a recent event (e.g. the death of a loved one) nor simply deviant behaviour, unless the deviance is a symptom of dysfunction in the individual (Stein et al., 2010). In contrast, research studies are often concerned with measures of reported difficulties, using measures such as the SDQ. Whilst some children picked up within such measures will meet diagnostic criteria, there will also be children who have difficulties in various areas but who do not meet the clinical threshold. These children are termed as subclinical or subthreshold. This broader measure takes a dimensional approach to the classification of mental health disorders, taking into account age-of-onset, severity, symptomology, impairment and a range of other characteristics, as oppose to a categorical approach which classifies a person as having a disorder or not. The current study also uses a methodology which is dimensional rather than categorical, looking at various levels of severity and combinations of symptoms. There are benefits to taking this approach when exploring mental health disorders: there is greater sensitivity to individual differences – for example, there may be clinically significant differences among those who fall above, and those who fall below, a clinical cut-off for diagnosis. Furthermore, more sensitive measures allow for exploring differences over time (Chmura Kraemer, Noda, & O'Hara, 2004; Helzer, Kraemer, & Kreuger, 2006). It has been argued that, while categorical criteria are important for determining which patients are ill enough to justify treatment, dimensional criteria are far better suited to understanding the relationships between biological and social variables, as is the case in the current study (Goldberg, 2000).

8.1.2 Prevalence of social, emotional and behavioural difficulties

In the 2004 Mental Health Survey of Great Britain Children and Young People survey, 1 in 10 children aged 5 – 16 in the UK were reported to have a clinically diagnosed mental disorder, including 4% with an emotional disorder (anxiety or depression), 6% with a conduct disorder and 2% with a hyperkinetic disorder (Green, McGinnity, Meltzer, Ford, & Goodman, 2005). This study used the Development and Wellbeing Assessment (DAWBA), which is an elaboration of the SDQ. Patterns in Scotland were reported to be similar to the rest of the UK. The Growing Up in Scotland study used the SDQ to explore parent-reported social, emotional and behavioural difficulties at entry to Primary school. The results of this study show that scores were classified as 'abnormal' for 5% of children on the Total Difficulties score (which is a summation of the Conduct Problems, Hyperactivity/Inattention, Emotional Symptoms and Peer Relationship Problems scales), with a range of 2% having abnormal scores on the Prosocial scale to 12% on the Conduct Problems scale (Bradshaw & Tipping, 2010). To date there have been no regional variations found between Scotland and other countries within the UK, in relation to social, emotional and behavioural difficulties. The Millennium Cohort Study found that children in Scotland had lower mean scores on the SDQ, compared with those from other UK regions, however, when this was investigated further, the variation was entirely explained by the different demographics of families in the cohort in Scotland (Dex, 2008). Further work around regional variations in adult psychiatric morbidity has also found that regional variation between UK countries is explained by differences in demographics of the citizens within the respective areas, rather than the impact of living in a particular country per se (Duncan, Jones, & Moon, 1995). There has, however, been unexplained variation in adult health and mental health outcomes related to living specifically in Glasgow City (Landy, Walsh, & Ramsey, 2010). This 'Glasgow Effect' is discussed later in this chapter.

Various studies have attempted to ascertain prevalence rates of different disorders: rates of 5.7 to 17.7% were found for anxiety disorders in children (Angold & Costello, 1995), with rates of 5-10% cited in a review of prevalence rates of ADHD in school-children (Scahill & Schwab-Stone, 2000). Major depression affects 3-5% of children (Bhatia & Bhatia, 2007), while preschoolers have been found to have depression rates of 5.7% in Germany (aged 5-7) (Fuhrmann, Equit, Schmidt, & von Gontard, 2014) and 1.2% in Spain (aged 3-5) (Domenech-Llaberia et al., 2009). Prevalence of Conduct Disorder has been estimated between 0.6% and 4.8% in girls and between 1.7% and 13.2% in boys (Maughan, Rowe, Messer, Goodman, & Meltzer, 2004).

Countries out with the UK report different levels of social, emotional and behavioural difficulties. The US is frequently cited as having one of the highest prevalence levels of mental health difficulties in the world, with almost a quarter of the adult population having a mental health problem (The WHO World Mental Health Survey Consortium, 2004). These elevated rates of mental health problems appear to be mirrored in the child population of the US. This highlights the importance of the current study gaining a clearer picture of all children who need additional support, including those who are subthreshold. Noam and colleagues found that 20% of children that they studied in a US inner city middle school had internalising or externalising problems. Furthermore, they also pointed out that there were large proportions of children who were not clinically ill, but who were in need of extra support to help their emotional and social development reach its full potential (Noam & Hermann, 2002). A further US study using the SDQ combined with DSM-IV diagnostic concepts reported prevalence rates of 12.5% (Bourdon, Goodman, Rae, Simpson, & Koretz, 2005), whilst Costello and colleagues found that among 9-16 year olds, 13.3% would have a disorder at any one point, but over three years, 36.7% of children would have a at least one psychiatric disorder (Costello, Mustillo, Erkanli, Keeler, & Angold, 2003). In contrast, Norway have some of the lowest rates of mental health difficulties, estimating the prevalence of any psychiatric disorder in preschool aged children at 7.1% (excluding encopresis which alone accounted for 6.4% and was thought to be related to Norwegian laxity with toilet-training rather than a psychiatric problem), and recording teacher-rated prevalence rates of 7% for 8-10 year olds and combined teacher and parent-rated levels of 6.1% (Heiervang et al., 2007; Wichstrom et al., 2012).

In relation to other countries, in Denmark, teacher-rated levels of overall difficulties on the SDQ for 5-7 year old children were 7.5% for boys and 4% for girls, whilst for 10-12 year olds these levels were 10% and 4.4%. It should be noted though that parent-rated problems were consistently lower than teacher-rated levels (Goodman, 2013a; Skovgaard et al., 2005). Brazil shows prevalence rates of DSM-IV disorders close to that in the US – 12.7% of 7-14 year olds having mental health problems (Fleitlich-Bilyk & Goodman, 2004). Spain have produced prevalence rates using the SDQ for 4 year old children, in which teacher-rated levels sit at 5.9% overall. However, as is clear from the evidence cited, it is difficult to compare international prevalence rates on child social, emotional and behavioural difficulties, due to the use of different ages of children, different measures and, even within the same measure, different cut-offs, subtle differences in the language used in translation and the use of different people to rate the scales (i.e. teachers and parents).

8.1.3 Prevalence of social, emotional and behavioural difficulties at different ages

Social, emotional and behavioural difficulties have different prevalence levels over the course of childhood. Overall, levels of difficulties, and particularly those meeting diagnostic criteria, increase in the general population the older children get (e.g., (Skovgaard et al., 2005; Green et al., 2005; Fleitlich-Bilyk & Goodman, 2004)). For example, in the British Child and Adolescent Mental Health Survey, prevalence of a mental disorder was 12% in 11-16 year olds compared with 8% for 5-10 year olds (Green et al., 2005). However, research following-up children regularly between the ages of 9 and 16, suggests that these wide age bands may hide more subtle differences between years: the overall prevalence of disorders found was highest in 9-to 10-year olds, falling to the lowest levels at age 12, before gradually increasing again (Costello et al., 2003).

Different disorders/ types of symptoms follow different trajectories. In terms of internalising disorders, such as depression and anxiety, levels have generally been found to be low across early to middle childhood (Toumbourou, Williams, Letcher, Sanson, & Smart, 2011; Waxler, Dougan, & Slattery, 2000). Waxler reported rates of depression of less than 1% in preschoolers, 2% in school-aged children and rates of 2-8% in adolescence, with a dramatic increase shown between the ages of 15 and 18 (Waxler et al., 2000). In contrast, in a community sample of children in Australia, researchers explored internalising symptoms measured at eight time points between ages 3 and 15 and saw a steady decline in mean scores of internalising behaviours. However, they identified a specific group of girls with increasing trajectories of internalising behaviours, which predicted depression scores in late adolescence (Toumbourou et al., 2011). A further study following boys between the ages of two and ten, found that four distinct trajectories could be seen in the development of anxiety disorders: low, low-increasing, high-increasing and high-declining. Evidence showed that shyness in the early years accounted for much of the variation between high and low levels of anxiety. This was exacerbated in both groups over time by maternal depression and maternal negative control (Feng, Shaw, & Silk, 2008). It is worth noting, however, that those rating behavioural (and other) difficulties are likely to be using their experience of children of a particular age as the reference group for reporting difficulties. The importance of this is that difficulties at certain ages, for example behavioural problems in two year olds, may be down-played as this is simply seen as being ‘normal’ at a particular age. There may be a more pronounced pattern of difficulties therefore than reported.

Peer relationship problems demonstrate an increasing prevalence for most children during early to middle childhood, which is consistent with the view that, as children age, they spend more time interacting with peers and therefore are more likely to experience negative peer experiences (Barker, Boivin, & Brendgen, 2008; Biggs et al., 2010). Studies have shown an overall increase in the likelihood of being a victim of bullying between the ages of 3 and 7 years old, as reported by teachers and children (Barker et al., 2008), with further increases between the third and fifth years of school (Biggs et al., 2010). However, prevalence of bullying in the US was higher among children in the 6th to 8th Grades, compared with older children in the 9th and 10th Grades (Nansel et al., 2001).

In relation to externalising behaviours, longitudinal studies following children from infancy have found that a majority of children display some kind of aggression towards family or friends in infancy, but most will learn ways to regulate the use of physical aggression before the start of school. Tremblay and colleagues have produced a body of evidence around such trajectories using data from Canada. Evidence showed that boys’ levels of conduct problems were either stable or declining from age six onwards (Nagin & Tremblay, 2001). A further study identified two groups of children who had either a moderate increasing trajectory of aggression, or a high-risk trajectory. The latter was linked to a series of adverse circumstances in childhood, such as living in a low income household, family dysfunction and coercive parenting, as well as having a mother with a history of anti-social behaviour (Tremblay et al., 2004). Importantly, analyses of trajectories of physical aggression have found no evidence of a late onset of such problem behaviours, suggesting that children on problematic aggression trajectories can be identified by the start of school (Brame, Nagin, & Tremblay, 2001).

Anti-social behaviour trajectories have been argued to show both a life course persistent pathway and an adolescent onset trajectory, both for boys and girls. Girls were more likely than boys to be in the adolescent-onset group in relation to anti-social behaviour (17.4% of girls vs. 12.3% of boys), though the majority of children had either persistent low levels of anti-social behaviour or declining levels of anti-social behaviour from mid-childhood (these two groups representing approximately three-quarters of children) (Odgers et al., 2008).

Hyperactivity disorders follow similar patterns to conduct problems, showing decreasing frequencies as a function of age (Shaw, Lacourse, & Nagin, 2005). A study of six to fifteen year old boys showed that the majority of boys followed a low or moderately declining trajectory of hyperactivity with just 6% following a chronically high hyperactivity trajectory (Nagin & Tremblay, 1999b). The main difference from that of conduct and aggression problems is the slightly later onset of hyperactivity disorders: the peak age of diagnosis of hyperactivity disorders is at 7-9 years old (McGee, Williams, & Feehan, 1992), though again this could be related to age referencing, with hyperactivity in younger children being seen as developmentally 'normal'.

8.1.3.1 Stability of individuals' social, emotional and behavioural difficulties over time

In terms of stability of difficulties, it has been suggested that children with a history of psychiatric diagnosis are three times more likely to have a subsequent psychiatric diagnosis, compared with children with no history of mental health problems (Costello et al., 2003). It is worth pointing out that there are two types of continuity in mental health problems: homotypic and heterotypic. Homotypic continuity, which most studies including the current one focus on, is the continuity of a disorder which has a similar manifestation across the years for a child; whilst heterotypic 'suggests an underlying vulnerability to psychiatric illness that may expose children to different disorders at different ages or an underlying disorder that has different manifestations at different ages' (Costello et al., 2003).

Focusing on homotypic continuity, some conditions appear to be more stable over time than others. Aggression has been found to be relatively stable throughout childhood and adolescence (Pouwels & Cillessen, 2013b; Moskowitz, Schwartzman, & Ledingham, 1985). Tremblay found that children with chronic Oppositional Defiant Disorder could be identified as early as kindergarten age (Tremblay, Duchesne, Vitaro, & Tremblay, 2013). Both problem behaviours and social competence have been found to remain stable in the first two years of school, according to both mother and teacher-rated reports (National Institute of Child Health and Human Development Early Child Care Research Network, 2003). Furthermore, recent evidence suggests that, for children who enter school with heightened levels of aggression, 65% had behavioural problems two years later (Kim-Cohen et al., 2005). Other evidence using teacher-reports of externalising behaviours found that these increased between kindergarten and 3rd Grade. This is counter to parent-rated trajectories of the same measure, which tend to decrease over time (Silver, Measelle, Armstrong, & Essex, 2005).

Furthermore, issues such as victimization and bullying demonstrate inconsistent results with regards to the stability of difficulties over childhood. Whilst some studies have evidenced peer relationship problems to be far less stable in early (Barker et al., 2008) and middle childhood (Pouwels & Cillessen, 2013a), other studies have produced evidence of a high level of stability in bullying and victimisation, though only for boys: Finnish evidence shows a strong degree of continuity of victimisation and bullying, respectively between ages 8 and 16, however the same did not hold true for girls, where bullying showed very little stability and only half of girls who were victimised at age 16 were also victims at age 8 (Sourander, Helstelñ, Helenius, & Piha, 2000). There is also a suggestion from some studies that bullying is more stable than being a victim, and that both bullying and victimisation are more stable for boys than for girls (Camodeca, Goossens, Terwogt, & Schuengel, 2002).

Among 9-16 year olds, the most stable conditions were found to be panic disorders, psychosis, verbal tics, encopresis (when toilet-trained children continue to soil their clothes) and enuresis (inability to control urination – often nocturnal i.e. bedwetting). This study also found that girls, although having lower levels of disorders across the board, had the highest levels of continuity (Costello et al., 2003).

The stability of internalising symptoms, such as anxiety and depression, in early childhood continues to be a source of great debate. Internalising symptoms in preschool aged children has been found to be relatively stable (Perren, Stadelmann, von Wyl, & von Klitzing, 2007). Evidence focusing on children aged 2 to 11 years old reported that the majority of children followed fairly stable trajectories of internalising symptoms between these ages, however, there was a group of children whose symptoms decreased during early childhood and a group whose symptoms increased during late childhood (Sterba, Prinstein, & Cox, 2007). Recently, it has been argued that anxiety and depression cannot be distinguished from each other until adolescence (Wichstrom et al., 2012; Moffitt, Harrington, & Caspi, 2007). This view is backed by evidence which show that children who experienced anxious solitude and peer exclusion in preschool show relative stability in their difficulties five years later, and were also more likely to experience depressive symptoms at this point (Gazelle & Ladd, 2003). Further evidence suggests that children who are socially withdrawn in preschool are at risk of internalising problems at age 9-10 (Rubin, Hymel, & Mills, 1989). Moffitt explored the overlap of anxiety and depression in a longitudinal study in the first 32 years of life. Results showed that anxiety preceded depression in 32% of cases, whilst depression preceded anxiety in 37% of cases, with 72% of lifetime cases of Generalised Anxiety Disorder also experience Major Depressive Disorders, indicating that it may not just be in childhood that these two sets of internalising symptoms are difficult to untangle (Moffitt et al., 2007). Furthermore, it has been argued that the separation of depression and anxiety as discrete disorders was purely to create new licensing opportunities for the pharmaceutical industry (Shorter & Tyrer, 2003). The SDQ used in the current study contains depressive symptoms and anxiety-related symptoms in the same scale of Emotional Symptoms, so this overlap is taken account of.

Not only are there overlaps between anxiety and depression, but there are significant overlaps between other areas of social, emotional and behavioural difficulties during childhood. The following section explores further the overlap between different difficulties.

8.1.4 Comorbidity

Comorbidity is the presence of additional disorders alongside a primary diagnosis (Valderas, Starfield, Sibbald, Salisbury, & Roland, 2009). For the purpose of the current research (focused on screening questionnaires and therefore dealing with a more dimensional approach to mental health) comorbidity can be referred to more loosely as the overlap between difficulties. Comorbidity has been found to be high among social, emotional and behavioural difficulties: previous studies in the UK indicate that, of children with a DSM-IV diagnosis, 22% had two diagnoses, 5% had three, 2% had four and 0.4% had five disorders (Ford, Goodman, & Meltzer, 2003). Norwegian results are similar: at age 8-10, of Norwegian children who had a disorder of this nature on DSM-IV, 26% had at least one comorbid disorder: this ranged from 18% with an emotional disorder and 48% for behavioural disorders, to 78% for children with ADHD (Heiervang et al., 2007).

One of the strongest associations found between different disorders is between Attention Deficit Hyperactivity Disorder (ADHD) and behavioural problems (Heiervang et al., 2007; Ford et al., 2003; Costello et al., 2003; Kadesjouml, & Gillberg, 2001; Kadesjo & Gillberg, 2001). Indeed, one study went as far as to conclude that ‘pure’ ADHD (a persistent pattern of hyperactivity, impulsivity or inattention without behavioural problems) is rare, even in a community sample (Kadesjo & Gillberg, 2001). Ford et al. found that over half of children with ADHD had a comorbid behaviour disorder, in comparison with 27% of children with Conduct Disorder and 26% with Oppositional Defiant Disorder (ODD) who were also found to have a diagnosis of ADHD (Ford et al., 2003). Heiervang et al. found no significant association, however, between ADHD and emotional disorders (Heiervang et al., 2007).

Children diagnosed with Conduct Disorder at age five have been shown to have an increase of anti-social behaviour problems at the same age (Kim-Cohen et al., 2005) and there has been a correlation found between behaviour problems and emotional disorders at age 8-10 (Heiervang et al., 2007). Work with older children (aged 9-16) has suggested an association between depression and behaviour problems among girls but not boys (Costello et al., 2003).

In relation to emotional disorders, in a UK sample, children with depression were most likely to have an additional diagnosis (66% having a comorbid disorder). As discussed previously, there is a substantial overlap between anxiety and depression in childhood and beyond (Moffitt et al., 2007; Ford et al., 2003). Just over a quarter of UK children who had an anxiety disorder had a comorbid depression or anxiety disorder between the ages of 5 and 16 (Ford et al., 2003). Whilst some have argued that these two sets of difficulties separate at adolescence (Wichstrom et al., 2012), others have argued that there is substantial comorbidity in at least the first three decades of life (Moffitt et al., 2007).

It could be that we can only identify more 'global' problems in early to middle childhood. Gillberg and colleagues have termed such conditions as 'ESSENCE' – Early Symptomatic Syndromes Eliciting Neurodevelopmental Clinical Examinations. They argue that the co-existence of disorders such as ADHD, ODD and Autism Spectrum Disorder (ASD) is the norm rather than the exception in child psychiatry and that these children are often picked up through their lack of speech and language skills, sleep, social and behavioural problems, to name but a few. The authors argue that we need to be moving away from pigeon-holing children into a particular disorder, but rather that the child needs to be treated holistically (Gillberg, 2010).

This section has explored the prevalence, trajectories, stability and overlap of social, emotional and behavioural difficulties in childhood. The current literature reveals a complex picture even within normative development, with levels of difficulties peaking at different ages throughout childhood, the majority of which will resolve through maturation. For a group of children however, these difficulties will persist and may result in a psychiatric diagnosis. A number of studies have found substantial overlaps in difficulties at both the diagnostic and subthreshold levels. Indeed, it has been argued that in early childhood in particular it may be difficult and even unhelpful to distinguish between areas of problems. The next section goes onto explore the literature on the potential impact of experiencing such difficulties over the life course.

8.1.5 The lifelong consequences of social, emotional and behavioural difficulties in childhood

Social, emotional and behavioural difficulties during childhood are of concern, not simply due to the effect that they have in childhood, but to their association with a range of adverse outcomes in adolescence and beyond. Social, emotional and behavioural difficulties in childhood are associated with a range of mental health problems in adulthood. Overall, previous studies have reported that having social, emotional or behavioural difficulties in childhood is associated with having a psychiatric diagnosis in adulthood (Hofstra, Van Der Ende, & Verhulst, 2002). However, different areas of difficulties predict different outcomes, both in terms of adult mental health and other outcomes.

Depression in childhood has been associated with an increased risk of depression in adulthood (Copeland, Shanahan, Costello, & Angold, 2009; Harrington, Fudge, Rutter, Pickles, & Hill, 1990). A UK study which followed up a matched cohort of children with and without depression found that 18 years later adults who had depression as a child had odds 3.6 times higher of having a depressive episode after their 17th Birthday, 5.7 times higher of having a depressive episode after their 21st Birthday and 7.0 times higher of a major episode of depression after their 21st Birthday. In addition, previous studies have shown that children who experience depression go onto have a higher risk of any treatment of psychiatric disorder, being treated by a mental health professional or having medication prescribed for a psychiatric disorder. However, depression during childhood was not found to be predictive of any non-depressive psychiatric disorder during adulthood (Harrington et al., 1990). Furthermore, children who experience depression are more likely to have a higher Body Mass Index (BMI) (Pine, Goldstein, Wolk, & Weissman, 2001) and were more likely to have attempted suicide in adulthood (Harrington et al., 1994; Rao, Weissman, Martin, & Hammond, 1993). There has been considerably more research performed around adult outcomes for adolescents with depression. Depression at age 13, has been associated with increased odds in early adulthood of cigarette and alcohol use or dependence (Odds Ratio (OR) of 2.1 and 1.5, respectively), suicidal behaviour (OR 2.9), school failure (OR 1.8), a reduced likelihood of entering university (OR 0.6), recurrent unemployment (OR 1.8) and early parenthood (OR 3.7) (Fergusson & Woodward, 2002). In addition, adolescent girls who experience depression have a 24% increase in odds of being exposed to mild partner violence and a 24% increase in being exposed to moderate or severe partner violence in early adulthood (Lehrer, Buka, Gortmaker, & Shrier, 2006), though adolescent depression in girls was not associated with a higher BMI, poorer health or higher numbers of sexual partners at age 21 (Bardone et al., 1998).

Children who have experienced anxiety disorders in childhood have also been found to have higher rates of panic disorder, depression, social phobia, separation anxiety disorder, conduct disorder and generalised anxiety in early adulthood (Copeland et al., 2009; Pine, Cohen, Gurley, Brook, & Ma, 1998; Bittner et al., 2007; Goodwin, Fergusson, & Horwood, 2004). There is little evidence available on the impact of childhood anxiety on other (non-psychiatric) adult outcomes, though some evidence is available on the impact of adolescent anxiety disorders. Adolescent girls who had anxiety disorders were more likely to have a higher level of medical problems in early adulthood (Bardone et al., 1998). Other studies, however, suggest that internalising symptoms, such as anxiety and depression, do not predict later school achievement (Masten et al., 2005; Woodward & Fergusson, 2001), nor does anxiety in early adolescence predict substance or cigarette dependence, suicide attempts or early parenthood (Woodward & Fergusson, 2001).

Having experienced peer relationship problems as a child is associated with a range of adult psychiatric outcomes. Evidence around the associations between peer relationship problems and later outcomes have been mixed: whilst evidence has been found that peer rejection at age 11 predicts truancy, suspension and early school leaving (Kupersmidt & Coie, 1990; Woodward & Fergusson, 2000), other evidence suggests that peer rejection is only associated with truancy in late schooling, but not with other educational outcomes (DeRosier, Kupersmidt, & Patterson, 1994; Risi, Gerhardstein, & Kistner, 2003). Peer relationship problems may take different forms. Three specific elements of peer relationship problems are being a victim of bullying, a bully or both. These three elements demonstrate their own impacts on later psychosocial adjustment and outcomes in adulthood. Having been victimised in childhood has been reported to be associated with elevated rates of anxiety (Copeland gives increased odds of 2.7, whilst Sourander gives odds of 2.9 for males only), panic disorder (O.R. 3.1) and agoraphobia (O.R. 4.6) (Copeland, Wolke, Angold, & Costello, 2013; Gladstone, Parker, & Malhi, 2006; Goodwin et al., 2004; Sourander et al., 2007). Poorer self-reported adult health was also significantly associated with having been bullied as a child, even once other characteristics were controlled for (Allison, Roeger, & Reinfeld-Kirkman, 2009). Interestingly, having *been* bullied was associated with perpetrating violence in adulthood (O.R. 1.4) (Ttofi et al., 2012).

Being a bully during childhood was related to an increased risk of antisocial personality disorder (Copeland et al., 2013), as well as, for males, depressive (O.R. 3.0) and anxiety disorders (O.R. 3.6) (Sourander et al., 2007) . Having been a bully during childhood was also associated with violence (O.R 2.0) (Ttofi et al., 2012) and (for males only) substance use in early adulthood (Sourander et al., 2007). Research exploring the link between bullying in childhood and criminality has produced conflicting results. A meta-analysis by Ttofi and collagues concluded that the likelihood of offending behaviour had odds 2.5 times higher for those who had been bullies, compared with those who had not (Ttofi, Farrington, Loesel, & Loeber, 2011). In contrast, later results by Piquero and colleagues, found that, although male bullies did follow different trajectories of offending behaviour in adulthood, this difference was entirely accounted for by the difference in the individual and environmental risks that they were exposed to, thus the authors concluded that there was no effect of being a bully per se (Piquero, Connell, Piquero, Farrington, & Jennings, 2013).

Being both a victim and a bully has been associated with increased odds of depression in early adulthood (O.R 4.8), panic disorder (O.R. 14.5), agoraphobia in females only (O.R. 26.7) and an increased risk of suicide in males only (O.R. 18.5)(Copeland et al., 2013), as well as (for males only) with a higher risk of anti-social personality disorder (O.R. 6.8), anxiety disorders generally (O.R. 6.9) and psychotic disorder (O.R. 8.9) (Sourander et al., 2007).

It is notable that children with Autistic Spectrum Disorders (ASD), which are partly classified by impaired social interaction, particularly difficulties in forming peer relationships and friendships, and impaired social communication, are particularly at risk of peer rejection and isolation (Wing, Gould, & Gillberg, 2011). One previous study which used observation techniques to explore positive and negative includiong of children with ASD at elementary school found that negative inclusion included neglect or ignoring of the child, and rejection and scorn. However they also found demonstrations of positive inclusion, including befriending, demonstrating or helping with tasks and patiently correcting the child when they behaved inappropriately, suggesting that peer problems do not always prevent positive peer interactions for children with ASD (Ochs, Kremer-Sadlik, Solomon, & Sirota, 2001). It is also important to note when exploring results in the current study that children with ASD also have higher rates of other mental health difficulties, such as depression and hyperactivity, and thus any overlaps between peer relationship problems and other difficulties may be partly mediated by the presence of an ASD (Brereton, Tonge, & Einfeld, 2006).

There is a wealth of evidence linking externalising symptoms in childhood with a range of psychiatric disorders in later life (Reef, Diamantopoulou, Meurs, Verhulst, & Ende, 2011; Tremblay et al., 2004; Copeland et al., 2009; Pingault et al., 2013; Cötë, Tremblay, Nagin, Zoccolillo, & Vitaro, 2002). The impact of some externalising symptoms is complicated by there being an early onset and late onset type, each of which has different outcomes. The Diagnostic and Statistical Manual of Mental Disorders (DSM) has had a separate childhood-onset lifecourse-persistent subtype of Conduct Disorder (CD) (i.e. at least one Conduct Disorder criterion prior to age 10), alongside the adolescent-onset subtype (no CD criterion prior to age 10) since DSM-IV in 1994 (American Psychiatric Association, 1994). DSM-V continues with this distinction between subtypes, though extends the criteria to include patterns in emotional and interpersonal functioning (American Psychiatric Association, 2013). Children with childhood-onset type conduct disorders have different characteristic problems as well as having a different prognosis. Childhood-onset type is frequently characterized by severe family adversity, parental antisocial behaviour, greater genetic liability, perinatal complications, neurocognitive deficits, low IQ, hyperactivity, inattention, impulsivity, school difficulties, and peer difficulties as children. In contrast, adolescent-onset subtypes usually score within the normal range on these areas and are generally thought to be more greatly influenced by delinquent peers (American Psychiatric Association, 2013). In terms of lifelong outcomes, these subtypes also differ, with childhood-onset subtypes having relatively poorer outcomes (Moffitt, Caspi, Dickson, Silva, & Stanton, 1996).

Conduct Disorder during childhood and adolescence has been found to be related to antisocial personality disorder only (O.R 5.2), whilst Oppositional Defiant Disorder in childhood was related to depression in adulthood (O.R. 2.4) (Copeland et al., 2009). One recent study indicated that over 43% of young adults with depression had a history of conduct problems in childhood and early adolescence (Stringaris, Lewis, & Maughan, 2014). Overall, Conduct Disorder in childhood has been related to a range of adverse outcomes in adulthood. These include increased substance misuse (Fergusson, Horwood, & Ridder, 2007), poorer performance at school (Masten et al., 2005), violence, personality disorder, criminal convictions and a range of personal and work-life outcomes (Moffitt et al., 2008). In addition, teacher-rated conduct problems and hurtful and uncaring behaviours at age 6, have been found to predict criminal convictions at age 24 (Hodgins et al., 2013), while Conduct problems at age 8 in girls have also been found to increase the chances of teenage pregnancy by 5.3 times (Woodward & Fergusson, 1999). Conduct problems in adolescent girls have also been related to a higher level of medical problems, a poorer overall self-reported health rating, an increased number of sexual partners, increased tobacco and sexually transmitted diseases, poorer educational outcomes, increased rates of teenage pregnancy, juvenile offending and having been raped or sexually assaulted (Bardone et al., 1998; Fergusson & Woodward, 2000).

Hyperactivity and inattention symptoms have generally been found to decline over time, though this is often alongside increases in rates of other types of impairments. For example, Klein and Manuzza studied 100 hyperactive boys aged 6-12 and found that, although 43% met the ADHD diagnosis criteria ten years after baseline, only 8% met these criteria 16 years after baseline (Klein & Mannuzza, 1991). ADHD in childhood has been found to have no association with affective disorders in adulthood (Copeland et al., 2009). ADHD in childhood has, however, been associated with a range of negative outcomes in later life, including increased drug and alcohol use (Biederman, Wilens, Mick, Faraone, & Spencer, 1998), (Lee, Humphreys, Flory, Liu, & Glass, 2011), cigarette smoking (Wilens et al., 2011) and poorer educational outcomes (Frazier, Youngstrom, Glutting, & Watkins, 2007). There has been some suggestion however that the negative outcomes associated with attentional and hyperactivity problems in childhood are actually mediated by physical aggression and opposition problems, rather than as a result of hyperactivity/inattention per se (Nagin & Tremblay, 1999a). For example, recent studies have indicated that substance misuse is largely mediated by the association between attentional and conduct problems (Fergusson et al., 2007), whilst further results suggest that adult criminality and juvenile delinquency were associated with hyperactivity, but only when aggression and opposition are not accounted for in the models (Pingault et al., 2013; Nagin & Tremblay, 1999a).

This section explored the impact of different types of social, emotional and behavioural problems on later difficulties. There have been a number of longitudinal studies which have demonstrated associations between childhood social, emotional and behavioural difficulties and disorders and adult mental health problems. These include not only the continuation of the same difficulties e.g. depression in childhood and depression in adults, but also links between different types of problems, for example a strong association between childhood conduct problems and adult depression. Furthermore this section has shown that previous studies have reported on the impact of such difficulties in childhood and non-mental health outcomes in adulthood: many social, emotional and behavioural difficulties in childhood have been associated with having fewer qualifications, poorer job prospects, risky sexual behaviour and criminal behaviour in adulthood. The tremendous impact on the whole life course that has been demonstrated in this section has an economic cost attached to it, both in terms of treatment and loss of earnings. The next section explores the evidence which has been published on the economic cost of social, emotional and behavioural difficulties.

8.1.6 The economic cost of social, emotional and behavioural difficulties

In recent years, various studies have been conducted in order to ascertain the financial cost of a lifetime of social, emotional and behavioural difficulties. This has often been related to justifying the costs of early intervention programmes, such as the Family Nurse Partnership, which can seem expensive (Olds, 2006). In childhood, costs include items such as general and specialist mental health services, justice costs, and school related costs (Foster, Jones, & Conduct Problems Prevention Research Group, 2005). In addition, adult costs include the loss of earnings and productivity, and disability payments (Doshi et al., 2012). The overall impact of having a mental health problem in childhood is substantial: having a mental health problem in childhood reduces educational achievement and affects future employment, resulting in an estimated reduction in income of 20% ($10400 per family per year - £6119.10[i]). This was partly due to adults who had a mental illness as a child working seven weeks less per year compared with an adult who did not have a mental illness as a child. Overall, the study concluded that the economic burden of childhood mental illness is high, with a cost of $300,000 (£176,512.64) in lost family income over the lifetime. The main transmission pathway through which childhood disorders affect adult employment and income is through the increased likelihood of mental health problems as adults (Smith & Smith, 2010).

In relation to the costs associated with depression in childhood, very little evidence exists. One review by Lynch and colleagues found only five studies containing information on the cost burden of depression in childhood, though all studies reported a significant increase in spending for children with depression (Lynch & Clarke, 2006). One such study, using Medicaid data from the US, found that children with depression had an average claim of $6688 (£3935.06), compared with $5391 (£3171.93) for Conduct Disorder, $3544 (£2085.20) for ADHD, and $160 (£94.14) for children with no disorder (Mandell, Guevara, Rostain, & Hadley, 2003). Depression in adulthood has been estimated as costing $16.3 billion per year (£9.6 billion) in the US (Stoudemire, Frank, Hedemark, Kamlet, & Blazer, 1986) and £9 billion per year in the UK (Thomas & Morris, 2003), while in Germany, costs per person per annum were €458.9 (£367.92)(Luppa, Heinrich, Angermeyer, Koenig, & Riedel-Heller, 2007). In the UK in the year 2000, it was estimated that among the adult population, 109.7 million working days were lost and there were 2615 deaths due to depression (Thomas & Morris, 2003).

Children who had Conduct Disorder at age 10 in the UK had costs that were 10 times higher by age 28, than costs for children who had no conduct problems at all at age 10, and 3.5 times higher for children who had subthreshold conduct problems at age 10 (Scott, Knapp, Henderson, & Maughan, 2001). The additional public cost of Conduct Disorder during childhood in the US has been calculated at $70,000 (£41186.28) per child over a 7-year period. It has been reported that public expenditures for Conduct Disorder are substantially larger than for other related conditions (Foster et al., 2005), though evidence based on Medicaid data in the US, explored in more detail above, suggests that children with depression have a higher cost associated than children with Conduct Disorder or ADHD (Mandell et al., 2003).

A review of literature reporting on the costs associated with ADHD reported that the annual cost of ADHD in children and adolescents was $14,576 (£8576.16) per individual child. The authors estimated the costs of ADHD in children and adolescents in the US as $42.5 billion (£25 billion) per year (Pelham, Foster, & Robb, 2007), with a further review concluding that ADHD in children and adolescents costs the US in the range of $38 billion (£22 billion) to $72 billion (£42 billion) per year (Doshi et al., 2012). One US study compared medical, pharmaceutical and disability insurance claims for under 18s and found that children with ADHD had an average annual claim of $1574 (£926.10), compared with $541 (£318.31) among matched controls (Swensen et al., 2003). There are fewer British surveys exploring the cost implications of hyperactivity. One of the few that has been carried out looked at costs associated with children aged 3-8 with high levels of both hyperactivity and anti-social behaviour. The study found that the average cost was £6000 per child per annum, with costs being higher for boys and for children with a higher anti-social behaviour score (Romeo, Knapp, & Scott, 2006). It should be noted that different studies use different measures to determine diagnosis, which come with them substantially different prevalence rates. Differences in costs may therefore depend on whether a more severe measure is being used to determine diagnosis. The cost of adult ADHD in the US per annum, meanwhile, was estimated between $105 billion (£62 billion) and $194 billion (£114 billion). Whilst the largest expenditure for children with ADHD was on health care and education, the largest cost for adults was productivity and income losses (Doshi et al., 2012).

This section examined the literature around the economic costs associated with different childhood mental health problems. The economic costs of problems such as depression, ADHD and Conduct Disorder were shown to be high, both in childhood and particularly beyond, when loss of earnings is substantial.

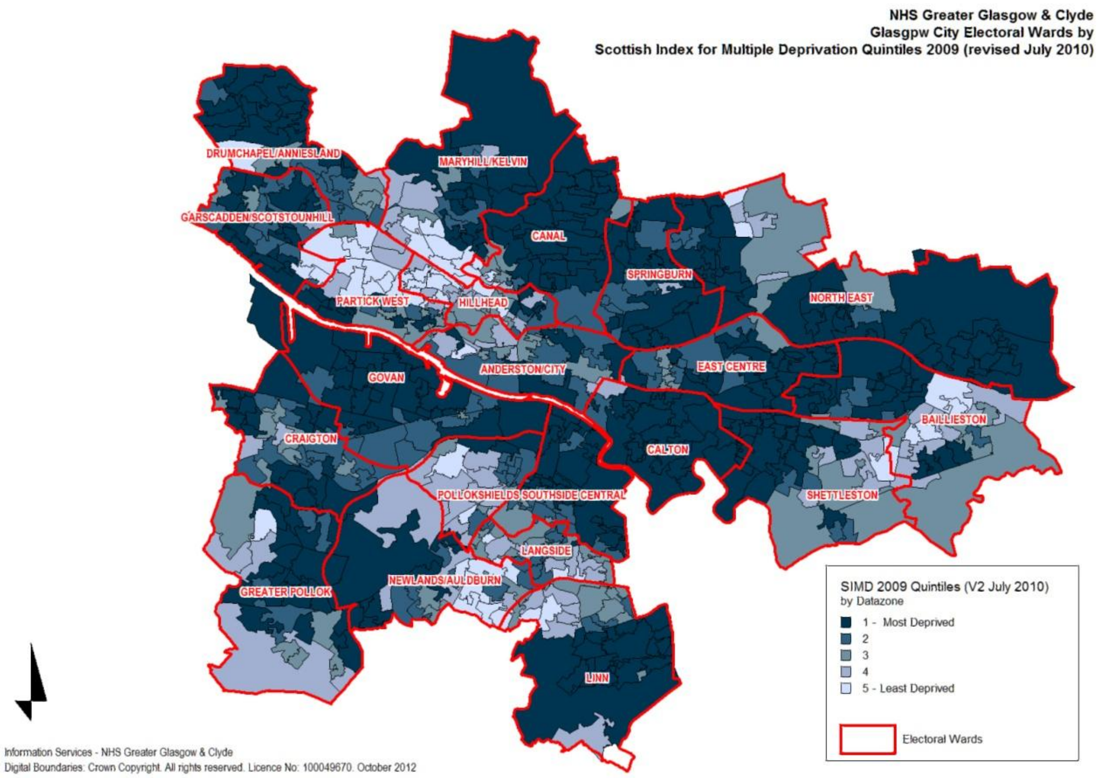
However, most studies of this nature have been conduct in the US, which has a very different health care system to the UK. The increased risk of early social, emotional and behavioural difficulties to impact throughout the lifecourse and the substantial cost to society associated with this, both socially and economically, suggests that this is an important area to study. It may be that early screening of children in order to implement interventions and give extra support to children who require it could have a substantial impact on these children's lives and on society as a whole, and thus the cost of this early screening and intervention may be justified, though evidence around the potential consequences of screening and labelling children suggests a more complex discussion around screening may be needed (Sayal et al., 2010). This will be discussed later in the thesis.

8.2 Is this development likely to be different in Glasgow city?

Glasgow is a city in west central Scotland with a population of 598,320 (in 2011) (National Records of Scotland, 2012). It is a city unlike any other in the UK. It is the largest city in Scotland, and one of the most deprived areas in both Scotland and the UK. A third of the population in Glasgow, over 190,000 people, lived in the 10% most deprived areas in Scotland in 2009. However, within Glasgow City there is substantial inequality, with pockets of both extreme deprivation and extreme wealth. The city is relatively ethnically diverse, far more so than any other Scottish city, but with very low rates compared to English cities: 5.5% of the population in Glasgow City are from an ethnic minority (Glasgow City Council, 2012).

Children make up 16% of Glasgow's population. As with the adult population, a third of children in Glasgow live in the 10% most deprived areas in Scotland. In 2009, 34% of children in Glasgow were estimated to be living in poverty, in contrast to 19% in Scotland as a whole, and 21% in the UK (Glasgow Centre for Population Health, 2013). Figure 1 illustrates the widespread levels of relative deprivation in Glasgow City, with the darker coloured areas having higher levels of deprivation.

Figure 1 Map of Glasgow City by ward and level of area deprivation (darker blue indicating higher levels of deprivation)



Glasgow has a particularly poor record when it comes to health outcomes and behaviours. The city has had the highest mortality rates in working age adults in Europe since the 1970's (Whyte, 2006). Although to some extent this can be attributed to the higher levels of deprivation in Glasgow, there is also thought to be a significant amount of the variation in health outcomes in Glasgow which cannot currently be explained by known factors. This is termed the "Glasgow effect". A recent report comparing Glasgow City with two English cities, Manchester and Liverpool, which have almost identical demographic profiles, found that Glasgow had 30% more premature deaths in comparison. The causes of premature mortality between Glasgow City and the English cities were markedly different. Deaths among Glaswegians (compared with citizens of Manchester and Liverpool) were 27% higher in relation to lung cancer (likely due to the high smoking rates in Glasgow City), 32% higher for external causes (such as accidents, intentional self-harm and assault) and 70% higher for suicide. In addition, alcohol related deaths were 2.3 times higher and drug-related deaths were 2.5 times higher. Indeed, the results of this study indicated that around half of excess mortality in Glasgow City could be directly accounted for by drug and alcohol abuse (Walsh, Bendel, Jones, & Hanlon, 2010). A further report using data from the Scottish Health Survey to investigate if there really is a true Glasgow Effect for adults, in comparison with other Scottish adults, concluded that socio-demographics could explain the majority of the health outcomes examined, with biological factors explaining differences in General Health Questionnaire Scores (a mental health screen), and being overweight. However, neither socio-demographic or biological factors could explain the difference in Glasgow's health statistics in relation to anxiety and doctor-diagnosed heart attacks (Landy et al., 2010).

In relation to a Glasgow Effect on children's outcomes, there is little evidence at present. The evidence that does exist centres around child mortality, and suggests that, in comparison to Manchester and Liverpool, mortality in 0-15 year olds in Glasgow is actually slightly lower, suggesting that there is not a Glasgow Effect at this age, at least in terms of childhood mortality (Walsh et al., 2010). Levin looked at mental well-being, mental health and self-rated physical health in adolescents in the first four years of secondary school (aged around 12-16). The results showed that Glaswegian adolescents actually had better well-being than adolescents in the rest of Scotland, controlling for socio-demographic factors, though this could be related to peer referencing e.g. if an adolescent is surrounded by peers who appear to be very depressed, they may think of themselves as having very good well-being, even though in a different context they may appear to have more problems. There were signs, however, of a Glasgow effect starting to emerge in the fourth year of secondary school (aged 14-15) in relation to self-rated physical health (Levin, 2012).

One reason for this could be that differences in parenting behaviours and childhood experiences between Glasgow City and other areas are the mechanism for a Glasgow Effect, in terms of adverse health outcomes in later life. Certainly, given that the excess mortality in Glasgow City has been shown to be heavily related to drug and alcohol misuse, along with suicide and violence, it makes sense to look towards differences in childhood experiences, which may lead to these negative outcomes. The Adverse Childhood Experience study indicated that experiencing adverse events in childhood, such as abuse and neglect, was a key factor in increase risks of adult drug, alcohol and tobacco misuse, depression and suicide (Felitti et al., 1998). However, a recent study by

Glasgow Centre for Population Health, which compared a large number of different indicators of parenting behaviours, found little difference between Glasgow and the Clyde Valley (GCV) compared with other areas, or between Scotland and England. Indeed, the study found that there was almost no difference between GCV and other regions in relation to social and material circumstances, child and maternal health, or parenting. Though Scottish children fared worse than their English contemporaries in terms of exposure to smoking during pregnancy and breastfeeding, children in GCV were not substantially worse than those from comparative English regions (Merseyside and Greater Manchester) (Taulbut & Walsh, 2013). It is worth noting however, that this study looked at Glasgow and the Clyde Valley, which included Glasgow City's wealthier neighbours, rather than Glasgow City alone. This may mean that differences in Glasgow City itself are masked by its neighbours' relative advantage.

In terms of domestic abuse, however, the data did demonstrate one significant difference between regions: 14.4% of 16-59 year olds with at least one child in the household in Glasgow City and Clyde Valley responded positively to a partner having 'Ever kicked, bit or hit you with a fist, or thrown something at you', in contrast to 9.9% in Greater Manchester and 7.9% in Merseyside. These data carry with them a caveat, as the data were collected through one question in the British Crime Survey and two separate questions in the Scottish Crime and Justice Survey, and thus may lead to differences in response (Taulbut & Walsh, 2013). Further research is needed to decide if this is a true difference or simply an artefact of the question form. If the difference seen is real in the population, it may lead to at least partial explanation of the higher levels of violence in the population. There is a large amount of evidence on the impact of children witnessing violence in the home on later conduct problems, mental health outcomes, antisocial behaviour and criminal behaviour e.g. (Margolin & Gordis, 2000b; Cohen, Mannarino, Murray, & Igelman, 2006; Holtzworth-Munroe, Smutzler, & Sandin, 1997).

This brief review of the literature indicates a lack of evidence available on children in Glasgow City in relation to a potential Glasgow Effect. Given the findings around differences in adult outcomes, for example increases in anxiety and excess deaths related to suicide, substance misuse and violence, it appears to be crucial to investigate whether the roots of these problems lie in childhood experiences in Glasgow City. Whether there is a Glasgow Effect or not in the current study is important to establish, both when considering the generalisability of results of research based in Glasgow City, and for implementing any future interventions in Glasgow City itself. We would expect to see higher levels of social, emotional and behavioural difficulties in Glasgow City due to its particular demographic profile, however, whether this can be explained solely by the demographics of the areas or whether there is an amount of unexplained variance in Glasgow City is unknown.

Glasgow City sits within the partially devolved governance of the Scottish Parliament. The devolved powers in Scotland include health and education policy, which is therefore different to that in the rest of the UK. The next section briefly outlines the policy context in Scotland within which the current research study is situated.

8.3 The policy context in Scotland

The current research occurs at a time when there is a strong emphasis on both child wellbeing in Scotland and on the role of early intervention in addressing some of Scotland's difficulties. These strands have been vocalised through a number of key approaches.

In Education, the Curriculum for Excellence has recently been implemented in all Local Authority schools. This new curriculum had four aims: to ensure children become successful learners, confident individuals, responsible citizens and effective contributors. The 'confident individuals' capacity has as its attributes that children should have 'self-respect, a sense of physical, mental and emotional wellbeing, secure values and beliefs, and ambition'. This emphasis on mental health and wellbeing should be present throughout school from 3-18 years old (Education Scotland, 2014).

In 2009, the Scottish Government published the Early Years Framework, which aimed to give children in Scotland the best start in life. The framework set out the steps that the Scottish Government, local partners and practitioners needed to take to achieve that. This included a renewed focus on the 0-3 period, increased parenting support, integrating education and childcare services and making them more flexible, improving play opportunities, providing child-centred services, among others (Scottish Government, 2009). Following on from this, the Early Years Collaborative was founded in Scotland, which was a coalition of community planning partners from all different sectors who come together to ensure that all children and their families have access to the best sources of support available and to put the principles from the Early Years Framework into practice. Among its aims for improvements was a focus on reducing levels of social, emotional and behavioural difficulties in children in early childhood.

The current research examines social, emotional and behavioural difficulties in early to middle childhood, and is therefore of key interest in the Scottish policy context at the moment, where multiple agencies have been seeking to explore such difficulties and to find ways to address them.

8.4 What factors are associated with social, emotional and behavioural difficulties in early to middle childhood?

8.4.1 Ecological Systems Theory

This chapter introduces the evidence around the associations between various factors in childhood and social, emotional and behavioural problems in early to middle childhood. The current study takes much of its theoretical basis from developmental psychology. Developmental sciences aim to examine how people change over time. No two people develop in exactly the same way however, even if raised in the same home, and so developmental science is involved with the study of both normative development (the typical patterns of change) and ideographic development (individual difference in patterns of change) (Shaffer & Kipp, 2013). Indeed, the current study examines both the overall patterns of social, emotional and behavioural development in Glasgow City children, and individual variations within that.

Developmental psychology started by examining infant and child development, but this has now expanded to cover the whole of the life course. Developmental psychology encompasses a variety of different theories. One of the most prominent theories still discussed in developmental psychology is Urie Bronfenbrenner's Ecological Systems Theory (EST) (Bronfenbrenner, 1979). EST theorises that different layers of environmental factors all have overlapping influences on child development. These layers were coined in Orville Brim's seminal paper on Macro-structural influences on child development (Brim, 1975). The layers are as follows:

1. Micro-system – this is the immediate setting containing the child e.g. the home, class or school;

2. Meso-system – this comprises the relationships between two or more settings e.g. the interactions between family, school and the child's peers;

3. Exo-system – these are the informal and formal social structures surrounding the micro- and meso-systems, such as the neighbourhood and social support networks;

4. Macro-systems – these are the over-arching cultures and sub-cultures e.g. the social or educational systems.

This model has evolved over the years into its latest form – the bioecological model (Bronfenbrenner, Morris, Damon, & Lerner, 1998). The bioecological model is defined in the form of three statements:

1. *Throughout the life course, human development takes place through processes of progressively more complex reciprocal interaction between an active, evolving bio-psychological human organism and the persons, objects and symbols in its immediate external environment. To be effective, the interaction must occur on a fairly regular basis over extended periods of time. Such enduring forms of interaction in the immediate environment are referred to as proximal processes.*

2. *The form, power, content and direction of the proximal processes producing development vary systematically as a joint function of the characteristics of the developing person, the environmental context - both immediate and more remote - in which the processes are taking place, and the social continuities and changes occurring over time throughout the life course, and the historical period during which a person has lived; and, of course, the nature of the developmental outcomes under consideration.*

3. *In order to develop – intellectually, emotionally, socially and morally – a human being, whether adult or child, requires – for all of them – the same thing: active participation in progressively more complex interaction with persons with whom he or she develops a strong, mutual, irrational attachment, and who, over time, become committed to each other's well-being and development, preferably for life.*

(Bronfenbrenner & Evans, 2000)

This approach fits the current analysis and methodology, as it assumes that no one level of effect operates in isolation, but rather that children's development is simultaneously affected by various different environments, such as the school, home, and their peer group (Bronfenbrenner, 1999). The model also proposes that the environmental influences may affect one child differently from another, depending on the characteristics which they bring to the equation (Bronfenbrenner & Evans, 2000).

Proposition 3 is rooted in attachment theory (Bowlby, 1969; Ainsworth, 1969), which has demonstrated profound effects of the child's attachment to a primary caregiver and child social and emotional development. Attachment theory proposes that the earliest attachment relationships are the first experiences of emotional closeness, and that these relationships present prototypes for close relationships throughout life, both in terms of couple relationships and parenting (Bowlby, 1969). A child's attachment is largely influenced by their primary caregiver sensitivity to responding to their needs. Four attachment styles have been identified, each with their own symptoms and consequences. These were demonstrated in Mary Ainsworth's Strange Situation Procedures (Ainsworth, Blehar, Waters, & Wall, 1978). A securely attached child will explore his/her surroundings while their carer is present and may display upset when their carer leaves the room, but is happy when their carer returns. Anxious-resistant insecure attachment (also known as ambivalent attachment) is characterised by the child showing little interest in exploring while the carer is present and being wary of strangers. If the carer leaves the room, the child is often highly distressed and ambivalent when they return. The third type is the anxious-avoidant insecure attachment. In this case the child will explore little and will avoid or ignore the carer and show little emotion when the carer leaves or returns. Ainsworth and Bell believed that this lack of emotion was actually a mask for their distress. The final type of attachment is disorganised/disorientated attachment, whereby the child displays fear, contradictory behaviours or affects occurring simultaneously or sequentially, such as jerky movements, freezing or disassociation (Ainsworth et al., 1978).

The consequences of poor attachment have been greatly explored, both in childhood and later life. Variations in attachment have been associated with behaviour problems, any psychiatric diagnosis, personality differences in later life, anxiety in adolescence, and with body dissatisfaction in women with eating disorders (Warren, Huston, Egeland, & Sroufe, 1997; Troisi et al., 2006; Bowlby, 1969; Sroufe, 2005). However, Sroufe warns that it is not right to think of attachment as causing certain outcomes, but that attachment is critical because of its place in initiating pathways of development and because it is related to so many important developmental functions, such as emotional regulation and arousal moderation (Sroufe, 2005). Furthermore, Sroufe points out that anxious attachment does not inevitably lead to psychopathology (Sroufe, Carlson, Levy, & Egeland, 1999), and it is likely that this is where Bronfenbrenner's person-environment fit model may come in: that it is both the environmental context, including the close early relationships and on-going care of parents/carers, and the characteristics of the individual that may lead to atypical development (Bronfenbrenner & Evans, 2000).

This theory has been further developed by Belsky, who proposed that some children are more malleable than others. Previous theories had assumed that all children were equally affected by sensitive and insensitive care-giving, for example. However Belsky argued that this was not the case and that children were either of a 'fixed' or 'plastic' type. Fixed children may be strongly predisposed to develop secure or insecure attachments, no matter what environment they find themselves in, whereas plastic children may be more sensitive to the environment and their development is shaped accordingly. Belsky named this Differential Susceptibility theory (Belsky, 1997). In the last ten years, this has been augmented by Boyce and Ellis' 'biological sensitivity to context', which suggests that children with heightened stress reactivity may have increased biological sensitivity to their environment (Ellis & Boyce, 2008).

The current study explores the social, emotional and behavioural development of individual children in the context of their wider environment, in light of Bronfenbrenner's theory. Proximal influences, such as current Looked After status and current level of home area deprivation, will be taken into account in the models as well as more distal factors, such as Looked After status and area deprivation at preschool. Different levels of the child's environment will also be explored where possible: for example, at the micro-system, ethnicity, Looked After status and the school attended will be examine; at the Exosystem, the level of area deprivation in which a family lives will be explored and arguably, a potential 'Glasgow Effect' – this unexplained variance particular to Glasgow City- may be part of the Macrosystem. Due to its reliance on administrative data this study does not contain any information on the mesosystem, which would have been interesting to collect, for example information about parental involvement in school or the parent-teacher relationship may explain some differences in development.

8.4.2 Overview of factors associated with social, emotional and behavioural development

There are a wide range of factors which have been associated with social, emotional and behavioural development in recent years, though this evidence base is less well developed and less consistent than that around children's cognitive development. At the individual level, child gender is one of the strongest factors associated with social, emotional and behavioural development (Cohen et al., 1993; Sterba et al., 2007). There is also evidence around the relationship between such difficulties and ethnicity, having Looked After status (i.e. being under the supervision of the state), living in a household with low income or with multiple deprivation, as well as the type of parenting a child experiences (Green et al., 2005; Dooley & Stewart, 2007). Genetic heritability of disorders is also an important area with an increasing body of evidence (McLoyd, 1998). The child's school may be associated in two separate ways. Firstly, the school itself may play a role in promoting positive social, emotional and behavioural difficulties, giving children who have difficulties greater support and encouraging a warm and caring environment. Furthermore, at this age, school constitutes the primary friendship group for the majority of children. They may thus be influenced by the difficulties (or absence of difficulties) that their peers may have, as well as the background characteristics that their peers may bring into the friendship (Aviles, Anderson, & Davila, 2006; Carpiano, Lloyd, & Hertzman, 2009).

At a third level, the characteristics of the area and community in which the child lives may be associated with social, emotional and behavioural difficulties. This may be due to the level of deprivation in an area as a whole, or the levels of crime and violence on the one hand, or social support and community engagement on the other. The area in which the child lives and the child's school are not normally completely overlapping, but nor are they usually exclusive. This means that they must both be assessed in order to calculate their independent contribution to explaining differences in social, emotional and behavioural development (Church II, Jaggers, & Taylor, 2012; Brooks-Gunn, Duncan, Klebanov, & Sealand, 1993) .

The literature regarding the associations between social, emotional and behavioural development at each of these levels will now be explored in detail.

8.5 Individual influences

8.5.1 Genetics

There is increasing evidence around the role of genetics and heritability of social, emotional and behavioural disorders. Some types of difficulties have been found to have higher levels of heritability than others. In particular, Hyperactivity and Inattention disorders have been found to be highly heritable (Levy, Hay, McStephen, Wood, & Waldman, 1997), as are depression, psychoses and severe behaviour disorders (Patel, Flisher, Hetrick, & McGorry, 2014; McGuffin, Katz, Watkins, & Rutherford, 1996). Specific genetic mechanisms have not been identified for anxiety disorders, however twin and adoption studies have provided evidence of an association between children with a childhood anxiety disorder and prevalence in first-degree relatives of these children, compared with children with ADHD or children with no psychiatric diagnosis (Zahn-Waxler et al., 2000). More recent work around genetics and child development has focused on gene-environment interactions, whereby children who are genetically susceptible may be at greater risk of developing a particular disorder if placed in a sub-optimum environment (Jaffee & Price, 2007).

Evidence has been produced of a substantial gene-environment interaction in relation to behavioural problems (Moffitt, 2005).

For a fuller review of the evidence around genetics and social and emotional development of children, see Dilalla (2011) or Rutter (2003).

8.5.2 Gender

Gender has been strongly associated with differences in social, emotional and behavioural development, though the relationship differs for different types of difficulties (Cohen et al., 1993). In general, boys are more likely than girls to have a psychiatric diagnosis in childhood: figures from 1999 show that 11.6% of boys aged 5-16 in the UK had a psychiatric diagnosis, compared with 7.4% of girls (Ford et al., 2003). The figures specifically for UK 5-10 year olds were slightly lower: 10% of boys had a mental health disorder, in contrast to 5% of girls (Green et al., 2005). However, the picture is complex, with boys and behavioural problems tending to dominate in early to middle childhood, whilst depression and anxiety emerge more strongly in girls in adolescence and continue to dominate the adult mental health landscape (Cohen et al., 1993).

The gender difference begins early for externalising problems: at preschool level, boys were rated by nursery staff as being more aggressive than their female peers, and were reported to have more conflictual relationships with their teachers (Stipek & Miles, 2008). It may be that trajectories of aggressive behaviours differ for boys and girls. Figures from the first six years of school show low and flat levels of aggression for girls, compared with higher and gradually rising levels for boys (Kellam, Rebok, Ialongo, & Mayer, 1994). It should be noted that the respondent may well have an effect on the reporting of gender differences, particularly around conduct problems and hyperactivity. Previous studies have indicated a bias in teachers and parents to over-report problems in boys because of an overly-negative view of boys' behaviour (Bhana, 2009).

Boys are significantly more likely to experience hyperactivity/inattention and to be diagnosed with a hyperactive or inattentive disorder than girls. The Growing Up in Scotland study found that at school entry, boys were more likely to have problems with hyperactivity/inattention (as rated by parents on the SDQ) than girls: 22% of boys had an abnormal or borderline score, compared with 15% of girls (Bradshaw & Tipping, 2010). In the UK in 1999, 3.6% of boys aged 5-16 met the criteria for any ADHD diagnosis, compared with just 0.9% of girls (Ford et al., 2003). Even within children with ADHD, gender differences exist: girls with ADHD have been found to have higher levels of intellectual impairment, but lower levels of hyperactivity, with no differences found between the sexes in terms of inattention or social functioning (Gaub & Carlson, 1997). Again, rater bias may have an effect here (Bhana, 2009).

Studies focusing on emotional symptoms, such as anxiety and depression, demonstrate inconsistent results in relation to gender. Whilst some studies have found no significant gender difference in early to middle childhood (Toumbourou et al., 2011; Ford et al., 2003), others have found that boys have higher rates of depression at preschool than girls (Wichstrom et al., 2012). However, there is a general consensus that girls have a higher prevalence of depression in adolescence and that this increases at a higher rate than in boys (Toumbourou et al., 2011). Kessler reported than the gender difference in depression emerged at the age of 11-15, with prevalence rates for women from this point onwards at least two times higher than for men (Kessler, 2003). Angold and colleagues found the emergence of gender differences at a similar age, however concluded that it was the onset of puberty which was the important contributing factor, rather than age per se (Angold, Erkanli, Silberg, Eaves, & Costello, 2002).

Gender differences have also been reported with regards to interactions with peers in childhood. Aggression towards peers has been found to differ between boys and girls: whereas girls' aggression towards peers tends to be expressed in a nonconfrontive way (e.g. attempting to damage other's relationships or reputations), boys aggression tends to be confrontive (e.g. hitting and insulting peers). Evidence exists that girls who engage in confrontive aggression may be at particular risk of maladaptive development (Crick & Grotpeter, 1995). Boys who had experienced peer rejection have also been found to consequently become more aggressive, whereas girls who are rejected by peers tend to become more withdrawn and anxious (Ladd, 1999). However, Turner purports that gender differences in social behaviour may be explained by the different ways that children with insecure attachment behave with their peers, with boys with insecure attachment asserting more controlling and aggressive behaviours towards their peers in contrast to girls with insecure attachment, who still displayed more positive behaviours towards peers (Turner, 1991). It may be therefore that the factor underlying the way in which these young children interact with their peers is actually attachment, rather than simply aggression.

8.5.3 Ethnicity

In the UK, ethnic differences in social, emotional and behavioural difficulties are often hard to gauge due to the relatively low numbers of children from different ethnic groups in the population. They are also often difficult to untangle from the effects of deprivation, as ethnic minority families in developed countries, such as the UK, have higher levels of deprivation in general (although this does vary between ethnic groups) than White UK families (Gordon et al., 2000). It also is less relevant to use data from other developed countries, such as the USA or Australia to explore ethnic differences, as both the ethnic make-up of these countries and the socio-economic standing of different minorities within such countries are markedly different to ethnic minorities in the UK.

Where research has explored this subject in the UK, the results are highly inconsistent. In the 1999 British Child and Adolescent Mental Health Survey, no discernible differences were present between different ethnic groups and prevalence of psychiatric diagnosis in children. The one exception to this was that Asian children in the UK had lower levels of Oppositional Defiant Disorder (Ford et al., 2003). British Indian children have been found to have a notable advantage in terms of externalising problems, which could not be accounted for by the higher rates of living in two-parent families or having fewer academic difficulties, for example, than their White British counterparts (Goodman, Patel, & Leon, 2010). Research conducted with second generation Afro-Caribbean children living in the UK found higher prevalence of psychotic disorders and autism spectrum disorders in Afro-Caribbean children, but lower rates of conduct problems and emotional disorders. This difference in levels of emotional disorders between the two groups disappeared in girls when they reached their teens, whilst, in contrast, the difference for boys widened with age (Goodman & Richards, 1995). The Growing Up in Scotland study found that non-White children had higher rates of Peer Relationship problems on the SDQ at entry to school, compared with White children, though the authors caution that numbers of non-White children in the sample were small (Bradshaw & Tipping, 2010). Further results based on 11-13 year olds in London (also using the SDQ) have indicated that Nigerian/Ghanaian boys had the lowest scores on the Total Difficulties scale, compared with White boys. The results further suggest that 'other African' boys and girls had lower Total Difficulties scores compared with White adolescents (Maynard, Harding, & Minnis, 2007).

In relation to refugee-status children in particular, there is a lack of evidence around whether they are at additional risk of mental health problems compared with their non-displaced peers. The evidence that does exist suggests that children with refugee status in developed countries have higher levels of anxiety over time, but that there is no difference in levels of depression, hopelessness or post-traumatic stress disorder at long term follow-up (Fazel, Reed, Panter-Brick, & Stein, 2012). However studies are small and more research needs to be conducted in this area to reach a firm conclusion.

8.5.4 Looked After status

Looked After status means slightly different things in Scotland compared with the rest of the UK. In Scotland, having Looked After status means being under the supervision of the state, whether that is under a supervision order whilst still living at home with the child's biological parent(s) or living in foster care or other arrangement away from home. In the rest of the UK, a child mainly has Looked After status when living away from home. Although placements with parents are increasingly common in England (5% of Looked after children in England in 2013 were Looked After at home whilst under the supervision of the state), they are still very much in the minority (National Statistics, 2013), whereas in Scotland 29.7% of Looked After children are living at home (Scottish Government, 2014). Evidence shows that Looked After children are more likely to experience social, emotional and behavioural difficulties and disorders than non-Looked After children (Richardson & Lelliott, 2003a; Ford, Vostanis, Meltzer, & Goodman, 2007b; Stanley, Riordan, & Alaszewski, 2005; McAuley & Davis, 2009; Minnis et al., 2006) . In a sample of children living in the central belt of Scotland (roughly between Edinburgh and Glasgow), 57% of Looked After children had difficulties with social, emotional or behavioural problems on the SDQ, which would normally contain 10% of children in the population (Minnis et al., 2006). Even after controlling for the higher rates of Looked After boys and other notable demographic differences, 46.4% of Looked After children in Britain had any psychiatric diagnosis, in contrast to 14.6% of children in the most disadvantaged private households and 8.5% of children in other private households. In particular, Looked After children were far more likely to have any behavioural disorder (38.9% of Looked After children compared with 9.7% of their disadvantaged non-Looked After counterparts), to have any anxiety disorder (11.1% vs. 5.5%), to have higher levels of hyperactivity (8.7% vs. 1.3%) or to have depression (3.4% vs. 1.2%) (Ford et al., 2007b). Within groups of Looked after children, greater numbers of placements were associated with poorer psycho-social outcomes (Stanley et al., 2005). It has been suggested that Looked After children experience more complex problems, higher rates of comorbidity and problems which have greater pervasiveness (DeJong, 2010).

8.5.5 Parenting

Stewart-Brown's review of the effects of parenting on child mental health reports that:

'The impact of different approaches to parenting and the quality of parent–child relationships is now known to extend over the life course, and parenting is coming to be recognized as one of the most important remediable determinants of future health, particularly mental health' pg.11 (Stewart-Brown & Schrader-Mcmillan, 2011).

Several parenting practices in particular have been evidenced to contribute to children's poor mental health: low levels of warmth, either through rejection or a lack of involvement, punitive or harsh discipline, including yelling, hitting and demands for obedience, and over-involved or over-protective parenting, including intrusion, encouraging dependence and the exclusion of outside influences (Bayer, Sanson, & Hemphill, 2006). Excessive levels of stress caused by sub-optimal parenting have been widely recognised to have a substantial effect on the development of children's social emotional and behavioural functioning throughout childhood (Stewart-Brown & Schrader-Mcmillan, 2011).

Childhood externalising problems in early and middle childhood have been associated with harsh discipline and parental stress (Williford, Calkins, & Keane, 2007b; Bayer et al., 2011; Bradshaw & Tipping, 2010; Scott, Lewsey, Thompson, & Wilson, 2013). In particular, the Growing Up in Scotland study found that, at entry to primary school, children who had experienced harsh punishment (shouting and smacking) at age 3, had higher levels of Conduct Problems on the

SDQ at the start of school, than children were did not have this experience: 40% of children who experienced harsh punishment had possible or likely Conduct Problems, compared with 19% of children whose parents did not use harsh discipline (Bradshaw & Tipping, 2010). However, the direction of causality is not always clear, for example, it could be that parents are more stressed because of their child's behavioural problems, or that the parent's stress causes the behavioural problems (Williford et al., 2007b). In terms of internalising symptoms, in the early years these were predicted by over involved or overprotective parenting and harsh discipline. In middle childhood, only harsh discipline was associated with internalising symptoms (Bayer et al., 2011). In addition, childhood anxiety has been associated with inconsistent parenting, parental control and rejection (Rapee, 1997; Hudson & Rapee, 2001). However, it has been suggested that some of these parenting practices may be mediators for family stress, with family stress being associated with lower warm-engaged parenting, higher over-protectiveness and higher punitive parenting (Bayer et al., 2006). Furthermore, having a poor relationship with one's mother and father, respectively, was associated with poorer mental health at 42 years old (Morgan, Brugha, Fryers, & Stewart-Brown, 2012). However, one UK study found some level of sub-optimal parenting in up to 83% of families, the majority of children of whom experienced moderate levels of hostility and resentment and, as a result, had little effect on their health (Waylen, Stallard, & Stewart-Brown, 2008).

At the extreme end of the scale, abuse and neglect have been strongly associated with social, emotional and behavioural problems. The World Report on violence and Health identified abuse and neglect as being risk factors for poor mental health throughout life (Krug, Mercy, Dahlberg, & Zwi, 2002). Severe physical punishment (including being hit with an object, kicked, choked, smothered, burnt, scalded, branded, beaten or threatened with a weapon) predicted comorbid internalising and externalising problems in children aged 6-17, even once parental mental health and socio-economic factors were controlled for. Children who experienced severe punishment were twice as likely to display comorbid internalising and externalising symptoms. However, the results suggested that the underlying factor may be maternal mental health, which also increased the likelihood of severe punishment, rather than the experience of severe punishment itself (Bordin et al., 2009). Another study though found that children from physically abusive homes had lower self-esteem and higher levels of depression than non-maltreated children (Toth, Manly, & Cicchetti, 1992). There has also been a suggestion that mothers who have been abused themselves as children are more likely to have children with higher levels of externalising symptoms, possibly due to the mother experiencing on-going distress (Myhre, Dyb, Wentzel-Larsen, Gragaard, & Thoresen, 2014).

There is a relationship between suboptimal parenting and socio-economic factors: less hostility and less shouting were associated with higher maternal age, living in an owner occupied home and a lack of financial difficulties. Conversely, although it has been found that resentment of a child increases with financial difficulties, resentment also increases with owner occupation and maternal age, revealing a complex picture (Waylen et al., 2008).

It has been suggested that parenting policies and programs may offer scope for improving mental health of children through educating parents and giving them the tools to enhance their parenting and thus have a positive impact on children's social, emotional and behavioural development (Stewart-Brown & Schrader-Mcmillan, 2011; Barlow, Smailagic, Ferriter, Bennett, & Jones, 2010).

8.5.6 Poverty

Socio-demographic factors are also associated with variation in children's social, emotional and behavioural difficulties, with the most disadvantaged children (in terms of income, resources and other adversities) generally being found to have the poorest outcomes e.g. (Bradshaw, Hall, Hill, Mabelis, & Philo, 2012a; Green et al., 2005; Brooks-Gunn & Duncan, 1997; McLoyd, 1998). This is particularly relevant in Glasgow City, where a large proportion of children grow up living in socio-economically disadvantaged circumstances, as evidenced in the previous section. Gershoff states that "several decades of research leave little doubt that family income matters for children" (Gershoff et al., 2007a). Whilst the evidence clearly demonstrates that this is true in terms of cognitive development (Dooley & Stewart, 2007; Lee, 2011; Graham & Power, 2004; Sameroff, 1998a), results are less straight-forward for social and emotional outcomes, with outcomes related to peer relationships and emotional regulation appearing substantially weaker than those for behaviour (Wilson et al., 2013).

The impact of disadvantage on social and emotional outcomes in the early years has been less well researched than impacts in middle childhood or adolescence and, where it has been investigated, impacts are arguably smaller than on these later outcomes. Correlations have been found between low income and both lower social competence and an increase in behavioural problems at age three (National Institute of Child Health, 2007).

A recent British study found that experiencing 'adversity' in the first year, including poverty, predicted parent-reported externalising problems at age three, with adversity at ages two and three predicting both parent-rated internalising and externalising problems at age three (Flouri, Tzavidis, & Kallis, 2010). Data from the Longitudinal Study of Australian Children showed an association between income and child social, emotional and learning outcomes at age 2-3 (using a parent-rated abbreviated version of the Short Temperament Scale for Infants (Sanson, Prior, Garino, Oberklaid, & Sewell, 1987)). Children in the older cohort (social and emotional outcomes here measured using Goodman's Strengths and Difficulties Questionnaire) saw an improvement in socio-emotional scores at age 5-6. Effects of income were larger on learning outcomes, again suggesting that the relationship with income is stronger for learning outcomes than it is for social and emotional outcomes (Lee, 2011).

Results for middle childhood through to adolescence have generally found a link between low income and poorer socio-emotional development, though effect sizes vary dramatically. Poverty was associated with greater psychological distress for children in Grades 3-4 (mean scores on the Rutter Children's Behaviour Questionnaire were 11.73 in the low income group, compared with 6.86 in the middle income group) (Evans & English, 2002), and with parent-rated behavioural problems in middle childhood: an increase in income of one unit (which equates to a 2.7-fold increase in income, or an increase to $13,590 for a family starting with an income of $5,000) resulting in a decline in behaviour problems by 0.30 of a standard deviation (Votruba-Drzal, 2006). Prevalence of clinically measured mental disorders among 9 year old low income children living in Spanish slums was five times higher than the median derived from pooled published studies on the general population (Ezpeleta et al., 2007).

Longitudinal studies investigating within-child differences have demonstrated a relationship between family income and both internalising and externalising behaviours at age six, however the effect of a change in income was small, with a $10,000 rise in income resulting in a decrease of 0.13 in the externalising problems score on the Child Behaviour Check List (CBCL) (range 0-20) (Dearing, McCartney, & Taylor, 2006). The Canadian National Longitudinal Study of Children and Youth, which assessed children aged 6-12, concluded that a doubling of income reduces a child's emotional and behavioural score by one-tenth of a standard deviation, as reported by the child's parent (Dooley & Stewart, 2007).

Costello and colleagues followed slightly older children aged between 9 and 13 for eight years, who were part of a natural experiment which raised the income of every individual on an American Indian reserve and lifted many children out of poverty, named the Great Smokey Mountain Study. They found that children living in poverty were more likely to have DSM IV psychiatric diagnoses and symptoms than children who lived in never poor families. Those who were still in poverty four years after the change of income increased their total psychiatric symptoms by 21%, whilst children who moved out of poverty decreased their symptoms by 40% (Costello et al., 2003). Although the chronic poor group and the group who moved out of poverty, both started "in poverty", it may be that the two groups had different baseline characteristics: those who remained in poverty may have started out in more extreme poverty than those who later moved out poverty. It could also be that other factors, such as substance misuse and pre-existing mental health problems, differed between the two groups. This raises the question as to whether it is the differential baseline that had the impact on outcomes, rather than the subsequent move out of poverty. Effects of income poverty are not necessarily linear, with variations near the bottom of the spectrum showing far stronger relationships to cognitive and socio-emotional development, than those in the upper ranges (Votruba-Drzal, 2006; National Institute of Child Health, 2007). It may be that downward changes in income for families towards the bottom of the spectrum may result in greater stress and changes in material hardship, than variation further up the income spectrum.

8.5.6.1 The timing and duration of poverty

The impact of disadvantage on socio-emotional outcomes may differ depending on the timing of poverty and the length of time spent in poverty, though results are inconsistent. The majority of studies which examined duration found that children who experienced persistent or chronic poverty have the poorest outcomes in terms of both internalising and externalising behaviours (National Institute of Child Health, 2007; Costello, Compton, Keeler, & Angold, 2003; Lee, 2011). In contrast, Brooks-Gunn and Duncan report that that current, but not persistent poverty, was associated with more externalising problems among 4-8 year olds in the National Longitudinal Study of Youth (NLSY) cohort (Brooks-Gunn & Duncan, 1997).

The Great Smokey Mountain study reported that a move out of poverty was associated with declining behavioural problems four years later, as opposed to remaining in poverty. However, internalising problems, such as depression, were not affected by a move out of poverty, but rather remained significantly higher for those who had experienced early poverty but moved out of poverty (Costello et al., 2003). It should be noted that the children in this study ranged in ages from 9 to 13 at the start of the study.

McLoyd's review concluded that "neither internalising nor externalising symptoms have been linked to timing of poverty within the first four years of life" (McLoyd, 1998). Whilst evidence is weaker for the early years, research has recently been conducted on the impact of poverty on early outcomes. Social patterning of externalising problems has been found in children as young as three years old (National Institute of Child Health, 2007; Spencer & Coe, 2003), with differences in parental behavioural reports at 8 months and at 18 months (Spencer & Coe, 2003). In addition, there is increasing evidence for a degree of stability of social and emotional ill-health throughout childhood (Spencer & Coe, 2003); (Sameroff, 1998b), which may suggest that any early impact on child social and emotional development may have long-lasting consequences.

It remains the case, however, that a greater proportion of the literature establishes a link between late poverty and externalising and internalising symptoms. In reports directly comparing early and later poverty, late poverty appears to have an effect on behavioural outcomes over and above any effects of living in early poverty (Votruba-Drzal, Coley, Maldonado-Carreno, Li-Grining, & Chase-Lansdale, 2010; National Institute of Child Health, 2007). The NICH study reported that, although all mothers reported fewer behavioural problems over time, living in poverty between the ages of four and nine resulted in significantly more behavioural problems than being in poverty up to the age of three. Furthermore, mothers in the 'late poor' and 'always poor' groups reported significantly more internalising problems than those in the never poor group. On the teacher-rated behavioural problems though, there was no significant difference between the early poor and late poor groups. This suggests the possibility of reporter bias, in that more recent poverty may affect parental mental health, which may in turn reflect in the parent's view of the child's behaviour (National Institute of Child Health, 2007). It may also be that teachers use the area where they work as a reference point when rating children, which may minimise true differences between levels of socio-economic deprivation in different areas.

Whilst the evidence suggests a relationship between income and poverty, it is debatable whether there is a direct causal link, or whether this link is mediated by other factors such as parental stress, parenting, resources or diet. Gershoff, among others, found a small direct link once factors such as parental stress and material hardship were controlled for, though it is arguable whether this small 'direct link' is actually confounded by unmeasured variables (Gershoff, Aber, Raver, & Lennon, 2007b; Gershoff et al., 2007a).

Many mediating factors have been cited and investigated. A difficulty with this area of research is that studies often control for a small number of individual risks, but rarely control for a wide spectrum of potentially contributing factors. Factors are generally split into those related to the family stress model (Conger, Conger, & Martin, 2010) and those related to the Parent Investment Model (Becker & Becker, 2009).

The family stress model proposes that income poverty and material hardship (the latter being a lack of material goods, rather than a lack of money) have an impact on parental mental health and relationships with partners, which has an effect on parenting behaviour, which in turn impacts on child outcomes (Williford, Calkins, & Keane, 2007a). Lee's results demonstrated a link between poverty and socio-emotional outcomes at the age of four only where there was also a mother with mental health problems, who lacked social support and who had a lower level of education. Where this was not the case, the child was usually progressing as normal (Lee, 2011).

Three studies found an impact of poverty/material hardship on parental stress, which in turn impacted on the provision of family resources (National Institute of Child Health, 2007); (Gershoff et al., 2007a);(Black et al., 2007). The NICH found that poverty was highly related to enrichment of the home environment, however once other family characteristics were taken into account, such as parental education, partner status and depressive symptoms in the mother, the effect was not statistically significant (National Institute of Child Health, 2007).

The parent investment model proposes that parents' abilities to provide material resources, such as books and other goods, as well as trips, e.g. to museums and libraries, may impact on child well-being. The mediating role of family resources has been highlighted in a substantial body of research. Though the effect of better family resources has been evidenced as being stronger for cognitive development, there is a body of research showing the benefits of providing a high quality, safe and stimulating home environment on social development (Evans & English, 2002; Nakao et al., 2000; Sameroff, 1998a). For example, Vortruba-Drzal looked at the middle childhood period and found that, whilst the home environment did appear to mediate some of the effects of income on behaviour, it rarely explained more than 30-40% of the variance, suggesting that other pathways must mediate these effects. Providing warm, responsive care-giving in the home environment helps children to develop secure attachments, regulate emotion and learn to successfully negotiate social situations (Votruba-Drzal et al., 2010).

There appears to be a stronger link between the home environment and socio-emotional outcomes in the pre-school period, where children are most reliant on their main carer, than it does once the child reaches school age (Bradley & Corwyn, 2002). Maternal sensitivity and warmth have also been viewed as a mediator between poverty and child socio-emotional outcomes. NICH found that mothers who were classed as 'never poor' showed the highest rates of maternal sensitivity, while those who were 'always poor' showed the lowest rates (with those who moved into and out of poverty having sensitivity rates in between these) (National Institute of Child Health, 2007).

The amount of supervision through the presence of an adult in the home also appears to be a mediating factor in the link between poverty and behavioural outcomes. Costello found that this was the main factor responsible for the change in behavioural outcome when a family moved out of poverty (Costello et al., 2003). Dunifon et al. also demonstrated that where low income single mothers had a long commute, and thus were absent from their children for longer periods, this had an impact on child behaviour outcomes, in comparison with those who were on low incomes but did not have a long commute (Dunifon, Kalil, & Bajracharya, 2005). Further support is lent to this through the success of some interventions focussing on parenting in order to improve social and emotional outcomes in the early years. For a full review of this see Barlow's Cochrane Collaboration Review (Barlow et al., 2010).

The impact of peers, particularly in terms of levels of peer victimisation, behavioural problems and aggression, has also been cited as a mediating factor for children already at risk of poorer outcomes through poverty (Hoglund & Leadbeater, 2004). Conversely, Sacker et al. found that school composition had little effect on psycho-social adjustment in middle childhood, though it did have an effect in adolescence (Sacker, Schoon, & Bartley, 2002). The latter may account for some of the differences seen between the impact of early and late poverty on children's internalising and externalising behaviours, for example in the NICH's work (National Institute of Child Health, 2007).

Genetic confounders did not frequently arise in the particular literature examined. However, it is important to mention the few cases in which they have arisen. Biedermann reports that previous twin studies have shown that genes explain a substantial amount of environmental variation normally seen in terms of social support and life stress (Biederman, Faraone, & Monuteaux, 2002). Costello purports that a possible reason for the lack of effect on behavioural problems for children who move out of poverty is a genetic loading which predisposes these children to behaviour problems, rather than an effect of poverty per se (Costello et al., 2003). Flouri et al., however, found an effect for family contextual risk on externalising and internalising symptoms, even when controlling for maternal characteristics, which they suggest therefore transcends genetic disposition (Flouri et al., 2010).

Whilst there is some evidence of a small direct link between disadvantage and child social and emotional outcomes, this section has demonstrated a wide range of factors, through which much of the impact of disadvantage may be mediated. These include parental stress and parenting more generally, resource availability, peers, genetic confounders and cumulative risk. This is particularly interesting for the current research study as it raises the possibility of picking up children at risk of maladaptive development in these areas and introducing interventions to alleviate some of the mediating factors which may be contributing to these outcomes, e.g., helping parents to manage their stress and promote positive and warm parenting. It is clear, however, that this is a highly complex area which needs to be explored in the context of these different environments in future research.

8.5.7 The associations between neighbourhoods and social, emotional and behavioural difficulties

Recent years have seen an increase in research around the relationship between neighbourhood-level variables and social, emotional and behavioural outcomes. Whilst this has traditionally been an area of greater interest in relation to adolescents (Drukker, Kaplan, Feron, & Van Os, 2003; Natsuaki et al., 2007; Schneiders et al., 2003), who spend more time in their neighbourhood and are thus more directly influenced by the area in which they live, more recent evidence has emerged about the possible impact which neighbourhoods have on younger children, over and above both individual and family characteristics. The most common measure of neighbourhood quality is the socio-economic status of an area, often taken from census data. The Longitudinal Study of Australian Children found a relationship between neighbourhood socio-economic status (SES) and children's levels of conduct problems at age four to five, with children residing in the three most disadvantaged quintiles of neighbourhoods having significantly higher levels of conduct problems. However, no independent relationship between neighbourhood SES and child pro-social behaviour at the same age was found (Edwards & Bromfield, 2009). Similar results were found by Colder et al. at age six (Colder, Lengua, Fite, Mott, & Bush, 2006), whilst other studies, which concentrated solely on social and emotional outcomes, rather than behavioural outcomes, also found no correlation (Kiernan et al., 2008; Schaefer-McDaniel, 2009a). In contrast, Cook and colleagues did find an association between neighbourhood SES and behaviour, although effect sizes were smaller than those for individuals, families, and peers (Cook, Herman, Phillips, & Settersten Jr, 2002).

Reasons suggested for this lack of effect of neighbourhood socio-economic status on social and emotional development, over and above that of the household, include that the timing of measurement of outcomes is too early, and that, compared to behavioural problems, the impact on social and emotional development may not be seen until later in childhood (Colder et al., 2006). Furthermore, there has been a suggestion that clusters of neighbourhoods may be too similar to each other to show differences (Schaefer-McDaniel, 2009b) and that census-based neighbourhoods may not be reflective of the 'true' neighbourhood boundaries perceived by residents, and thus difference between perceived neighbourhoods may be greater than between the more abstract census-based neighbourhoods.

Other neighbourhood measures which have been investigated are neighbourhood quality (assessed by items such as unemployment, abandoned buildings, crime, and perceptions of supervision of children and people caring about the neighbourhood) and neighbourhood safety (measured by ratings of neighbourhood problems such as crime and witnessing violence), both of which have produced mixed results regarding child outcomes. Poor neighbourhood quality was related to increased antisocial behaviour between the ages of six and twelve (Colder et al., 2006). In contrast, having positive role models in a neighbourhood was seen to promote good behaviour and social skills (Kupersmidt, Griesler, DeRosier, Patterson, & Davis, 1995). Neighbourhood safety, and more specifically neighbourhood violence, has been related to increased levels of anti-social behaviour in slightly older children (aged 10-12) (Fishbein et al., 2009) and social and emotional outcomes in younger children (Thomas, 2010).

Brooks-Gunn and Duncan warn about over-estimating neighbourhood effects, due to the neighbourhood characteristics being a product of the choices of neighbourhood residents (Brooks-Gunn et al., 1993), thus reflecting more about the impact of parents than the impact of neighbourhoods per se. Furthermore, having a higher Socio-economic Status (SES) household in a low SES neighbourhood has been found to provide no protection against the impact of living in a low SES neighbourhood on social competence, though it did make a difference to emotional maturity (both measured at entry to Primary school) (Doyle, McEntee, & McNamara, 2012). By contrast, other studies suggest that middle SES neighbourhoods did have a protective effect for black children from low income, single parent homes, in terms of their aggressive behaviours, however they were also seen to have a detrimental effect on the social adjustment of white children in low income, single parent homes (Kupersmidt et al., 1995). It is possible that it is the particular fit of the demographics of a household and neighbourhood that may produce particular results (Gordon et al., 2003).

This section explored the associations between different factors and social, emotional and behavioural development in childhood. Factors were assessed at an individual, family and neighbourhood level, in line with ecological theory, which proposes that a combination of different environments work together to influence child development. There has been a strong focus in the literature to date on individual and family factors, with the current evidence suggesting associations with genetics, gender, ethnicity and poverty, among others. However, the picture is complex, with factors such as poverty appearing to be primarily mediated by further issues such as parenting behaviours and stress. In recent years, the impact of neighbourhoods, over and above individual and family variables, has been explored. The literature in this area is often contradictory, with associations being found in some studies but not in others, in relation to social, emotional and behavioural difficulties in early to middle childhood. Overall evidence from the studies examined suggests that there may be a stronger association between neighbourhoods and behavioural difficulties, in contrast to social and emotional difficulties, and that this may have a larger impact in adolescence.

The final level of influence which this literature review will explore is at a school level.

8.6 What effect do schools have on social, emotional and behavioural development in Primary school?

8.6.1 School effectiveness research (SER)

School effectiveness research (SER) has been one of the main drivers of educational research into school effects in the past few decades. The term school effectiveness research has been used to describe research concerned with exploring differences both within and between schools (Goldstein, 1997). The central focus of the theory concerns the idea that "schools matter, that schools do have major effects upon children's development and that, to put it simply, schools do make a difference" (Reynolds, Teddlie, Creemers, Scheerens, & Townsend, 2000). SER is ultimately concerned with examining what is currently happening within schools and attempting to explain variation between them using appropriate models. For example, a traditional basic model would look at an outcome, such as educational achievement, and study average differences among schools after adjusting for explanatory factors, such as demographics and intake achievement level of the pupils (Goldstein, 1997). The prominent paradigm in school effectiveness research is a mechanistic one, in which the effectiveness of a school is the ability of a mechanism that enables schools to control and shape its pupils' outcomes (Elliott, 1996).

Reynolds reported that there were three main streams of SER: School Effects Research, Effective Schools Research and Schools Improvement Research. School Effects Research was said to deal with studies of the 'scientific properties of school effects evolving from input-output studies to current research utilising multilevel models'. Effective Schools Research on the other hand was said to investigate the processes of effective schools, through exploring outliers in the data using quantitative and qualitative methods. Finally, Schools Improvement Research explore the processes through which schools can change using increasingly sophisticated statistical techniques to explore 'multiple levers' of change in schools (Reynolds & Teddlie, 2000).

During the 1980s and 1990s, SER was primarily concerned with producing 'performance indicators' to measure how well schools were performing. This produced considerable debate about the appropriateness of such measures. There were two main criticisms of this sort of research. Firstly, it was criticised for focusing too heavily on ranking schools from best to worst performing, and not having enough emphasis on exploring the factors which were contributing to schools performing in different ways (Goldstein, 1997). This criticism has been countered by a claim that SER has now developed a considerable level of detail in its findings, taking account of such explanatory factors as intake assessment (Thrupp, 2001).

Secondly, there were also recognised to be limitations within the method itself. Much of this criticism began to arise with the advent of new statistical techniques, such as the increased use of multilevel models, which brought into question the strength of some of the previous findings (Elliott, 1996). These limitations fall into two parts: it is now recognised that comparing schools has to be based upon baseline achievement of the school's intake and other factors and that, once these things are controlled for, the resulting added value estimates usually have too much uncertainty attached to them to be able to say how a particular school is doing. At best, it is suggested that one can identify outliers for further examination, however Goldstein suggests that we cannot use this type of analysis to make a definitive judgement on a particular school (Goldstein & Spiegelhalter, 1996; Goldstein, 1997). It is also pointed out that modelling SER longitudinally does not contain any mechanism for accounting for children who move schools between time points. This may be important, as these children may have particular characteristics which makes them different from children who do not change school (Goldstein & Spiegelhalter, 1996).

The second part of these limitations is that the assessment of the school is always out of date. Information has a tendency to be based on one cohort of children. It has been argued that as data is frequently based on pupils who enter a school several years previously, its utility for pupils in the future may be 'dubious' (Goldstein, 1997). This is particularly a problem for A-Level data which uses GCSEs as a baseline, for example, as data will always have a time lag of 5-6 years (Goldstein & Spiegelhalter, 1996). Even in the current study, there is a substantial time lag, with data from 2010 being useful for children entering school in 2014 or, more likely, 2015. Schools can change rapidly, however it can take far longer for a school's reputation to change. These types of studies may exacerbate this problem, by promoting out of date information on school performances (Goldstein & Spiegelhalter, 1996).

There have also been political criticisms of SER, with critiques arguing that researchers are 'in league with conservative policy-makers'. This criticism centres on the claim that SER is underpinned by an ideology of social control, with the research being used to blame schools and teachers for school failure, and with researchers not acknowledging the extent to which factors such as social class have an impact on educational outcomes (Teddlie & Reynolds, 2001). Townsend argues that the use of findings by various politicians cannot be controlled by researchers and that this critique suggests that anyone contemplating research which has a chance of being used for the wrong reasons should not start it in the first place (Townsend, 2001).

However, despite its limitations, SER has, in a slightly modified format, remained at the forefront of educational research into schools, along with School Improvement Research. It has been argued that SER results can provide a useful starting point for reviewing, developing and evaluating strategies and policies within schools (Sammons, 1999). Sammons claims that:

'…baseline and national assessment information can be used constructively to help identify children's strengths and weaknesses, to challenge stereotypes and to help teachers monitor student progress' p.10 (Sammons, 1999).

The comparisons of institutions such as schools has been said to be 'extremely important' activity, though one which is best carried out in collaboration with educational establishments, rather than in confrontation with them (Goldstein & Spiegelhalter, 1996). SER has been viewed as a tool which can promote schools' own capacities for improvement and empowers practitioners, by providing information on the school in which the staff work, to encourage self-reflection and evaluation. This research-based evidence can be provided to a school, taking into account their own specific intake demographics and abilities to enable them to monitor their school's results (Sammons, 1999).

Although SER is potentially useful, however, researchers must also guard against its misuse and misinterpretation. In particular, that SER is just one piece of information which needs to be used in context and that may be susceptible to measurement error (Sammons, 1999). Townsend furthers this by stating that 20 years of SER has shown that some schools can make a difference to child outcomes, but that they can make a far greater difference if they work in conjunction with the wider community and society (Townsend, 2001).

Sammons states that, although academic outcomes will continue to be important in SER, there needs to be a broadening of outlook to include social and affective outcomes for students in schools. There is also a suggestion that long-term follow-up, currently rare in SER, needs to be implemented in order to truly see whether schools have an effect on outcomes (Sammons, 1999).

In summing up the debate about SER, Townsend concludes that:

'Satan or Saviour? The truth is, it's neither. It is simply another attempt, with fallacies, flaws and successes, to help us to understand what happens when young people learn how to live in a rapidly changing world' pg.128 (Townsend, 2001).

8.6.2 Overview of the current literature

Since the 1960's, a debate has been raging about the school effectiveness and child outcomes. Much of this debate has centred on the ability of schools to affect academic outcomes, such as literacy and numeracy rates and exam passes.

One of the most influential pieces written in this field was Michael Rutter's book 'Fifteen thousand hours: secondary schools and their effects on children', which listed seven criteria for an effective school (Rutter, 1982):

- The pupil control system (e.g. rewards systems)
- School environment (e.g. good working conditions and responsive teachers)
- Pupil participation
- Academic development of pupils (e.g. use of homework, high expectations)
- Behaviour of teachers (e.g. providing good role models and dealing with pupils social/emotional difficulties)
- Classroom management
- Management structure (e.g. good leadership and teacher involvement in running of the school)

The main areas of schools around which the debate continues to focus on is in relation to the effects of class size and school size, the importance of parental involvement, the impact of intake mix, peer influences and the level of resources available to the school (Rutter & Maughan, 2002). There remains a focus in the research on academic achievement and, to date, there has been little attention paid to school effectiveness in relation to social, emotional and behavioural development, particularly in Primary school (Kasen, Johnson, & Cohen, 1990; Rutter & Maughan, 2002). The research which does exist in this field mainly centres on behavioural problems, or on adolescent tobacco, alcohol and drug use, both of which have shown substantial school effects, though weaker than those for academic attainment (Rutter & Maughan, 2002; West, Sweeting, & Leyland, 2004).

This section describes the current evidence around the effectiveness of schools in relation to social, emotional and behavioural difficulties. The current research around each of the areas of school effectiveness described by Rutter, as set out above, will now be explored in turn.

8.6.3 Effects of class size and school size on social, emotional and behavioural development

Evidence to date has tended to conclude that smaller schools result in better outcomes for children in elementary and secondary schools, in terms of both behavioural and academic outcomes (Leithwood & Jantzi, 2009a). The case for small schools was first made in educational research as far back as the 1960's, when it was argued that children in smaller schools were more active participants in extra-curricular activities and took more responsibility within the school than their counter-parts in larger schools (Barker & Gump, 1964b). However more recently, Schneider et al. conducted hierarchical linear models to explore the effects of school size in the US, and concluded that the evidence of a positive effect of smaller schools is inconsistent at best and, in some cases, small schools may actually have detrimental effects for some groups of students (Schneider, Wyse, & Keesler, 2006). Furthermore, research in Ireland found that children are more likely to be victimised or bullied in smaller schools (O'Moore, Kirkham, & Smith, 1997), though other studies have found no significant association for bullying by school size (Whitney & Smith, 1993b; Wolke, Woods, Stanford, & Schulz, 2001). Bonnet et al. suggested that the effect of school size on peer victimisation differed between the sexes: in the study boys experienced lower levels of peer victimisation in smaller schools, but no effect was found for girls (Bonnet, Goossens, Willemen, & Schuengel, 2009).

The majority of studies producing positive results by school size has been conducted in the USA and in secondary schools, where school sizes are significantly bigger than in the UK, with secondary schools in the US reaching up to 6,000 pupils, compared with the largest school in the UK, which had 3,500 pupils aged 3-18, and the largest in Scotland: Holyrood High School in Glasgow, which had over 2000 pupils. In the UK, where school size is perhaps less of an issue, the focus has been more on class size, with the conclusion being that small class sizes (less than 20 pupils) produce the best educational outcomes for children in the early years of school, and that this is particularly the case for disadvantaged children (Blatchford & Mortimore, 1994).

There is also some evidence to suggest that class size may be associated with social, emotional and behavioural functioning, and that this relationship is stronger than that for school size overall. The issue of class size has been under increasing scrutiny over the past twenty years, due to the increasing class sizes in the state education sector. Conclusions are, however, inconsistent. Some of the most comprehensive sources of evidence on this topic comes from the Project STAR (Student/Teacher Achievement Ratio) randomised control trial (RCT), conducted in Tennessee in 1985. The RCT randomly allocated children entering kindergarten to either a small class (13-17 pupils), a regular class (22-26 pupils) or a regular class with a classroom assistant in. Children were kept in the same experimental condition (class size) for four years and have been followed up ever since. Though the majority of this evidence has centred on academic performance, there has been some analysis of outcomes in relation to social, emotional and behavioural development. In particular, the study found fewer classroom disruptions and discipline problems in the small class sizes. In addition, after the experiment had finished, and classes all returned to regular sizes, children who had been in the small classes were found to have retained improvements in behaviour and were less likely to display inattentive-withdrawn behaviours, compared to peers in other classes. It should be noted that having a teaching assistant within a class did not produce the same effects (Finn & Achilles, 1999), suggesting that pupil-teacher ratio is not the key factor. This third element, the pupil-teacher ratio, whereby the class size remains the same but an additional teacher or teaching assistant is brought into the class, is increasingly important in the Scottish education context following new guidelines brought in by the Scottish Parliament to reduce the pupil-teacher ratio.

Further research, focusing on nursery stage children, found that larger class sizes in nursery lead to more aggression, annoying and teasing between pupils (Blatchford & Mortimore, 1994). A review of available research of pupil engagement, interaction and inattention concluded that small classes were favourable in terms of keeping children engaged and providing greater interaction between both pupils and teachers, and pupils and other children within the class (Finn, Pannozzo, & Achilles, 2003). Studies since then have produced contradictory results, with some backing up Finn's findings (Dee & West, 2011), but with other studies finding no impact of class size in any of these areas (Blatchford, Bassett, & Brown, 2005; Hoover-Dempsey, Bassler, & Brissie, 1987). Pianta concluded that it is more important to have an emotionally supportive and child-centred classroom in kindergarten, than a small class size (Pianta, Paro, Payne, Cox, & Bradley, 2002).

8.6.4 The importance of parental involvement

Parental involvement in school life is a key predictor of academic development. However, it is increasingly being seen as a predictor of social and emotional development as well (El Nokali, Bachman, & Votruba-Drzal, 2010; McWayne, Fantuzzo, Cohen, & Sekino, 2004). Previous studies have reported that increases in parental involvement in school life over the first five years of school are related to decreases in problem behaviours and increases in social skills (El Nokali et al., 2010), whilst evidence from the USA and China suggests that greater parental involvement in pre-adolescence increases the amount of positive emotional functioning in children (Cheung & Pomerantz, 2011). Mothers' involvement has been evidenced to play a role in the prediction of children's self-regulation and adjustment, whereas no effect was found for fathers. The author suggests that this may be due to the greater interaction that mothers have with children in the early years when these areas are being developed (Grolnick & Ryan, 1989). Conversely, it has been found that parents who were 'disconnected' from their child's school had children with higher levels of both internalising and externalising problems in school (Thijs & Eilbracht, 2012), though it may be that these parents had a poorer relationship with their children as well which could also be associated with such difficulties. There has also been some suggestion that the parent-teacher relationship, in particular, may account for some of the differences in child social, emotional and behavioural difficulties, beyond that of the child-teacher relationship. This was found to be particularly the case with children with Hyperactivity/inattention difficulties, and where the child was of an ethnic minority background (Thijs & Eilbracht, 2012).

However, Rutter suggests that there may be disadvantages as well as advantages to parental involvement in the child's schooling, for example if 'cliques' form or if parents are made to feel 'deskilled' (Rutter & Maughan, 2002). There has also been some discussion around the detrimental effect of parental 'control' i.e. pushing children towards particular outcomes, as opposed to facilitating autonomy in children, though, to date, this has mainly related to negative academic outcomes, rather than emotional and behavioural development (Pomerantz, Moorman, & Litwack, 2007). Furthermore, it has been shown that boys are more likely to be bullied and to be a bully when their parents are more involved in school. The same did not hold true for girls (Nansel et al., 2001). The direction of causality here is unclear however, as it may be expected that parents of children with problematic behaviour may be required to have increased contact with the school because of their child's problems.

It should be noted though that studies explored here use a mixture of parent and teacher-reports of parental involvement. Reynolds found that there was a substantial amount of disparity between parent and teacher ratings of parental involvement at preschool when measured simultaneously (Reynolds, 1992).

There are various theories as to why parental involvement appears to have an impact on social, emotional and behavioural outcomes. It has been suggested that the association between improved engagement and improved outcomes may be related to a growing awareness by parents of the social difficulties their child is facing, through discussions with teachers and school staff, and thus social skills may be promoted increasingly at home (El Nokali et al., 2010). Parent involvement has been found to be related to levels of stress in the household, which may be directly and/or indirectly having an effect on the child's social and emotional wellbeing (McWayne et al., 2004). Levels of engagement may also be related to school size, as there is some evidence that parents in larger schools may themselves be less likely to volunteer at the school or have contact with the school, compared with parents of children attending smaller schools, though effect sizes are small (Walsh, 2010).

8.6.5 The impact of intake mix

Aviles points out that children 'do not leave their home/community problems at the school door' (Aviles et al., 2006). Children's social, emotional and behavioural problems are very much shaped by their early experiences and the context in which they mix. Children within schools are more likely to share similar background characteristics compared with children in other schools (Hill & Rowe, 1996). Sellstrom et al. suggested that:

'The fact that schools are situated in different neighbourhoods and the pupils come from different socioeconomic backgrounds could explain variations in their school achievement and health and wellbeing' pg 149 (Sellstrom & Bremberg, 2006).

It is for this reason that research exploring the effects of schools must take into account the demographic characteristics of the school intake and the levels of difficulties within this intake. Indeed, early school effectiveness research was strongly criticised for failing to take the impact of intake mix into account when exploring school effects (Rutter & Maughan, 2002).

This area is strongly related to selection effects. In Scotland the majority of children go to their local school which falls within a catchment area, the size of which normally is normally limited depending on the size of the school so that a place can be guaranteed for each child in the catchment area (Leech & Campos, 2003). Parents can also ask for a 'placing request' which means that their child may get a place at a school outwith their catchment area, however 'popular' schools are frequently full and so placing requests are not always successful. The Growing Up in Scotland study found that 67% of parents in Scotland took a place at their local primary school, whilst 32% had a placing request accepted (Bradshaw et al., 2012a).

Where a local school is popular and tends to be full, it creates an incentive for families to move house at an appropriate time, or to take school catchment areas into account when moving house. There is evidence that parents will pay a premium for a house in the catchment area of a popular school, which creates a selection effect, where parents are essentially ‘buying into’ what are seen as ‘good’ schools. Research shows that the premium paid on house prices to be in the best secondary school catchment areas can be as much as an additional 20% of the house price (Leech & Campos, 2003).

Placing requests may help parents to circumvent this premium, by selecting a school out with their local area. Evidence from the Growing Up in Scotland study suggests that parents who make placing requests are more likely to live in an area of higher deprivation and to have a lower income than those who do not, which may suggest that parents were less content with the quality of their local school. Parents from an ethnic minority and those from urban areas (where there is greater choice of schools) were also more likely to submit a placing request (Bradshaw et al., 2012a). Previous research conducted in Lothian, Fife and Tayside in Scotland, however, suggests that parents who put in placing requests had higher levels of education and more prestigious occupations (Willms, Echols, & Willms, 1992). Either way, it is likely that the parents of children in the more popular schools differ from peers in less popular schools, either because parents have a higher income, or because they are potentially more motivated and engaged in their child’s education. This may compound differences in the intake demographics of pupils and widen the gap between schools in different areas.

Evidence to date shows that children in schools with higher levels of poverty amongst their intake are at greater risk for aggressive-disruptive behaviours in the first year of school (Thomas, Bierman, Thompson, Powers, & Conduct Problems Prevention Research Group, 2008). Further research has suggested that the higher concentrations of behavioural and emotional difficulties seen in schools within lower-SES neighbourhoods may increase the risk of children becoming victims of bullying within such schools (Hoglund & Leadbeater, 2004). Furthermore, in secondary school, being in a school with a lower proportion of girls in it is associated with being less likely to become a victim of physical violence at school (Mooij, 1998).

8.6.6 *Peer influences*

Social learning theory proposes that children learn by copying others, including their peers (Bandura, 1978). By this theory, children who witness a greater degree of misbehaviour in the classroom, particularly if poorly managed by teachers, may be at increased risk of conduct problems themselves. Within schools, the impact of levels of classroom aggression on individual aggression trajectories has been evidenced. Boys who had higher levels of individual aggression at the start of school and who were in a classroom with high levels of aggressive behaviours, were at a significantly heightened risk for behavioural problems in middle school (Kellam et al., 1994). Further research suggests that the longer a child is exposed to such an environment, the higher their levels of aggression will become, even after controlling for initial levels (Thomas & Bierman, 2006). Being a low-achieving child has also been found to exacerbate the effect of poor-behaving classroom environments on individual behavioural trajectories, with low-achievers in poor-behaving classrooms having worse developmental outcomes than higher achieving peers in the same context (Werthamer-Larsson, Kellam, & Wheeler, 1991).

There is a substantial body of research which has explored the role of peer acceptance and rejection in the development of externalising behaviours (Dodge et al., 2003; Cowen, Pederson, Babigian, Isso, & Trost, 1973) . Peer acceptance has been found to mediate decreases in externalising behaviours over time (Witvliet, van Lier, Cuijpers, & Koot, 2009), while peer rejection in the first year of school has been found to predict conduct problems in school four years later (Miller-Johnson, Coie, Maumary-Gremaud, Bierman, & Bierman, 2002). Others though have suggested that peer rejection in early schooling predicts antisocial behaviour in later primary school, only among those children already predisposed towards aggressive behaviour at the start of school (Dodge et al., 2003).

Evidence has been found of substantial school class effects in preschoolers on their psychosocial adjustment. Results from one study suggested that 11% of differences in psychosocial adjustment were due to school class effects. The authors attributed this to peer influences, evidencing the significant association between the amount of contact children had with each other and higher levels of positive social relations and fewer teacher-reported behavioural problems.

This was also supported by the authors not finding any significant correlations with classroom or teacher characteristics. The amount of contact children had with each other was also found to be related to lower levels of wellbeing at school, as reported by the children themselves (Van Den Oord & Rispens, 1999) . Furthermore, being a boy with behavioural problems, with a conflictual relationship with the teacher and in a classroom with conflictual social interactions and relationships within it, has been found to be associated with behaviour problems three years later. The same study also found that being in a classroom with a conflictual socio-emotional climate and having low individual behaviour problems at preschool predicted being withdrawn from peers in the second year of school (Howes, 2000).

A Canadian twin study found that genetic vulnerability for depression was not related to the number of friends a child had, or to the child's participation in friendships, however it was related to the self-reported quality of the child's friendships at age 10. In terms of depressive symptoms at the same age, a greater number of friends lowered the risk of depressive symptoms for boys, though this was not the case for girls. Both sexes reported fewer depressive symptoms if they had a better quality of friendship, even once controlling for genetic risk of depression (Brendgen et al., 2013). The direction of causation here is tricky, however, as it could be that children with fewer depressive symptoms are more able to form more and better quality friendships, compared with those with higher levels of symptoms.

8.6.7 Social climate of the school

Peer relationships and aggression within a classroom are strongly linked to the social climate of the school. In 1980, Moos identified three elements of the social climate of the school which were thought to be associated with academic achievement, behavioural competence and socio-emotional wellbeing. These were: 'relationship dimensions' (involvement of students in activities, peer relationships and teacher support); 'personal growth or goal orientated dimensions' (task orientation and between pupil competition); and 'system maintenance and change dimensions' (including pupil behaviour and class organisation, rule clarity, teacher control and innovation) (Moos, 1980). More recently, schools with positive social climates have been said to have an emphasis on academic achievement, positive relationships between pupils and teachers, a culture of respect, fair and consistent discipline policies, a safe environment and the involvement of families and the local community (Wilson, 2004).

Overall, school social climate has been reported to explain 5-8% of variance in behavioural problems between schools (Mooij, 1998). However, another study exploring the impact of school climate specifically on internalising symptoms found that, in middle school children, school social climate only explained 2% of the variance (Kuperminc, Leadbeater, & Blatt, 2001). It may be therefore, that school climate has more of an effect on some domains than others.

Lower levels of peer victimisation within the first year of school have been found to be related to the positive social climate of the school (e.g. anti-bullying policies) (Bonnet et al., 2009). Furthermore, pupils' sense of school community was related to more positive attitudes, greater motivation within school and better behaviour. This was true for schools with different levels of poverty within them and, in some cases, was found to be strongest for schools with the highest levels of poverty among their pupils. However, the study also found that pupils in schools with high levels of pupil poverty were less likely to report a positive sense of community in the school, suggesting that the school experience is less rewarding for pupils in school communities with higher levels of poverty, compared with their more affluent counterparts (Battistich, Solomon, Kim, Watson, & Schaps, 1995).

Other evidence suggests that pupils perceiving the teacher as stricter and more perturbed by disruptive pupils is associated with higher levels of premeditated physical violence in school. Furthermore, it was suggested that physical violence is more likely to occur where a pupil is in a class where a lot of whole-class instruction is given (Mooij, 1998). A slightly odd finding, which did not appear to be theory driven, was that schools which participated in pupil exchange programmes with other schools had fewer instances of disruptive behaviours in them (Mooij, 1998).

However the evidence is not always consistent. Wilson et al. found that a positive school climate does not always reduce the likelihood of aggression and victimisation and, in reverse, a negative school climate does not always result in increases in these areas. The author suggests that this is because victimisation and aggression are complex processes, influenced by a whole variety of factors alongside school climate, and thus school climate alone cannot predict outcomes – it is but one piece in the puzzle (Wilson, 2004).

Kuperminc and colleagues propose that the emergence of behavioural and social problems in relation to school social climate are better explained in terms of the person-environment fit theory, whereby problems arise when the needs of young people are not met by the particular environment of their school. The study found evidence of an interaction between self-criticism and internalising problems, which was stronger for children who held negative views of school social climate. This held true for boys and girls. In relation to externalising behaviours, the same interaction was found, however this time it was stronger for boys than it was for girls (Kuperminc et al., 2001).

8.6.8 The level of resources available to the school

The impact of the level of resources remains a controversial topic in relation to school effectiveness research (Rutter & Maughan, 2002). The majority of research conducted in this area has explored the impact on academic outcomes (Levaciç & Vignoles, 2002) and there is very little research available on the impact of school resources and facilities on the development of children's mental health.

At a preschool level, research has shown no evidence of an association between the availability of facilities in a school and psychosocial adjustment in preschoolers (Van Den Oord & Rispens, 1999). A synthesis of the evidence on school facilities showed mixed results on the impact of building quality. Older studies in the 1980's found that improved building quality was associated with fewer disciplinary incidents. However, further studies in the 1990's found exactly the opposite – that disciplinary incidents increased in newer and better buildings. It is proposed that this may be due to newer schools having stricter discipline standards and thus having more incidents reported and acted upon, rather than having a greater number of problems per se (Evans, 2005).

In recent years there has been a greater focus on the availability of green space in school grounds, as opposed to the traditional concrete playground which we have become accustomed to in the UK. Attention Restoration Theory proposes that natural environments can help with attentional functioning (Kaplan, 1995).

Further research has found that Attention Deficit Disorder symptoms are reduced following activity which has taken place outside in green space (Taylor, Kuo, & Sullivan, 2001). One would theorise therefore that there would be a relationship between the amount of time spent in and around green space at school and improvements in externalising symptoms. Studies have shown that replacing asphalt and other traditional playgrounds surfaces with grass trees and shrubs leads to an increase in social inclusion (Dyment & Bell, 2008), decreases in behavioural problems both inside the classroom and outside in the school grounds, decreases in aggression and fewer discipline problems (Bell & Dyment, 2008; Dyment, 2005).Furthermore, a study in Melbourne of 90 Australian schools suggested that having hands-on contact at school with nature can improve children's mental health and peer relationships (Maller & Townsend, 2006).

8.6.9 Teacher-child relationships

It has been suggested that teacher-child relationships, taken together with the previous child and family factors, may serve to promote adaptive or maladaptive trajectories of development (Silver et al., 2005). Attachment theory sits behind this suggestion, with the idea that children use their child-teacher relationships to organise their school activities: when a child has a warm relationship with their teacher, they are able to use this for other social relationships, e.g. with their peers (Howes, 2000). Previous studies indicate that children who have close relationships with teachers within a supportive environment may perform better academically and experience improved behaviour (Gest, Welsh, & Domitrovich, 2005).

At preschool level, teachers' emotional interactions with children were found to predict teacher-rated social skills, even once background characteristics of the child were controlled for (Mashburn et al., 2008). Another study demonstrated that teachers can reduce poorer outcomes for children at high risk of social, emotional and behavioural problems: children with high levels of social, emotional and behavioural problems at preschool, who were placed in a classroom with a high level of emotional support from teachers in the first year of school, were found to have improved relationships with staff and academic outcomes en par with their non-at risk peers by the end of their first year (Hamre & Pianta, 2005).

Teacher-pupil relationships have been found to be a stronger predictor of behavioural problems than of academic performance at elementary school, even when controlling for baseline scores (Hamre & Pianta, 2001). Teacher reports of conflict in the teacher-child relationship were associated with escalating levels of externalising behaviours (Silver et al., 2005). The combination of aggressive behaviours and poor teacher-child relationships has been evidenced to produce poorer academic outcomes for children between the start of school and age 10-11 (Stipek & Miles, 2008). Conversely, there is also some evidence that the closeness of teacher-child relationships may be related to decreasing externalising behaviours, but only for children already exhibiting externalising behaviour in kindergarten (Silver et al., 2005). Longitudinal research suggests that this relationship is a reciprocal one in that, not only does escalating aggression predict poorer teacher-child relationships, but also that worsening relationships predict more problematic behaviour (Stipek & Miles, 2008).

Studies have produced mixed results on whether a gender effect exists in relation to the association between child-teacher relationships and behavioural outcomes. On the one hand, evidence has shown that results for boys and girls are the same, with conflict in the relationship being associated in a similar way with poorer behavioural outcomes for both genders (Silver et al., 2005). However, both behavioural difficulties and conflict in teacher-child relationships, respectively, have been found to be substantially lower for girls than for boys (Gest et al., 2005).

The direction of causality is difficult to establish in these studies. Children who exhibit particularly difficult behaviour in a classroom may well have more conflict with their teacher, due to the teacher having to manage that behaviour. However, Hamre and colleagues looked just at children who had behavioural problems in kindergarten in relation to their later behavioural outcomes at 8th grade, and found that children who, despite their behavioural problems, managed not to develop a negative relationship with their kindergarten teacher, were at far lower risk of still having behavioural problems later in school (Hamre & Pianta, 2001). This would suggest that, in at least some cases, the teacher-pupil relationship can work separately to the child's behavioural problems and that this can be beneficial to the child. This may be because the teacher brings some characteristic or behavioural factor into the equation, or it could be due to some unmeasured confounding factor.

It should be noted that, because many of these studies are based on observations which are then quantified, sample sizes tend to be relatively small e.g. (Silver et al., 2005; Hamre & Pianta, 2001).

8.6.10 The accumulation of risk factors

It is increasingly argued that it is not any one risk factor, but an accumulation of risk factors that results in the poorest child outcomes. For example, work using the Rutter scale of adversity proposes that, at the age of ten, having 0-1 risk factors results in a prevalence of psychiatric disorder of 2%, whilst children in families with four or more risk factors have a 20% risk (Biederman et al., 2002). Other studies have found that early cumulative childhood risk significantly predicts internalising and externalising symptoms, respectively, in adolescence, but that middle childhood risk factors did not (Appleyard, Egeland, van Dulmen, & Sroufe, 2005). Indeed, the total number of risks has been found to account for as much as 20% of the variance in externalising behaviour scores in middle childhood (Deckard, Dodge, Bates, & Pettit, 1998). Furthermore, evidence from the Adverse Childhood Experiences study suggests that the number of adverse experiences in childhood, such as witnessing violence and experience abuse, is directly related to mental health problems in adulthood and that a dose-response can be seen, so that the higher the number of childhood adverse experiences, the poorer the mental health of the adult (Edwards, Holden, Felitti, & Anda, 2003). However, it may not just be the pure number of difficulties experienced by children that are associated with mental health outcomes, but it could be that interactions between different factors in childhood may lead to poorer outcomes.

8.7 Conclusions

The current evidence highlights the importance of social, emotional and behavioural development, due to the recognised impact of early functioning on later mental health and other adverse outcomes. There are still gaps in the knowledge base however, particularly around the overlaps and continuity of internalising symptoms in early to middle childhood.

Glasgow City has been evidenced to have poorer outcomes in relation to adult physical and mental health, which cannot solely be explained by differences in population demographics, when compared with other similar cities. However, evidence is lacking around whether a Glasgow Effect operates in relation to child outcomes and more research needs to be conducted to explore this area.

The evidence around individual, family, area and school factors associated with social, emotional and behavioural development was synthesised. Research in this area has not been as prolific as it has in relation to academic or cognitive outcomes. In particular, there appears to be a substantial gap in the literature in relation to overall school effects on social, emotional and behavioural development in primary school age children. To date there has been little agreement on which factors are most important in relation to social, emotional and behavioural problems in early to middle childhood. What is clear is that there are a wide range of factors relating to social, emotional and behavioural development and that it creates a complex picture. It is plain though that it is not enough to look just at individual or school level variables, but that we need to take an ecological approach to investigating child development in the first few years of school.

9 Methods

9.1 Introduction

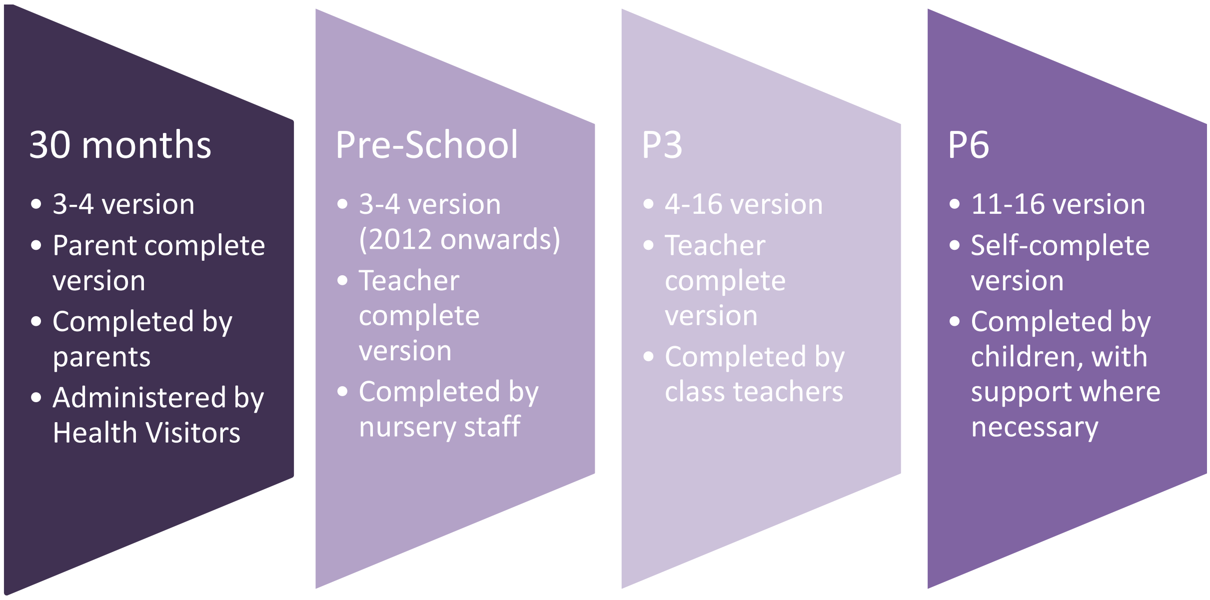
This chapter details the overall conduct of the research, describing each stage of the data collection process and how each one relates to the others. Piloting and roll-out of the different stages took place over a few years and were therefore used to inform each other. In addition, the chapter explores non-response within the data. The analysis plan for each results chapter is detailed within the respective chapter.

9.2 Overview

The data utilised in this thesis was part of a dataset from a larger evaluation being run by a team at the University of Glasgow, exploring the impact of the Parenting Support Framework in Glasgow City, which primarily comprised evaluating the implementation of Triple P Parenting Program for parents of children growing up in Glasgow (Marryat, Thompson, White, McClung, & Wilson, 2012).

As well as exploring pre- and post-intervention measures, the evaluation took an innovative approach in measuring social, emotional and behavioural difficulties in the whole population of children in Glasgow City at various stages. It was hoped that this would allow researchers to ascertain whether the implementation of a Universal parenting program was having an impact, both on individual children, and on the population of children in Glasgow city as a whole. Data were collected through educational establishments on the social, emotional and behavioural development of children at 30 months, pre-school (four to five years), Primary 3 (seven to eight years), and Primary 6 (ten to eleven years).

Figure 9 Diagram of SDQ versions used at different stages



The analysis in this thesis focuses on the first cohort of children in the study who were in Pre-school in 2010 and Primary 3 in 2013, as indicated in the circled cohort in Table 1. At each of these stages, nursery or school staff completed the data for each child. Data from both stages were used to explore social, emotional and behavioural development over time and linked educational administrative data allowed for the investigation of different layers of influence, such as at the individual, neighbourhood and school levels, on these pathways. The cohort will again have SDQs completed when they are in Primary 6 in 2016, outwith the time period of this PhD.

Table 1 Stage of data collection by cohort and year of data collection

Cohort	Year of data collection						
	'09/10	'10/11	'11/12	'12/13	'13/14	'14/15	'15/16
C1	PreSch			P3			P6
C2		PreSch			P3		
C3			30m		PreSch		
C4			PreSch			P3	
C5				30m		PreSch	
C6				PreSch			P3
C7				P6			

9.3 Outcome Measures and Indicators

9.3.1 Goodman's Strengths and Difficulties Questionnaire

The main outcome measure used in the analysis is Goodman's Strengths and Difficulties Questionnaire (SDQ) (Goodman, 1997). The SDQ is a brief behavioural screening questionnaire for children aged from 2 to 16.

The SDQ contains five separate scales and asks about 25 attributes of social, emotional and behavioural development. The scales are Emotional Symptoms, Conduct Problems, Hyperactivity and inattention, Peer Relationship Problems, and Pro-social Behaviours. The five scales each contain five statements, to which the respondent answers as to whether the statement is 'not true', 'somewhat true' or 'certainly true' of the child. The first four (negatively-rated) scales can be added together to create a 'total difficulties' scale. The Pro-social Behaviours scale is a positively-rated scale, whereby a higher score equates to a lower level of difficulties. Cut-off scores are provided which allocate children into one of three groups: no difficulties, possible difficulties or likely difficulties. In a normal population, the no difficulties group would contain 80% of children, with the remaining two groups each containing 10%. For the present analysis two of these categories will be collapsed creating two groups – those with likely difficulties (also known as an abnormal score) and all others (the no difficulties or normal group combined with children who scored in the possible difficulties/borderline group). This decision was taken due to the relatively poor predictive value of the 'possible difficulties' group (Goodman, 1997; Goodman et al., 2000).

The SDQ has been found to have good predictive validity. Children who scored in the likely difficulties range of the SDQ (as rated by parents or teachers) had increased odds of 15 for being subsequently diagnosed with a psychiatric disorder 4-6 months later. Children who rated themselves as having likely difficulties on the self-complete version of the SDQ, had odds of a psychiatric diagnosis 6 times higher (Goodman, 2001). In a normal population sample, the SDQ produces high numbers of true negatives (specificities and negative predictive values at c.95%) i.e. the proportion of children screened who don't have problems on the SDQ and really don't have problems (i.e. meeting the clinical diagnosis criteria) in real life, but it also produces lower proportions of true positives (the proportion of children with a likely difficulty on the SDQ who also have a diagnosis in real life), at just 35%. As Goodman points out though, screening tests often accept this level of risk in terms of the identification of false positives, as the priority is to reduce the rate of false negatives (Goodman, 2001). Similar results have been found in a number of other contexts (Wichstrom et al., 2012; Bourdon et al., 2005; Fleitlich-Bilyk & Goodman, 2004).

The SDQ is available in three separate versions for completion by parents, teachers and in a self-completion version for older children (aged 11-16). There is a separate version for 3-4 year old children, which replaces the items 'often lies or cheats' with 'often argumentative with adults' and 'Steals from home, school or elsewhere' with 'can be spiteful to others'. For the present study the 4-16 year old version of the questionnaire was used in 2010, the first year of data collection. In later years this was changed to the 3-4 year old version following staff feedback regarding some of the items in the older version being age inappropriate. In particular, there was a view from staff that although some children may put toys in their pockets and go home with them (essentially 'stealing'), the intent was not there, and so this question was not felt to be developmentally appropriate (White, Connelly, Thompson, & Wilson, 2013). The result of this is that scores on the Conduct Problems domain may be lower than expected in 2010, as staff were more reluctant to rate children as having difficulties in these areas.

Data collection at pre-school and P3 used the teacher-rated version of the questionnaire. At pre-school data collection at age 4-5, the SDQ was completed by a pre-school staff member (generally the Child Development Officer) who has known the child for at least six months. This is sometimes completed in collaboration with other nursery staff. At P3 (age 7-8), the SDQ was completed by the class teacher.

9.3.2 Potential Issues with the SDQ

The SDQ was designed as a shortened behavioural screening version, based on Rutter's longer questionnaire (Goodman, 1997). Whilst the SDQ has been validated in different settings (Muris, Meesters, & van den Berg, 2003; Goodman, 1997; Hawes & Dadds, 2004), there remains some criticism of use of the scale from some quarters. The scale is substantially shorter than many of the commonly used scales, for example the Child Behaviour Checklist (CBCL) (Achenbach & Edelbrock, 1991), though Goodman's own work on comparing validity between the SDQ and CBCL concludes that the SDQ is at least as good at detecting problems, and detects more on the inattention and hyperactivity scale (Goodman & Scott, 1999). These findings are supported by evidence comparing the German versions of the SDQ and CBCL (Klasen et al., 2000).

As discussed above, the SDQ is being completed by different raters at different times. The SDQ has the highest validity when completed by all three types of respondents simultaneously. While it would be highly desirable to have multiple informants at each time point in the Glasgow study, the resources available do not allow for this. There has been a considerable amount of research about the extent to which teacher, parent and self-report versions of the SDQ overlap (Collishaw, Goodman, Ford, Rabe Hesketh, & Pickles, 2009; Goodman, Ford, Corbin, & Meltzer, 2004). Goodman found a substantial overlap in the three informants' scores, ranging from r=0.35 (for teacher-child correlations in 1999) to r=0.50 (for parent-teacher and parent-child correlations in 2004). Agreement in SDQ scores between parents and teacher was substantially higher for boys than for girls (r=0.52 for boys in 2004, compared with r=0.45 for girls in 2004) (Collishaw et al., 2009). The concurrent validity study which ran alongside the

SDQ Pre-school pilot in Glasgow investigated the overlap between teacher and parent ratings of the same child. SDQs were given out to parents in a sub-sample of 24 nurseries in Glasgow (n=676). Forty percent of carers (n=273) completed the SDQ. It was possible to match carer and teacher SDQ forms in 60% of cases (n.=180), of which 174 had a complete set of information. There was broad agreement between parents and teachers as to whether the child was experiencing ‘probable difficulties’ on each scale, with agreement greatest on the Emotional Symptoms, Hyperactivity / inattention and Total Difficulties scales (91-92%). Teachers were less likely to find problems on the Conduct and Peer relations scales, compared with parents. The study is limited in its conclusions however, due to the small numbers of matched results. Goodman’s work suggests that, while the SDQ prediction works best when completed by both carers and teachers, where only one adult completes the SDQ, the parent and teacher versions provide roughly equal predictive value (Goodman et al., 2004).

It is also the case that different informants witness children in different settings, where real differences may be observed, for example, a teacher may witness far more social interaction between the child and other children and therefore pick up more problems in the peer problems or pro-social domains. In the Glasgow pre-school concurrent validity study however, teachers were less likely to pick up peer problems, though again, numbers here were small. Furthermore, in Primary school, children are expected to sit and concentrate on tasks for longer, so teachers may be more likely to observe hyperactivity or inattention problems, compared with parents or even nursery staff. It has also been suggested in the literature that teachers may have more of an idea of what ‘normal’ development looks like, and may therefore be more likely to spot children who appear to be not developing normally (Stone, Otten, Engels, Vermulst, & Janssens, 2010).

On the other hand, there has been some concern raised by nursery staff in the Glasgow qualitative feasibility study about the labelling of children (White et al., 2013). It is feared that this may lead some nursery staff to under-report some problems. There is also a concern that partnership provider nurseries may be under pressure, due to the way they are funded, not to report too many problems. Comparisons with national and international norms should help to shed light on this issue.

A further consideration in this type of research is the impact of social desirability. Social desirability is said to *"reflect[s] the tendency on behalf of the subjects to deny socially undesirable traits and to claim socially desirable ones, and the tendency to say things which place the speaker in a favourable light" pg.264 (Nederhof, 1985)*. It may be that some staff members would like to portray the behaviour of children in their establishment more positively than may be the reality, particularly as this information is collected by the Education Services department, through which pre-school establishments receive their partnership funding and schools are monitored. In contrast, it could be that nursery staff and teachers rate their children more negatively, in the hope that this will attract additional resources to the school or nursery in which they work. One would normally compare data to national or international norms, in order to get a gauge of any bias, however, there is a lack of available data broken down by age and a potential 'Glasgow Effect' may mean that Glasgow data are actually different rather than reflecting bias in the data.

9.4 Demographic Data

Demographic data were collected as part of the routine data collection undertaken by Glasgow City Education Services (GCES). The main benefit of this was that respondent burden was minimised. These data are completed by schools and held in the electronic SEEMIS education database. Additional data obtained from the SEEMIS system were:

- Child home postcode at preschool and P3
- Child Looked After status at Preschool and P3
- Child Ethnicity
- Child Sex

The child ethnicity field was poorly completed. Postcode was used to link to the child's home area and level of area deprivation – both Scottish and Glasgow City quintiles (further details below). Date of birth data was also held, but was poorly completed with a lot of missing data and implausible dates of birth. For this reason child age was excluded from the analysis.

In addition, GCES provided the research team with a range of school level data (from the 2012/13 academic year, which equated to the year in which the P3 data were collected), comprising:

- Religious denomination
- Number and percentage of children in each school eligible for Free School Meals
- School Pupil Roll
- The number of exclusion incidents per 1000 pupils

I also added to this school level data through a trawl of the publically accessible Her Majesty's Inspectorate of Education (HMIe)/Education Scotland inspection reports. In the reports all schools are given a mark for each area of school life, ranging from Unsatisfactory to Excellent. These were converted into numeric codes and an average taken. In addition, the reports detailed children's attendance in relation to the Scottish National average (e.g. well below average) and these categories were also taken into account in the analysis.

9.4.1.1Scottish Index of Multiple Deprivation

The Scottish Index of Multiple Deprivation (SIMD; 2009) (Scottish Government, 2012) is produced by the Scottish Government and takes into account 38 indicators of deprivation across seven domains: income, employment, health, education, skills and training, housing, geographic access and crime. Scotland is divided into 6,505 small areas, called datazones, each containing around 350 households. In order to create quintiles, each datazone is then ranked and split into five equal groups, each representing 20% of the population. This thesis uses two versions of the SIMD quintiles – Scottish quintiles and Glasgow quintiles. Glasgow deprivation quintiles are normed for the Glaswegian population. This is because when Scottish SIMD quintiles are applied to the Glaswegian population, due to the high levels of poverty in the area, around half of the population fall into the lowest deprivation quintile. The Glasgow Quintiles therefore allow for more detailed investigation of differences between different levels of deprivation within Glasgow. For this reason Glasgow Quintiles are used in the multilevel models.

9.5 Ethics

The main part of the data collection was not subject to ethical approval due to the primary intent of the project being to examine the impact of the implementation of Triple P (and the Parenting Support Framework more generally) in Glasgow. However, additional elements, such as the parent-teacher concurrent validation study and the Pre-school feasibility study did receive ethical approval from the University of Glasgow ethics committee. In addition, a legal data sharing agreement was drawn up between the University of Glasgow and GCES allowing for the sharing of the SDQ and demographic data between the two organisations.

9.6 Recruitment and Data collection

9.6.1 Preschool data collection

Preschool data collection occurred before LM came into post. Data collection was managed by Dr Jane White in collaboration with colleagues from GCES, with administrative assistance from Kim Jones and Kelly Chung. The evaluation was overseen by Dr Lucy Thompson and Professor Phil Wilson.

The pre-school year is the academic year directly before children start school. In Scotland, children routinely begin school in the August of the year in which they are five years old (White et al., 2013). Pre-school data collection began in 2010. All early years establishments which had 'partnership provider' status (i.e. places were paid for by Glasgow City Council as part of their commitment to free pre-school provision for all 3 and 4 year old children) were contacted by Glasgow City Education Services and asked to complete a SDQ form and cover sheet for each child in their nursery who was in the pre-school year and eligible to start Primary 1 the following August. In addition, an information sheet was sent to parents informing them of the completion of their child's SDQ with contact information in case they had any questions. No parents opted out of their child's SDQ being gathered. Forms were completed in February 2010, in order that results could be fed into the P1 transition documentation. At this stage SDQs were completed either electronically (as part of the SEEMIS system) or on paper. Those which were completed on paper were scanned into an electronic form by the evaluation administration office using Formic Pro version 5.3.041. These data were then merged with data completed electronically. In 2010, preschool establishments returned the SDQs for 70% of children in Glasgow City.

There was no pilot stage for the preschool data collection, however, a feasibility study and concurrent validation study ran alongside the data collection in 2010, and alterations were made after fieldwork, taking findings from these into account. Alterations included changing the version of the SDQ from the 4-16 year old version to the 3-4 year old version, which omitted certain questions that some nursery staff felt were inappropriate for the child’s age, as discussed earlier. The feasibility study, which involved interviews at 22 nurseries, concluded that, from the perspective of nursery staff, it was feasible to assess children in this way for social, emotional and behavioural development (White et al., 2013).

9.6.2 P3 Data collection

9.6.2.1 P3 Pilot

The P3 data collection for both the pilot and mainstage was project managed by LM in collaboration with colleagues from GCES, assisted by the research administrators, Kim Jones, Elsa Ekevall and Sheena McGowan, and overseen by Dr Lucy Thompson and Professor Phil Wilson.

The Primary 3 (P3) pilot was conducted in February and March 2012. Eight schools from across Glasgow City were approached initially by GCES and then by the evaluation team, and asked to take part in the pilot study. All schools agreed to participate. The schools were chosen to represent a range of areas and levels of deprivation. Class teachers for all P3 classes within the schools were asked to complete the SDQ and a cover sheet with demographic details in paper format for each child in their class. Forms were then compiled and sent back to the evaluation office where they were scanned into the computer using Formic Pro version 5.3.041. Out of 310 children in the pilot schools in P3, 300 SDQs were returned, a response rate of 96.8%. Of these, 298 had a complete set of SDQ data.

Following the pilot, a small feasibility and acceptability study was performed. Twenty-three interviews were conducted with primary school teachers, Depute

Heads and Head teachers involved in the study. Interviews were carried out by a researcher from GCES, Julie Riddell. Though there were concerns raised about the time which it took some teachers to complete the SDQs and cover sheets, there was also a view that there were some perceived benefits in terms of allowing staff time to step back and look at patterns of behaviours in their class. Overall the SDQ collection was felt to be feasible for teaching staff and acceptable to them and the schools involved.

9.6.2.2 P3 2013 full population data collection

The P3 cohort data used in this analysis was collected between March and April 2013. Head teachers in all Glasgow Local Authority schools were sent an email by the GCES, asking them to arrange for P3 staff to complete a SDQ and cover sheet, containing demographic and data quality measures, for each child in their P3 class. Also attached was guidance on completing the SDQ. The SDQs were completed on the SEEMIS system, which is the computerised data system used in Glasgow City to collect data from schools.

A database containing P3 SDQ data, along with demographic data available through the SEEMIS system, such as child home postcode, Looked After status and ethnicity, was created by GCES and passed to the Evaluation team at Glasgow University. Cover sheets were returned to the evaluation office through the Educational Psychologists for each school and scanned into the computer using the Formic system.

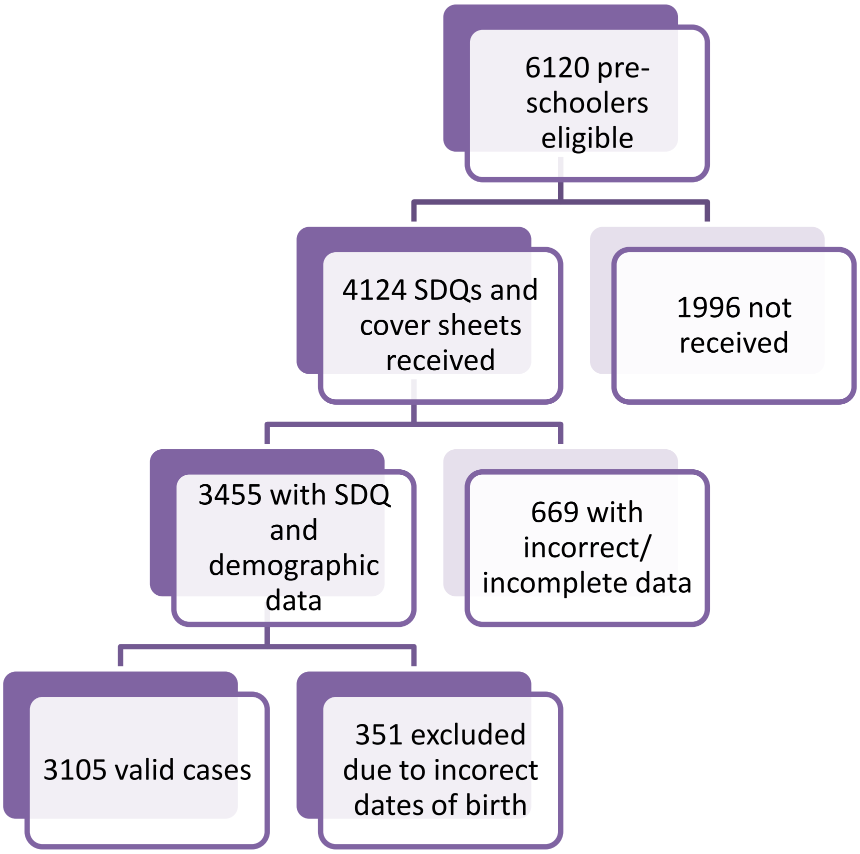
Data from the SEEMIS system (SDQs and demographics) were matched with data from the cover sheets (additional demographics, class information and quality control measures) using the Scottish Candidate number and checked through date of birth and name of child matching.

9.6.3 Response rates and missing data

9.6.3.1 Preschool 2010

It is estimated that there were 6120 children in 2010 who attended partnership or Local Authority nurseries in Glasgow City, and who were eligible to attend Primary 1 in the following academic year. Taking these numbers as the base, the response rate was 67.4% in 2010 (n=4124/6120). Complete SDQ results and full demographic data were received for 3455 children (56.5%) in 2010.

Figure 2 2010 Preschool Recruitment



In addition, 351 children were excluded from the analysis because they had dates of birth after February 2006, which was the cut-off for starting school in August 2010. Although, in theory, parents of younger children can apply for their child to enter school early, this is extremely rare, and allowances by Education Services are exceptional (e.g. one or two a year at most[1]).

Preschool SDQ data were matched to the P3 SDQ data. This was done in two separate ways. For children who had Preschool data collected on paper and scanned into a database, these children were matched to their preschool data on the basis of the child’s first name, surname and, where necessary/available, date of birth. Data were matched using SPSS commands and then those which were unable to be matched were matched manually. Duplicate cases also needed to be handled separately. Where there were cases of the same child having an SDQ completed at two different institutions, the institution where the

[1] Based on personal communications with Education Services Department, Glasgow City Council

child had attended the longest or, where this information was missing or the same, where the child spent the most time per week, was taken as the record for the child. Children who had their data collected on computer via the SEEMIS system in preschool were matched via their SEEMIS ID which appeared on both the preschool and P3 datasets. Of the 3105 SDQs for preschool, 2131 (68.6%) could be matched to their P3 SDQs. This equates to 39.6% (2131/ 5387) of children attending P3 in Glasgow City in the 2012/13 academic year.

Not all children who attend a preschool in Glasgow City will have had a P3 SDQ completed. P3 SDQs are not completed for children who attend private/non-local authority schools in Glasgow (this constitutes around 5% of the school population). Seventy children in the 2010 preschool database attended a preschool establishment which was attached to one of the private schools in Glasgow City. In addition, while a parent can choose to attend any preschool establishment, they must apply specially through a placing request to attend a school which is not their local school. This means that children may attend a preschool establishment in Glasgow City, even though they live out with the city boundary, but are then likely to go onto attend a Primary School in their local area (i.e. not in Glasgow City). This may also happen in reverse, with children attending a preschool out with Glasgow City and then attending their local school within the city boundary. In addition, children may move in and out of the area. Glasgow City has a relatively high number of asylum-seeking families (4887 in 2008, the latest figures available by city, compared with 1120 in Manchester and 1245 in Liverpool (Information Centre about asylum and refugees, 2014)), who are frequently more mobile than other groups. In addition there may be a small number of children who do not attend school because they are home educated or who attend a school for children with additional support needs.

Figure 3 2013 P3 Recruitment

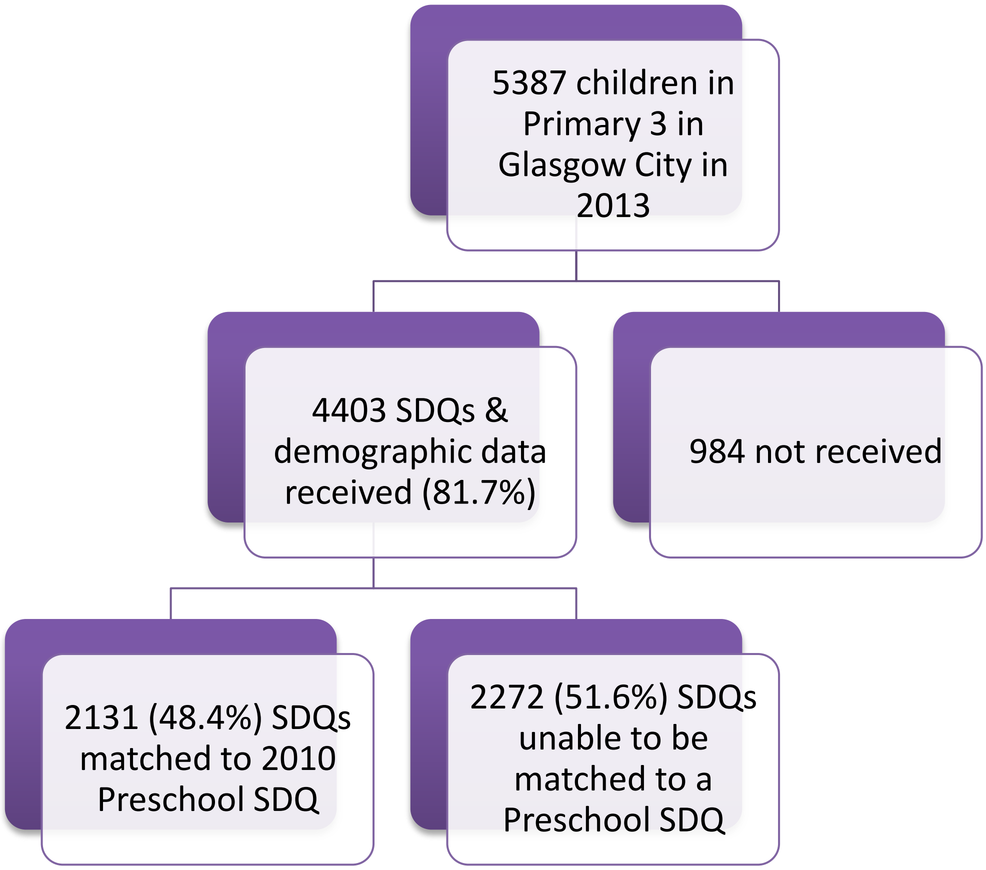


Table 2 Number of missing cases within matched dataset

	2010	2013 (who also have data at 2010)
Nursery	0	0
School	-	0
Sex	10	0
Date of birth	3101	1535
Looked After status	0	0
Postcode at preschool	869	392
Postcode at P3	-	345
Ethnicity	1917	59
Total Scale (preschool)	33	3
Emotional Scale (preschool)	33	3
Conduct Scale (preschool)	32	2
Hyperactivity Scale (preschool)	32	2
Peer Relations Scale (preschool)	32	2
Pro-social Scale (preschool)	31	2
Total Scale (P3)	-	1
Emotional Scale (P3)	-	1
Conduct Scale (P3)	-	1
Hyperactivity Scale (P3)	-	1
Peer Relations Scale (P3)	-	1
Pro-social Scale (P3)	-	1
Base	*3697*	*2131*

9.6.4 Non-response analysis

Preschool data were completed for 3682 children in 130 Glasgow City pre-school establishments. Twenty-eight children who had SDQs could not be matched to a particular pre-school establishment due to incomplete data.

In 2013, SDQ data were completed by school staff for 4403 children in P3. This comprised 81.7% of the P3 population (4403/5387) using September 2012 school census data as a baseline. Children attended 120 different schools in Glasgow City. 2131 of Pre-school SDQs were able to be matched to follow-up data at P3 (57.9% with an SDQ at preschool).

9.6.4.1 Preschool children in comparison to the population of children in Glasgow City (2010-2012)

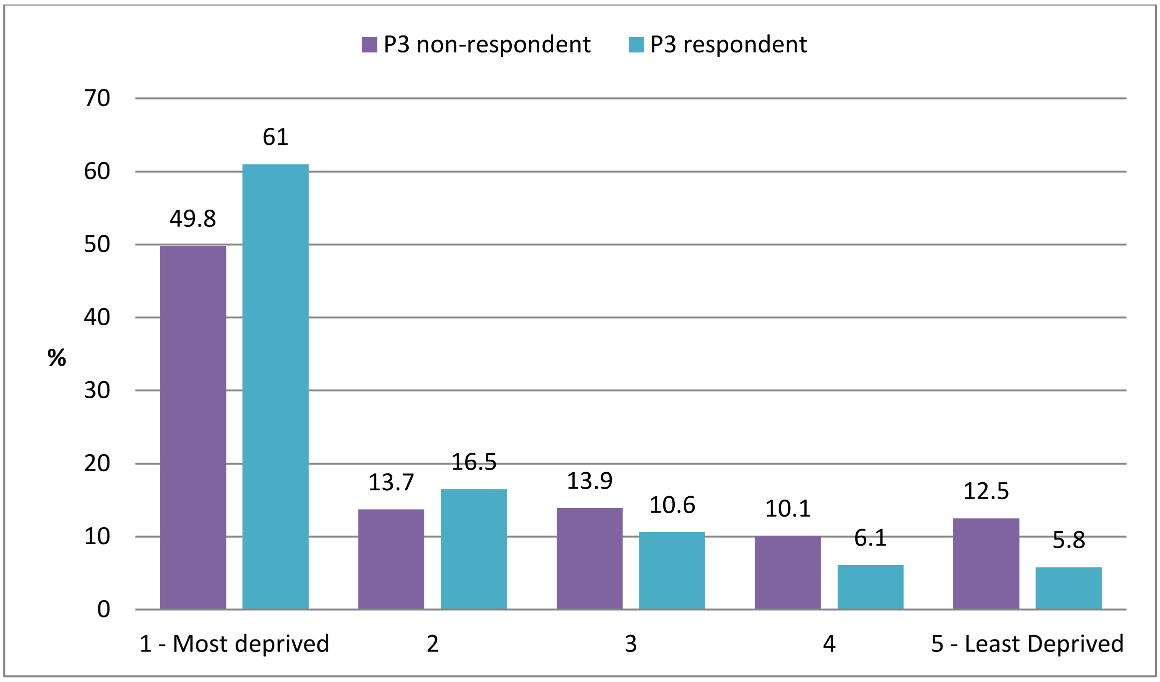
The postcodes of all children eligible to start school in Glasgow City in 2010, 2011 and 2012, based on the year of their birth, were obtained from NHS Greater Glasgow & Clyde in order to compare the geographical distribution and corresponding deprivation between the children leaving local authority/partnership nurseries and those likely to be entering schools. The statistician for the broader evaluation, Dr Sarah Barry, conducted the analysis for this section. Postcodes were provided for 19,597 children, of which 27 did not have a valid Glasgow City postcode, leaving a total of 19,570 children eligible to start school. Of these, 10,905 (55.7%) did not have an SDQ completed, while 1744 (16.8%) of the 10,409 children who did have an SDQ complete at preschool, did not appear in the NHS dataset for the corresponding year. This may be because the child had deferred their school place and was therefore old for the year or because they lived out with the boundary of Glasgow City, but attended a preschool within the city boundaries. 8655 (44% of those thought to be living in Glasgow City in the appropriate year group) children were both present in the overall cohort and had an SDQ completed for them.

Children in the sample lived in areas with higher levels of multiple deprivation than the overall population, with 14%, 17%, 20%, 22%, 27% of children in the sample and 18%, 18%, 19%, 21%, 24% in the overall population living in Glasgow SIMD quintiles 5 (least deprived) to 1 (most deprived), respectively. Geographically, the distributions of children across electoral wards in the overall population and sample were similar, with the largest differences between the cohorts being an overrepresentation in the sample of 1.7% for Drumchapel/Anniesland (containing 7.5% of the sample and 5.8% of the overall population) and an under-representation in the sample of 1.0% for Southside Central (containing 5.1% of the sample and 6.1% of the overall population) (Barry et al., 2014).

9.6.4.2 Attrition between Preschool and P3

Differences in baseline demographic characteristics could be seen between responders and non-responders at Primary 3. Children for whom we have no data at P3 were significantly more likely to have lived in a relatively affluent area at Preschool age than those for whom data is missing at P3. Just 5.8% of P3 respondents lived in the most affluent quintile, compared with 12.5% of children for whom we do not have follow-up data. The loss of higher proportions of children from more affluent areas would be uncommon in survey research, where attrition tends to be focused in more disadvantaged families. Part of the disparity in this data may be accounted for by children who went onto attend private schools: 6.2% of children in Glasgow City attended independent Primary schools in 2009 when this data was last published (Scottish Government, 2010). Data collection at preschool included private nurseries and nurseries attached to independent schools, whereas P3 data collection only included children at Local Authority schools. It may also be that more affluent families and, in relation, those with higher educational qualifications, may be more geographically mobile due to changing jobs. Evidence from UK Census data found that people with higher qualifications were more likely to move, and more likely to move further away (Champion, 2005).

Figure 4 P3 response by SIMD Quintile at preschool



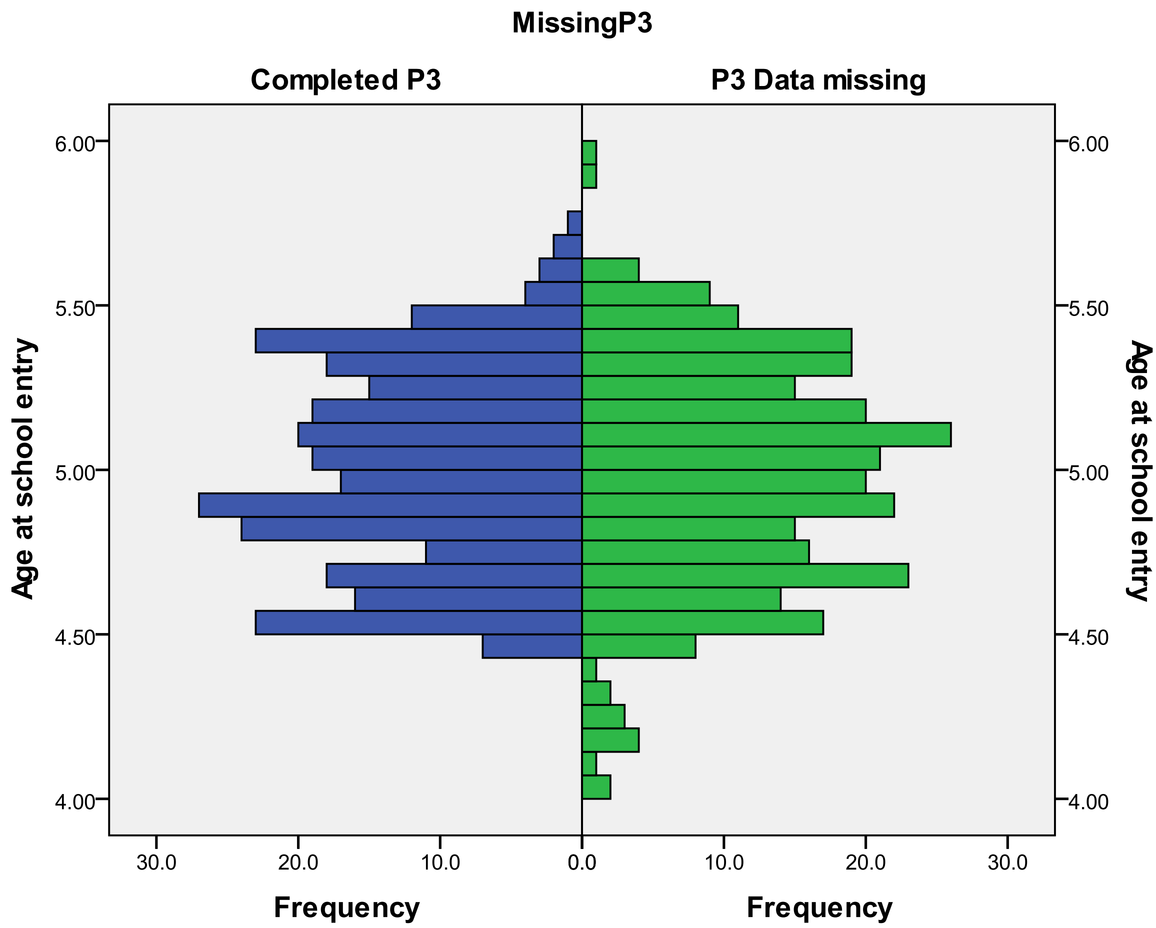
Base: 4430

There was also a considerable difference between children for whom we have Primary 3 data in terms of their ethnicity: 38.4% of children for whom P3 data was missing were of a non-White UK ethnicity, compared with 25.5% of children with both Preschool and P3 data. Evidence shows that non-White UK families are more likely to move house and to move further in terms of distance (Champion, 2005). Thus a larger proportion of ethnic minority families may have moved out of Glasgow City between the start of school and P3, compared with White UK families.

Little difference could be seen between proportions of boys and girls who were responders or non-responders: 51.9% of responders at P3 were boys, compared with 52.7% of non-responders. There was no difference at preschool between respondents and non-respondents in terms of levels of Looked After status.

Dates of birth were poorly completed at preschool. Only 596 (16.2%) children had a date of birth completed. Of these 21 had dates of birth which meant that they were under the age of 4 at the start of school and two children had birthdays which meant they were six at the start of school (calculated from the Glasgow City council school start date of 16th August 2010). These dates of birth were assigned as ‘missing’ for the purposes of the non-response analysis. Of this small sample for whom dates of birth were provided, there was no difference between the mean age at start of school, with both responders and non-responders having a mean of 5.0 years. However, the profile of ages, as shown in Figure 5, does vary somewhat, with non-responders being more likely to be at either extreme of the spectrum. This may be related to these children having deferred their entry to school (and thus would not be in P3 in 2013), or possibly moving to a school for children with additional needs, which would not be included in the P3 data collection.

Figure 5 Non-response by age at school entry

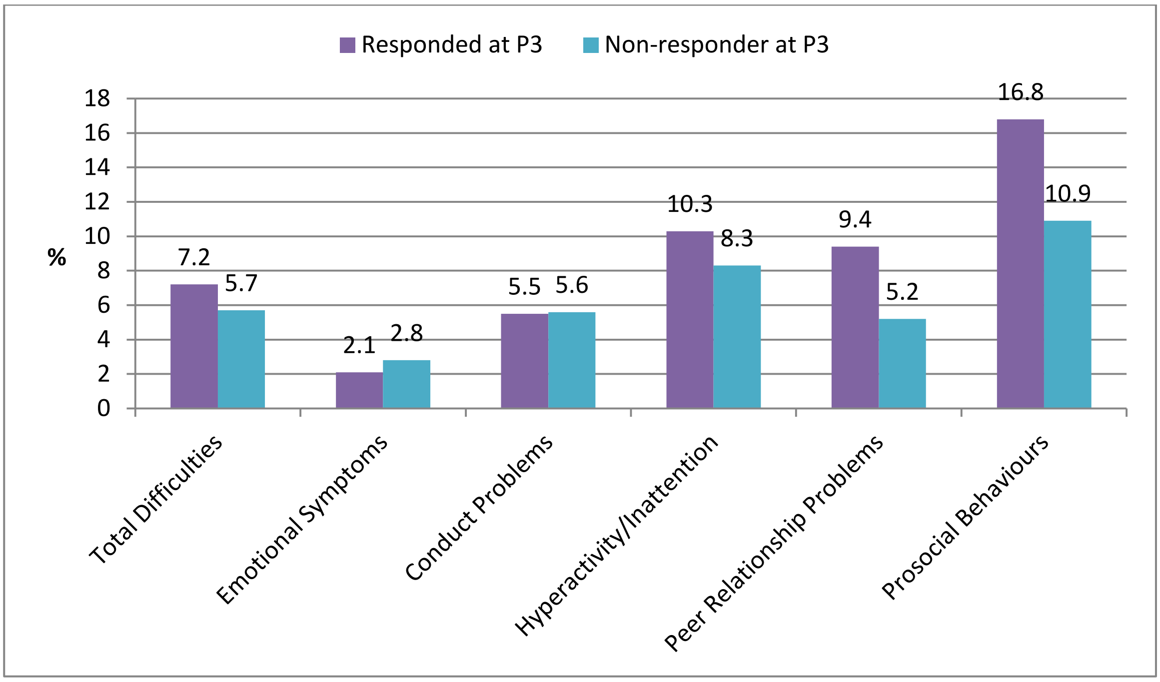


Base: 596

Children's scores on the SDQ at preschool were also examined to see if those with data at P3 were systematically different in any way. In terms of scores on the Total Difficulties scale, Hyperactivity/inattention scale, Peer Relationship Problems scale and Pro-social Behaviours scale, the proportions of children with scores in the 'abnormal' range were lower for those who did not respond at P3.

Previously, it was shown that those who did not respond at P3 lived in less deprived areas that those who did respond. We would expect scores in deprived areas to be higher, and thus this may be an effect of deprivation rather than differences in scores per se.

Figure 6 'Abnormal' scores by SDQ Domain and Response Status at P3



Base: 4430

Logistic regression models were performed in order to investigate which variables were independently associated with having follow-up data at Primary 3. The first model contained solely demographic variables. Of these, living in a more affluent area and being of a non-white UK ethnicity had a negative correlation with response at P3, suggesting that those from less deprived areas and those with a non-white UK backgrounds were less likely to have follow-up data at P3. The model only explained c.4% of variation in response. The second model additionally controlled for any nursery effect, but this was not significant. The third model incorporated binary SDQ scores as well. Model three showed independent relationships between response at P3 and area deprivation, ethnicity, abnormal Peer Relationship Problems and abnormal Pro-social Behaviours. In particular, having follow-up data at P3 was related to *not* being in the 'abnormal' range of the SDQ on the Peer Relationship Problems and Pro-social Behaviours domains at preschool.

Table 3 Logistic Regression Models exploring relationships with response at P3

	Model 1 *B (S.E)*	Model 2 *B (S.E)*	Model 3 *B (S.E)*
SIMD Quintile (Most deprived)	-0.15 (0.04)	-0.15 (0.04)	-0.17 (0.04)
Ethnicity (White-UK)	-0.62 (0.11)	-0.62 (0.11)	-0.58 (0.11)
Sex (Male)	NS	NS	NS
Looked After Status (Non-Looked after)	NS	NS	NS
Nursery	-	NS	NS
SDQ: Total Difficulties (Normal)	-	-	NS
SDQ: Emotional Symptoms (Normal)	-	-	NS
SDQ: Conduct Problems (Normal)	-	-	NS
SDQ: Hyperactivity/inattention (Normal)	-	-	NS
SDQ: Peer Relationship Problems (Normal)	-	-	-0.55 (0.20)
SDQ: Pro-social Problems (Normal)	-	-	-0.53 (0.15)
R Square	0.04	0.04	0.06
Base	3682	3682	3682

9.7 Comparative Data

9.7.1 Mental Health of Children and Young People in Great Britain Surveys

These two cross-sectional surveys were conducted in 1999 and 2004 with a sample of children and young people aged 5-16 in Great Britain (Green et al., 2005). They included both parent- and teacher-rated SDQs, as well self-complete SDQs for older children and a range of other measures of mental health in children. These surveys were used to produce the UK norms for the SDQ, which are used to compare levels of difficulties between studies. The raw data is available and does have a Glasgow city indicator, however numbers are small, particularly when drilling down to the age group of interest. In addition, the demographic information available (in terms of levels of deprivation) is not comparable. For these reasons, these normative data are used to compare the overall Glasgow City data with UK norms for 5-10 year olds, but not to explore whether results for Glasgow City are different from results in other areas. In order to further investigate whether there is unexplained variation in SDQ scores for children in Glasgow City compared with other areas in the UK once deprivation is controlled for, a further dataset, the Growing Up in Scotland study birth cohort, was used.

9.7.2 The Growing Up in Scotland Study (GUS)

Data from the Growing Up in Scotland study (GUS) was used to establish whether a 'Glasgow Effect' was present in preschool children's SDQs (as described in Section 11). GUS is a national birth cohort study, which covers the whole of Scotland. The sample is a stratified, clustered sample and was derived from child benefit records which, at the time of sampling covered 97% of the population with children. Data zones were aggregated until each area had an average of 57 live births per year, based on the previous three years data. These Primary Sampling Units were then stratified by Local Authority and then by Scottish Index of Multiple Deprivation rank. Sweep 1 took place in 2005/6 when the children were 10 months old and began with 5,217 children (Anderson et al., 2007). The dataset used for this analysis comes from the fourth annual sweep of data collection, which took place when the children were 46 months old, the time at which all children were eligible for a free pre-school place. By sweep 4 there were 3,394 children remaining in the sample.

Although in some respects GUS provides a good comparative sample, in that data is collected at similar time points and comes from a Scottish sample, there are some important differences. The most pertinent of these is that, whereas the Glasgow SDQ data is rated by teachers, GUS data collects parent-rated SDQ data from the main carer (normally the mother) of the child. Different raters of the SDQ tend to score more highly on different domains. This causes issues when comparing data, as it is difficult to tell whether any difference is due to actual differences in the data or simply different raters (see discussion earlier in this Chapter).

In addition, GUS is an opt-out survey, and suffers from differential attrition, in contrast to the Glasgow City SDQ data collection, which is integrated into routine monitoring data. Families in more deprived areas and with younger mothers were less likely to participate in the study and were more likely to drop out of the sample in later sweeps (Bradshaw, Marryat, Corbett, Ferrandon, & Tipping, 2010). GUS does have longitudinal and cross-sectional weights, which make the data more representative. However, there is some evidence that families with children with greater behavioural difficulties may have greater attrition than those without such difficulties, which may result in the children of most interest to this study being removed from the study (Wolke et al., 2009).

The GUS dataset contains a Health Board indicator, which includes NHS Greater Glasgow and Clyde (NHSGGC). There are 865 NHSGGC cases in the dataset and 3129 cases from other Scottish Health Boards. Ideally this analysis would look solely at Glasgow City, rather than the wider GGC Health board area, however small numbers prohibit this. It is important to note therefore, that differences exist between the Glasgow City population Scottish Index of Multiple Deprivation (SIMD) patterns and the GGC SIMD patterns: half of the population of Glasgow City resides in the most deprived SIMD quintile areas, in contrast to about 36% of both the GGC population and GGC GUS sample. Furthermore, just 8.4% of the Glaswegian population live in the least deprived areas, compared with 18.6% of the GGC population as a whole and 21.9% of the GGC GUS sample (National Records of Scotland, 2012). Attempts were made to compensate for this discrepancy in the analysis.

9.8 Data Analysis

9.8.1 Data cleaning

Data cleaning was a large task on this project, as several different data sources were utilised. In order to keep track of the data cleaning process, a log was kept of actions. Data cleaning included creating missing values where necessary, providing each case with a unique identification number (ID), checking for duplicates, ensuring that data were equivalent between years and creating derived variables. All files were converted from Excel to IBM SPSS Statistics v19 in order to clean the data.

SDQ scores also had to be recoded (from words to numbers and in some cases, reverse scoring was used and so had to be recoded the correct way round). Once clean, the scoring syntax for SPSS (located on the SDQ website (Goodman, 2013a)) was used to create individual continuous scores for each domain and for total difficulties.

In addition, change scores were created between preschool and P3. These scores were derived by subtracting the preschool score from the P3 score for each child. The continuous scores on the SDQ are heavily skewed, which violates statistical assumptions if put into a regression model. Though this can be corrected for (by using the square root or log of the score), in some cases (e.g. Emotional Symptoms score at preschool), the results were so heavily skewed that they still did not represent a normal distribution when corrected. The change score, which follows a more normal distribution was therefore used instead of the raw score.

Figure 7 Histogram of the distribution of raw Total Difficulties scores at preschool

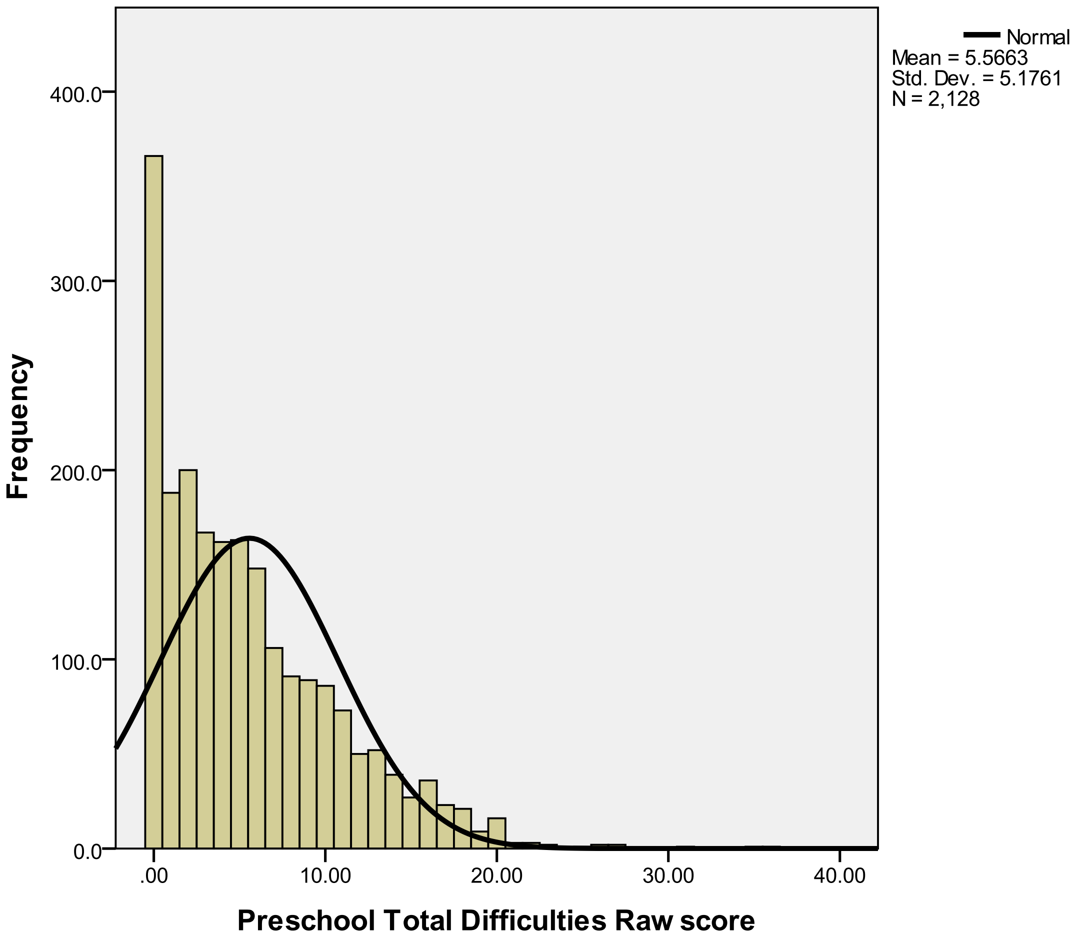
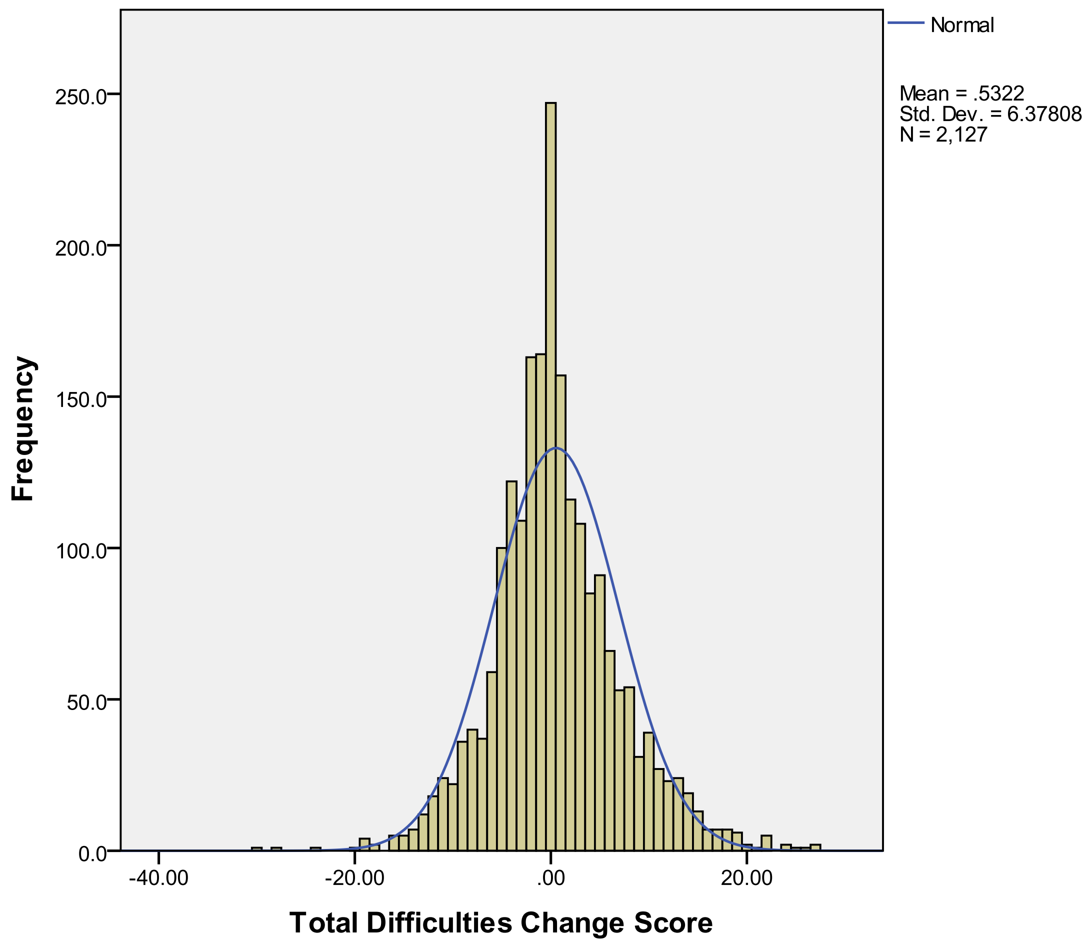


Figure 8 Histogram of the distribution of the Total Difficulties change score



The standard teacher-rated SDQ cut-off scores are provided on the SDQ website (Goodman, 2013a). They were used to create binary abnormal/normal variables for each domain. There are advantages and disadvantages to using binary scores as opposed to continuous scores. The disadvantage of using the binary rather than the continuous scale is that some of the power is lost in the statistical calculations. Using the continuous scores allows the analysis to explore smaller changes within pupils between years, which may not be at the level of either moving into or out of the abnormal cut-off region of the scale. This may be particularly significant to explore for Education staff, as a large proportion of children sitting high up the scale, but just below the cut-off for abnormal scores, may still contribute to a substantial amount of disruption and need a large amount of resource in order to teach the class effectively. Furthermore, it allows us to investigate the 'added value' that schools may have given since intake. It may be that, although a school has not reduced the proportion of children in the abnormal range since intake, these children's scores may still have decreased within this range, or vice-versa.

In contrast, because the binary SDQ scores use the standard cut-offs, there is evidence behind these regarding the diagnostic capabilities. For example, it is known that up to 60% of children with an abnormal score on the SDQ will go on to have a diagnosis. This is in contrast to just 1-4% of children scoring in the 'normal' range and 10-15% in the borderline range (the latter are grouped together with the normal range for the purposes of this study due to the small numbers and lack of diagnostic predictability) (Goodman, 1997). This ability to interpret the scores in such a way can make the binary scores more meaningful, particularly to non-statisticians. In addition, some would argue that it is only this group, who are likely to go onto have a diagnosis and to experience the consequences stemming from that, who are of interest. Whilst having a large proportion of low level problems within a class may be difficult for a teacher, it could be argued that ultimately these children are likely to be 'okay' in the long run and are therefore of little interest to the research or to Education Services, whose aim is ultimately to reduce problems and improve outcomes for children and young people.

9.9 Statistical analysis

9.9.1 Multilevel modelling

Multilevel modelling stems from educational research. In 1976, the educational researcher Cronbach asserted that:

'The customary methods of analysis were either incorrect or subject to misinterpretation. Therefore, the majority of studies of educational effects – whether classroom experiments, or evaluations of programs or surveys—have collected and analyzed data in ways that conceal more than they reveal' (Cronbach, 1976).

He went on to state that, in order to gain accurate results, the effects of groups needed to be taken into account (Cronbach, 1976). In education, much of what occurs does so in groups: students are situated in classrooms, which in turn are situated in schools, which are situated in regions or districts (Burstein, 1980).

Multilevel modelling acknowledges that students within a school are more likely to be similar to each other than students across different schools. For example, children who attend a local school are likely to live in a relatively local area, be of a similar level of affluence, share a similar culture etc. In Glasgow City, this may be even more the case with the denominational division between schools. If one didn't account for this similarity in the model, for example by fitting a single level linear regression model, then the errors within the model may be wrong and the effects of schools may be overestimated.

9.9.2 Conclusion

This chapter presented the methodology and methodological challenges of the research. The study aims to explore the social, emotional and behavioural development of children in the first three years of school, to see if prevalence of difficulties is different in Glasgow, and to explore what impact schools may have on this development. The methodology uses an ecological approach, grounded in School Effectiveness Research, to take account of a wide range of factors affecting child social and emotional development, in order to assess whether these have an independent effect on child outcomes in middle childhood. Different statistical techniques will be use to answer the various questions asked of the data, including logistic regression and multilevel modelling.

The following chapters explore the results from these analyses.

10 Results: the prevalence of social, emotional and behavioural difficulties for children in Glasgow City at preschool and the pathways that these take towards Primary 3

10.1 Introduction

This chapter explores the prevalence of social, emotional and behavioural difficulties, as measured by the SDQ at preschool and P3.

10.2 Methods

The cohort was first described in terms of its demographic composition. Movement of individuals between levels of deprivation and changes in Looked After status from time 1 to time 2 were explored. SDQ scores were then described at each stage in terms of mean scores and the proportions of children in the abnormal and normal ranges of the scale. Correlations between different scales were assessed in order to examine overlap between scores at the two time points and between different aspects of social, emotional and behavioural development.

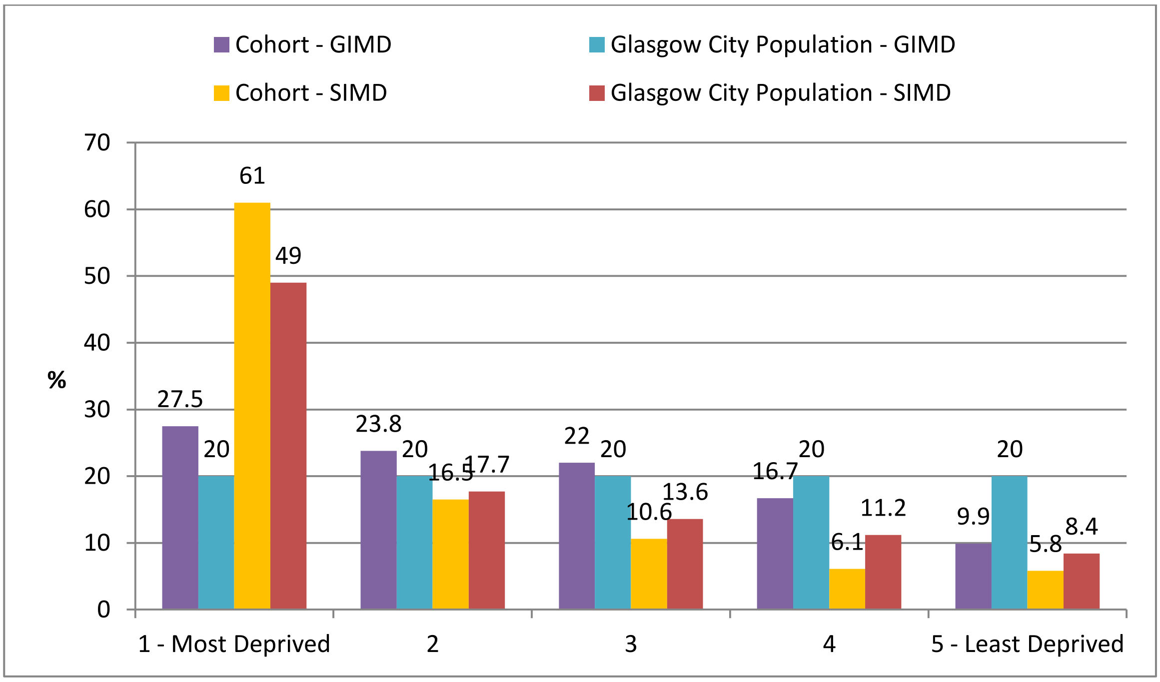
10.3 Describing the cohort at preschool

The 2171 children in the cohort came from 127 preschool establishments throughout Glasgow City. Just over half of the children (51.9%) were male. A minority of children (2.7%) in the cohort at Pre-school had ‘Looked After’ status, which in Scotland includes being in state care, or living at home but under the supervision of the state. A quarter of children in the cohort (25.5%) were of a non-white UK origin.

Glasgow City contains some of the most deprived areas in Scotland. Using the Scottish Index of Multiple Deprivation Quintiles (SIMD), 61% of children in the cohort live in areas in the highest deprivation quintile, compared with half of the Glaswegian adult population. In addition, data can be analysed using the

Glasgow Quintiles (GIMD), which evenly distributes the population of Glasgow between the quintiles, allowing for more in-depth analysis of variance within the city. The children in the pre-school cohort were significantly more deprived than the population of Glasgow: 27.5% living in the most deprived areas using the GIMD, compared with 20% of the whole population. In contrast, compared to the city norm of 20% in the most affluent quintile, only 9.9% of children in the cohort lived in the most affluent areas of Glasgow City at Preschool stage.

Figure 9 Proportion in each deprivation quintile by Cohort at Preschool and Index of Multiple Deprivation (SIMD or GIMD)



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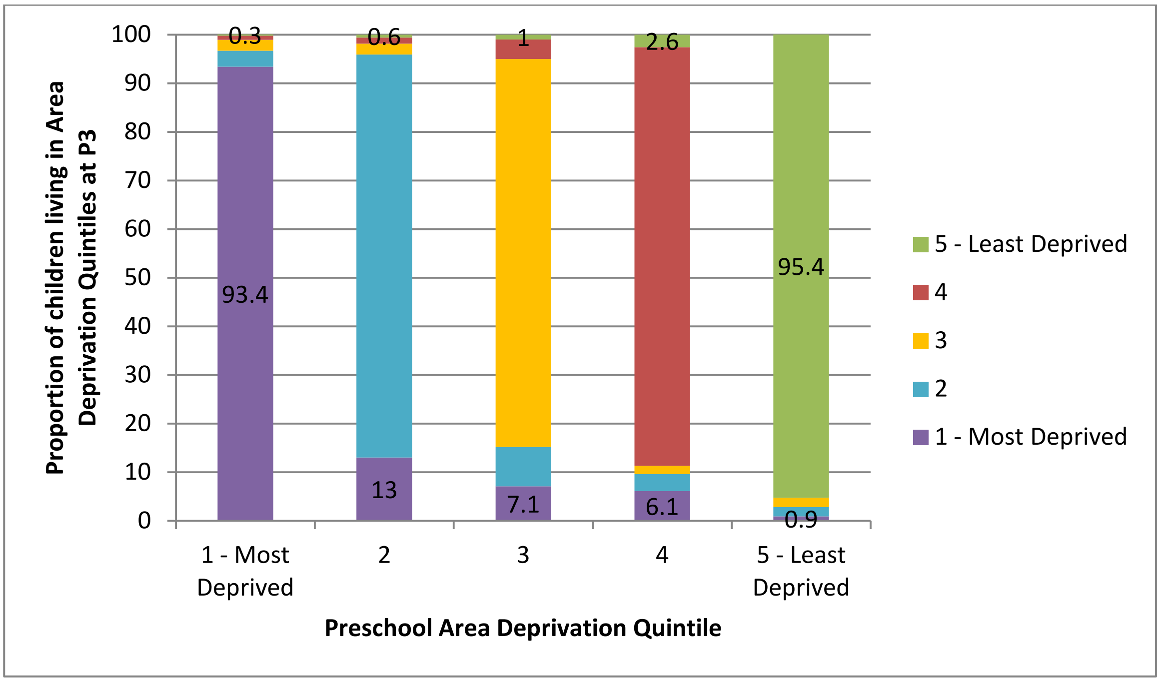
There was very little change in the level of area deprivation in which a child lived between Preschool and P3. Overall proportions of children living in each quintile were almost identical at each stage. Looking at individual level change, it is also clear that little movement between levels of area deprivation has taken place, particularly at the ends of the spectrum. Using the Scottish Quintiles, 95.4% of families who lived in an area of the lowest deprivation at preschool, still lived in an equivalent area at P3, whilst this was true for 93.4% of those in the areas with the highest levels of deprivation. As, Figure 10 demonstrates, there was more movement between deprivation quintiles around the middle of the distribution, though the majority remained in a similar type of area. The patterns were very similar when GIMD quintiles were used. Indeed, even when the GIMD deciles were utilised, when we may expect to see some more movement due to the more sensitive measure, there was still very little movement.

Figure 10 P3 Home Area Deprivation Quintile by Preschool Home Area Deprivation Quintile (Scottish Quintiles)



This does not mean to say that families did not move home during this time; simply that they did not move between levels of area deprivation.

By P3, 6.5% of children had been Looked After at some point, a rise of around 2% over the three years. At P3, the majority of these Looked After children (68.4%) were classified as being 'Looked after at home' i.e. they were living at home with their parents but under the supervision of the state. A further 6.5% of ever Looked After children were being 'Looked After away from home' (e.g. by a Foster Carer) and the remaining 25.2% no longer held Looked After status and were thus 'Previously Looked After'.

10.4 Prevalence of social, emotional and behavioural difficulties

Mean scores and standard deviations were first assessed at both stages. The mean score on the Total Difficulties domain rose from 5.6 to 6.1 between Preschool and P3, indicating a corresponding rise in difficulties. In addition, the mean Hyperactivity/inattention score increased from 2.5 to 3.0 over the same time period, again equating to scores getting worse, whilst the means scores on the Emotional Symptoms scale and the Conduct Problems scale remained relatively stable over the same period. The Pro-social Behaviours scale is a positively rated scale, meaning that a higher score is indicative of fewer problems. Between preschool and P3, mean levels of pro-social behaviours increased, from 7.6 to 8.2, indicating that children had a better score by P3 in this domain.

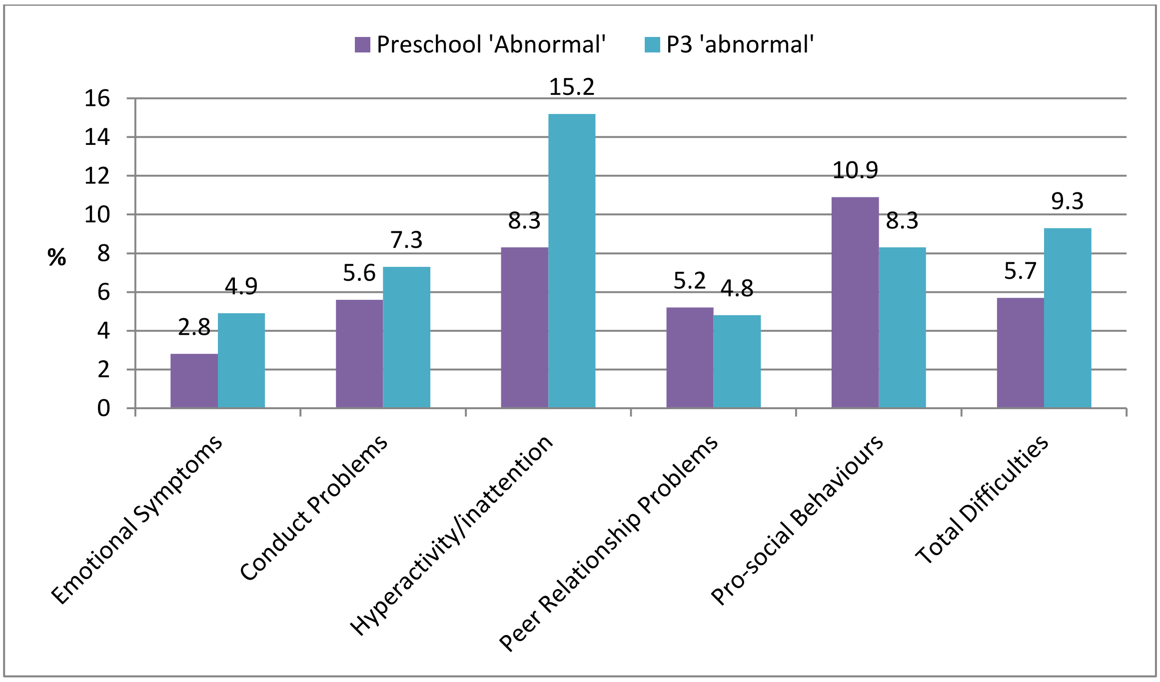
The Peer Relationship problems mean scores, on the other hand, did not alter greatly between Preschool and P3. Paired Samples t-tests were performed on all subscales and the Total Difficulties scale between Preschool and P3. All scales showed statistically significant differences at the $p<0.05$ level, with the Conduct Problems domain being significant at the $p<0.01$ level.

Figure 11 2010 Preschool and P3 Means and Standard Deviations by SDQ Sub-scale and Cohort

Scale	Glasgow Preschool Mean (SD)	Glasgow P3 Mean (SD)	Minimum	Maximum
Total Difficulties	5.6 (5.2)	6.1 (6.1)	0	40
Emotional Symptoms	1.1 (1.7)	1.3 (2.0)	0	10
Conduct Problems	0.8 (1.3)	0.9 (1.6)	0	10
Hyperactivity/Inattention	2.5 (2.5)	3.0 (3.1)	0	10
Peer Relationship Problems	1.3 (1.7)	1.0 (1.5)	0	10
Pro-social Behaviours	7.6 (2.4)	8.2 (2.3)	10	0

Due to the skew of the SDQ data standardised cut-offs were used to create binary normal/abnormal scores. The cut-offs are designed so that 10% of children (aged 4-16) would normally score in the abnormal range. As Figure 12 demonstrates, at Preschool, the greatest proportion of abnormal scores was found in the Prosocial Behaviours domain where 10.9% of children were found to have difficulties. The proportion of children with difficulties in this area decreased to 8.3% by P3, which perhaps supports this theory. With the exception of Pro-social behaviours and Peer Relationships Problems, where levels decreased or remained similar, respectively, all other domains saw an increase in prevalence rates of difficulties between preschool and P3. The largest of these increases in prevalence rates was in the domain of Hyperactivity/inattention, which increased from 8.3% of children having problems in this area at Preschool to 15.2% at P3. In addition, the prevalence of difficulties with Emotional Symptoms rose from 2.8% to 4.9% in the cohort, whilst Conduct Problems increased from 5.6% of children with difficulties at Preschool, to 7.3% at P3.

Figure 12 Proportions of 'Abnormal' scores at Preschool and P3



Bases – 2128 to 2131

10.4.1 Co-morbidity in social, emotional and behavioural difficulties

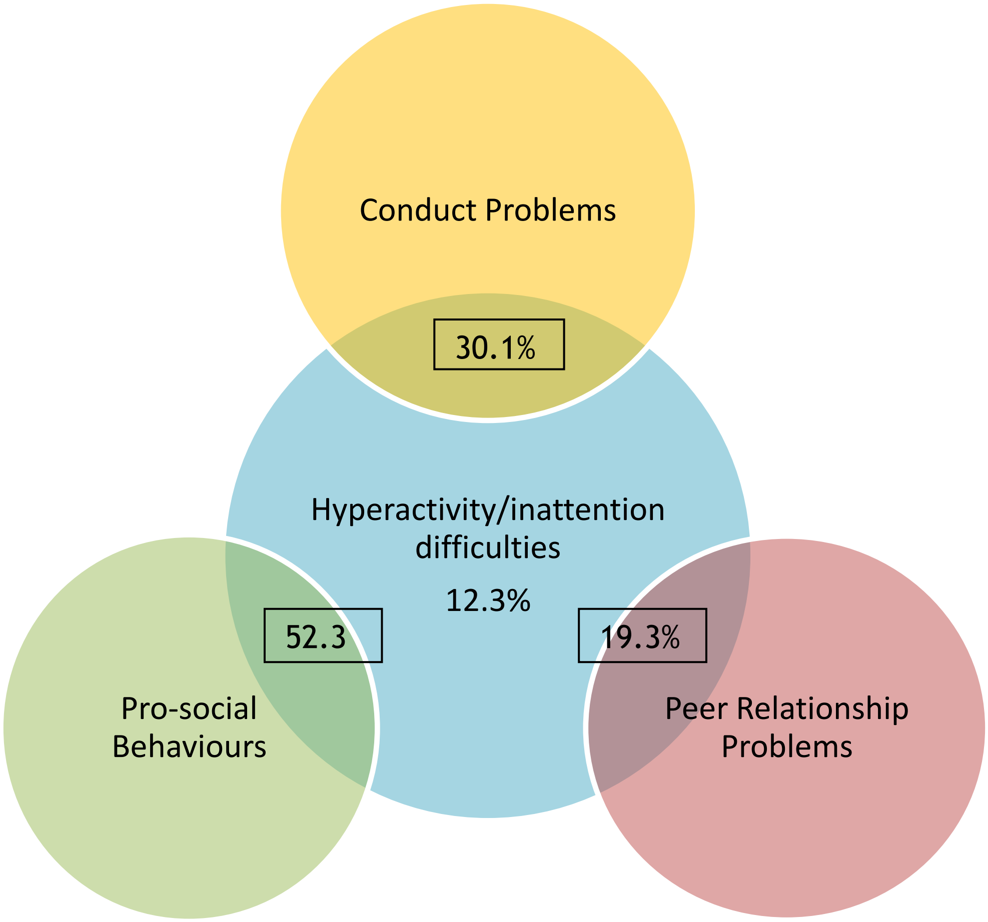
Previous research has found that some types of social, emotional and behavioural difficulties are more likely to be co-occuring in children – often referred to as comorbidity (Heiervang et al., 2007; Ford et al., 2003; Costello et al., 2003). Of the children who had at least one abnormal score at preschool, 57.4% children had one abnormal score, 27.1% had two, 10.9% had three, 4.1% had four and 0.6% had five abnormal scores. At P3, overlap was similar: 57.3% had one abnormal score, 26.5% had two, 11.8% had three, 3.4% had four and 1% had five comorbidities.

Pearson correlations were performed to investigate the overlap in abnormal scores on SDQ subscales (**Error! Reference source not found.**). Overall, yperactivity had the largest overlap with other scales: at preschool, the strongest correlations could be seen between Hyperactivity/inattention problems and lack of Prosocial Behaviours ($r=0.40$, $p<0.01$), and between Hyperactivity/inattention and Conduct Problems ($r=0.32$, $p<0.01$). Hyperactivity was also correlated with Peer Relationship Problems to a lesser extent ($r=0.19$, $p<0.01$). Figure 13 shows co-morbidity at preschool stage between Hyperactivity/inattention scores and other subscales which demonstrated a significant correlation. Of those children who had an abnormal Hyperactivity/inattention score at preschool, more than half also had an abnormal Pro-social Behaviours score (52.3%). This was in contrast to children who did not have an abnormal Hyperactivity score: only 7.2% of whom had difficulties on the Prosocial Behaviours scale. Children who had an abnormal Hyperactivity/inattention score were 10 times more likely to have an abnormal Conduct Problems score: 30.1% of those with an abnormal Hyperactivity score also having an abnormal Conduct Problems score, compared with 3.4% of those who didn’t have an abnormal Hyperactivity score. Furthermore, children with an abnormal Hyperactivity score at preschool were almost five times more likely to have an abnormal Peer Relationships score at preschool.

Table 4 Spearman Correlations between SDQ binary abnormal/normal scores at preschool and P3

		Preschool						P3				
		Emotional	Conduct	Hyperactivity	Peer Rel.	Prosocial	Total	Emotional	Conduct	Hyperactivity	Peer Rel.	Prosocial
PS	Emotional	1										
	Conduct	0.05*	1									
	Hyperactivity	0.04	0.32**	1								
	Peer Relationship	0.23**	0.12**	0.19**	1							
	Prosocial	0.10**	0.28**	0.40**	0.25**	1						
	Total	0.04	0.11**	0.19**	0.14**	0.15**	1					
P3	Emotional	0.04	0.01	0.04	0.03	0.06**	0.06**	1				
	Conduct	-0.02	0.16**	0.18**	0.07**	0.15**	0.10**	0.10**	1			
	Hyperactivity	-0.00	0.14**	0.21**	0.11**	0.15**	0.17**	0.18**	0.35**	1		
	Peer Relationship	0.06*	0.07**	0.11**	0.15**	0.10**	0.10**	0.15**	0.23**	0.18**	1	
	Prosocial	0.02	0.13**	0.16**	0.11**	0.19**	0.11**	0.11**	0.35**	0.35**	0.23**	1
	Total	0.04	0.11**	0.19**	0.14**	0.15**	0.17**	0.37**	0.56**	0.58**	0.39**	0.40**

Figure 13 Co-morbidity between Hyperactivity/inattention binary scores and other scales at Preschool



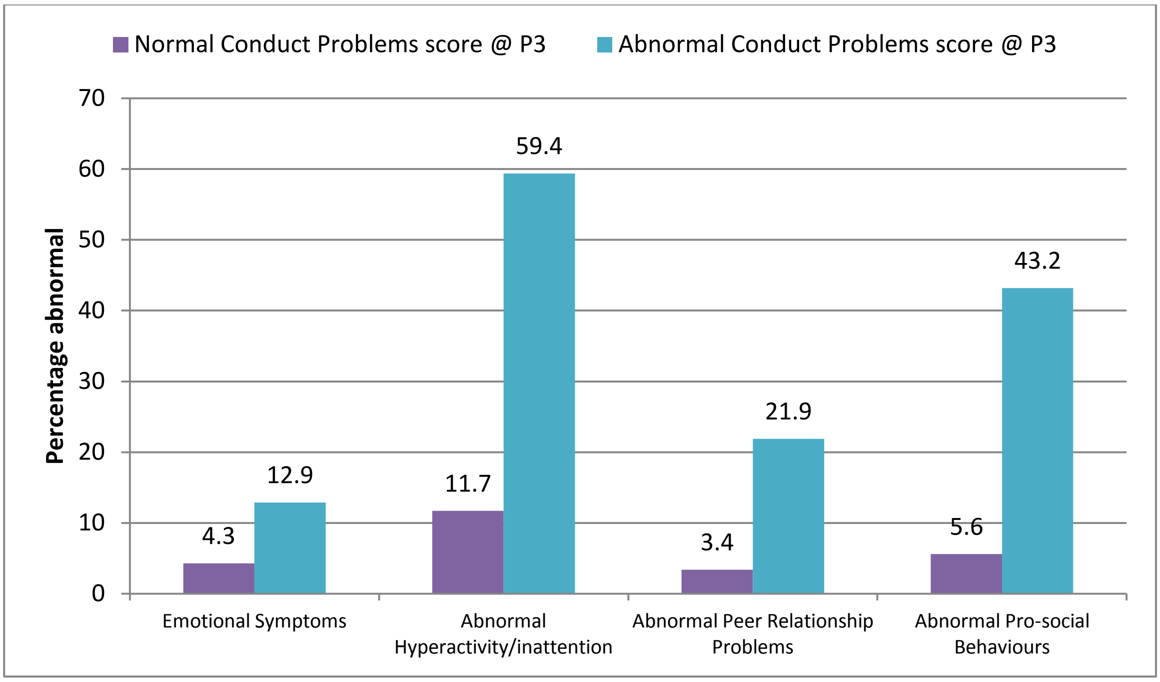
The only abnormal scores which were not significantly correlated at preschool were Emotional Symptoms and Hyperactivity / inattention, and Emotional symptoms and the Total Difficulties score.

Significant correlations could be seen between some abnormal preschool and P3 scores. Abnormal Prosocial Behaviours scores at preschool were positively correlated with all SDQ scale abnormal scores at P3. However, the strength of these correlations was relatively weak - from r=0.06 (p=0.01) with abnormal Emotional Symptoms at P3 to r=0.19 (p<0.01) with abnormal Prosocial Behaviours at P3. Conduct Problems, Hyperactivity/inattention difficulties and Peer Relationship Problems at preschool were associated with all abnormal scores at P3, with the exception of Emotional Symptoms at P3, which was significantly correlated with neither scale. Hyperactivity / inattention between preschool and P3 was the strongest correlation (r=0.21, p<0.01), though abnormal Hyperactivity / inattention scores at preschool were fairly strongly correlated with Conduct Problems at P3 as well (r=0.18, p<0.01). Abnormal Emotional Symptoms at preschool were only significantly correlated with Peer Relationship Problems at P3, and this correlation was weak at r=0.06 (p<0.01). This is likely to be related to the low levels of Emotional Symptoms abnormal scores at preschool across the board.

All correlations between subscales were statistically significant at P3 and far stronger correlations could be seen between SDQ subscales at this stage, indicating that comorbidity may be more of an issue by P3. The strongest correlations were between Conduct Problems at P3 and Hyperactivity/inattention problems at P3 (r=0.35, p<0.01), and between Conduct Problems with abnormal Prosocial Behaviours scores (r=0.35, p<0.01).

Figure 14 demonstrates the overlaps between Conduct Problems at P3 and other scales, in terms of the percentage of children with abnormal scores. It is particularly striking that 59.4% of children with Conduct Problems at P3 also have difficulties on the Hyperactivity/inattention scale, compared with 11.7% of those who have no Conduct Problems. Forty-three percent of those with Conduct Problems at P3 also have difficulties with Pro-social Behaviours, in contrast to 5.6% of those without Conduct Problems. Furthermore, children with Conduct Problems at P3 were three times more likely to also have Emotional Symptoms and more than six times more likely to have difficulties with Peer Relationships.

Figure 14 Co-morbidity of Conduct Problems with other difficulties at preschool and in P3



Bases: 2131

Hyperactivity/inattention difficulties at P3 were also significantly correlated with P3 abnormal Prosocial Behaviours scores (r=0.35, p<0.01). Emotional Symptoms were significantly correlated with all other subscales, though the correlations were generally weaker with this scale, ranging from r=0.10 (p<0.01) with Conduct Problems to r=0.18 (p<0.01) with Hyperactivity/inattention difficulties.

Correlations between raw scores were stronger as continuous measures are more sensitive to this type of analysis (Table 5). At preschool, all correlations between the SDQ subscales were statistically significant with a p-value of <0.01. Excluding the Total Difficulties scale, to which four of the subscales contribute, strongest correlations could be seen between Hyperactivity/inattention scores and Pro-social Behaviours scores (r=-0.64, p<0.01), and between Conduct Problems scores and both Pro-social Behaviours scores (r=-0.59, p<0.01) and Hyperactivity/inattention scores (r=0.59, p<0.01).

Continuous scores at preschool were significantly correlated with all subscale scores at P3, with the exception of Emotional Symptoms scores at preschool, which were neither correlated with Conduct Problems scores at P3, nor with Hyperactivity/inattention scores at P3. The strongest correlation between the two time points was on the Hyperactivity/inattention scale at preschool and P3, which had a correlation of $r=0.40$ ($p<0.01$). The association between Hyperactivity at preschool and Conduct Problems at P3 was also relatively strong ($r=0.32$, $p<0.01$), whilst Conduct Problems at preschool and P3 had a correlation coefficient of $r=0.31$ ($p<0.01$).

Co-morbidity was also high at P3 in relation to the continuous scores. Conduct Problems were strongly correlated with Hyperactivity/inattention scores at P3 ($r=0.59$, $p<0.01$), with Pro-social Behaviour scores ($r=-0.57$, $p<0.01$) and with Peer Relationship Problems scores ($r=0.42$, $p<0.01$). Pro-social Behaviour scores were also strongly correlated with Hyperactivity/inattention scores ($r=-0.56$, <0.01) and with Peer Relationship Problems scores ($r=-0.47$, $p<0.01$). Relationships between subscales were weakest with Emotional Symptoms scores, though correlations here still ranged from $r=-0.20$ ($p<0.01$) with Pro-social Behaviours scores to $r=0.42$ ($p<0.01$) with Peer Relationship scores.

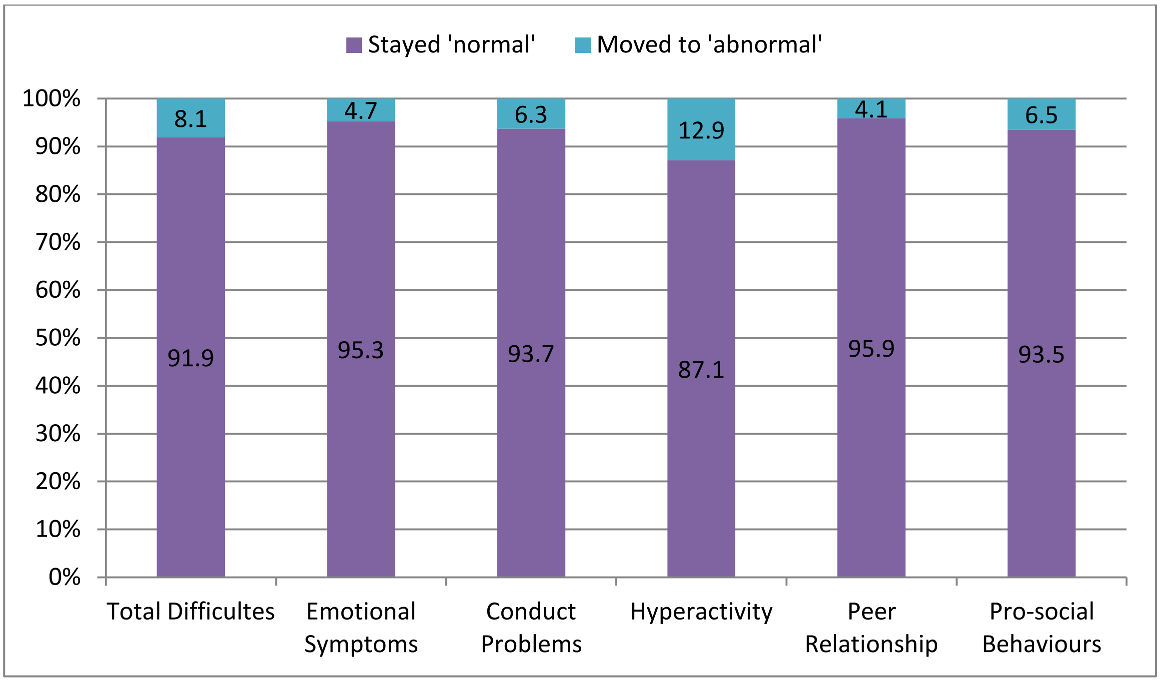
Table 5 Pearson correlations between SDQ Raw Total Difficulties scores and raw subscale scores at Preschool and P3

		Preschool						P3				
		Emotional	Conduct	Hyperactivity	Peer Rel.	Prosocial	Total	Emotional	Conduct	Hyperactivity	Peer Rel.	Prosocial
PS	Emotional	1										
	Conduct	0.17**	1									
	Hyperactivity	0.21**	0.59**	1								
	Peer Relationship	0.41**	0.30**	0.35**	1							
	Prosocial	-0.22**	-0.59**	-0.64**	-0.46**	1						
	Total	0.60**	0.70**	0.82**	0.70**	-0.68**	1					
P3	Emotional	0.15**	0.05*	0.15**	0.14**	-0.13**	0.18**	1				
	Conduct	-0.01	0.31**	0.32**	0.10**	-0.26**	0.27**	0.22**	1			
	Hyperactivity	0.04	0.27**	0.43**	0.14**	-0.29**	0.34**	0.30**	0.59**	1		
	Peer Relationship	0.13**	0.16**	0.24**	0.26**	-0.22**	0.28**	0.42**	0.42**	0.39**	1	
	Prosocial	-0.06**	-0.24**	-0.29**	-0.17**	0.29**	-0.27**	-0.20**	-0.57**	-0.56**	-0.47**	1
	Total	0.10**	0.27**	0.41**	0.21**	-0.31**	0.37**	0.63**	0.73**	0.86**	0.69**	-0.61**

10.4.2 Homotypic continuity of difficulties over time

Individual level binary scores were explored in order investigate the stability of social, emotional and behavioural difficulties between Preschool and P3. Due to the nature of the data collected in this study, only homotypic continuity was able to be investigated, that is, the continuity of a particular difficulty over time, as opposed to a vulnerability for different disorders or different manifestations of a disorder over time. On the Total Difficulties scale, of the children who were rated as being 'normal' at Preschool almost all stayed in this category at P3: 91.9% of children who scored in the normal range of the Total Difficulties scale at Preschool were also in the normal range at P3 (Figure 15). When the sub-scales of the SDQ are examined for children who scored in the normal range at Preschool, it emerges that the most stable scales are the Emotional Symptoms and Peer Relationship Problems scales, where 95.3% and 95.7%, respectively, were still in the normal range at P3. The least stable scale was the Hyperactivity/inattention domain, where 12.9% of the children moved into the 'abnormal' category at P3.

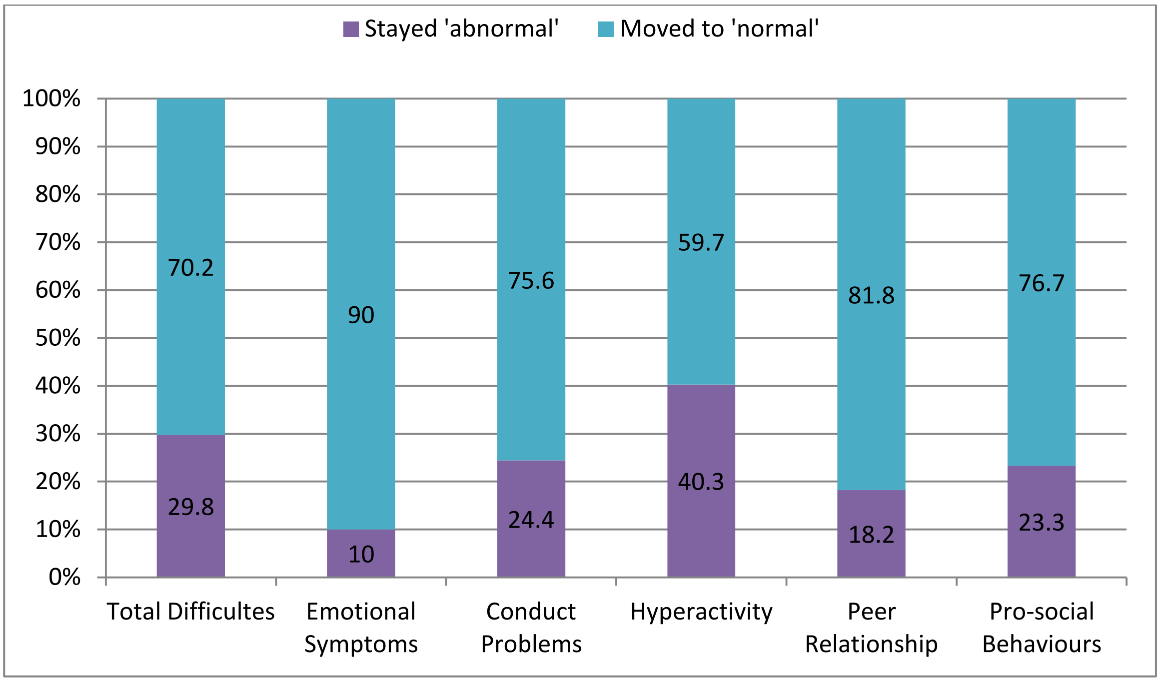
Figure 15 Stability of SDQ status for children who scored in the 'normal' range at Preschool by SDQ Scale



Bases -TD:2007, ES:2068, CP:2010, H/I:1953, PR:2019, PS:1897

Data from children who scored in the abnormal range at Preschool were also examined at P3. Overall, on the Total Difficulties scale, just under a third of children who scored in the abnormal range at Preschool were still in the abnormal range at P3 (29.8%). The most stable abnormal group between stages was on the Hyperactivity/inattention domain, where 40.3% of children remained in the abnormal group at P3. Additionally, just under a quarter of children were in the abnormal range of the scale at both time points on the Conduct Problems and Pro-social Behaviours domains, with 18.2% remaining in the abnormal group on the Peer Relationship Problems scale. The lowest stability was on the Emotional Symptoms domain, where just 10% of children remained in the abnormal group by P3 (Figure 16).

Figure 16 Stability of SDQ status for children who scored in the 'abnormal' range at Preschool by SDQ Scale



Bases - TD:121, ES:60, CP:119, H/I:176, PR:110, PS:232

10.5 Discussion

Prevalence of social, emotional and behavioural difficulties were fairly low at the preschool stage, with just 9.3% of children having difficulties overall. Comparative prevalence levels at this age using the SDQ are few and far between. Results on Spanish four year olds, however,show that 10.5% had an abnormal Total Difficulties score, slightly higher than the Glasgow City figures (Goodman, 2013b). The highest level of difficulties was in the Prosocial Behaviours domain (10.9% of children having difficulties in this area – far lower than the 25.6% of Spanish four year olds), followed by the

Hyperactivity/inattention domain (8.3% compared with 16.1% in the Spanish sample). Rates of Emotional Symptoms at preschool were, by contrast, particularly low, with just 2.8% (slightly lower than the 3.8% in the Spanish sample) of children being rated as experiencing difficulties in this area (Goodman, 2013b). It should be noted however, that the Spanish results are based on a smaller sample – just 607 four year olds, compared with over 2000 children in the Glasgow City sample, which may make the results slightly less reliable. In addition, one must consider that preschool staff will be rating children in comparison to their peers, therefore children in Glasgow City may have very high levels of pro-social problems but this may be seen as 'normal' in Glasgow City and therefore not rated highly for the majority of children.

The results indicated changes in prevalence rates of social, emotional and behavioural difficulties during the first few years of school. Most strikingly, prevalence of Hyperactivity/inattention difficulties almost doubled between preschool and P3. Although prevalence of Hyperactivity in the population would be expected to increase throughout childhood, in Glasgow City this increase was more pronounced than one would anticipate given previous evidence (Green et al., 2005). However, when compared to the UK norms for 5-10 year olds (children in P3 will be aged 7-8 – the centre of this range), Glasgow City is found to only have slightly higher levels of hyperactivity / inattention problems at this age: 15.2% in Glasgow City compared with 13.8% in the UK. This is discussed further in Chapter 11. The impact of these high levels of Hyperactivity/inattention problems in Glasgow City is likely to be felt in classrooms. With around 1 in 6 children in Glasgow City having difficulties with Hyperactivity/inattention, this means an average class of 25 pupils will be likely to have four pupils with such issues. Behaviours such as hyperactivity, impulsivity and inattention are more noticeable in classroom settings, because they are so at odds with how children are expected to behave in the classroom (Kos, Richdale, & Hay, 2006).

Previous research, however, has found large gaps in Primary school teachers' knowledge about teaching children with Hyperactivity disorders, with many being found to simply learn on the job. The research also showed that the more experience teachers had in the classroom, the more negative their perceptions of teaching children with ADHD, with many teachers becoming ambivalent about teaching children with such disorders (Anderson, Watt, Noble, & Shanley, 2012). Further evidence indicates that teachers with more positive attitudes towards teaching children with hyperactivity disorders can impact on these children's outcomes, both academically and in terms of the success of interventions to alleviate the symptoms of ADHD (Sherman, Rasmussen, & Baydala, 2008). In addition, an RCT explored the effects of labelling children with hyperactivity (i.e. informing their teacher or not) and found that children who were labelled and whose teachers were given a leaflet on teaching children with hyperactivity issues, did not have any improved outcomes, compared with children who were not labelled as being hyperactive. Furthermore, children who were labelled but with no advice given to the teacher, actually had poorer outcomes five years later. The authors suggest that this may be because the teacher expectations of the children are lowered and children may have access to fewer opportunities (Sayal et al., 2010). It may be therefore, that education bodies may wish to commit additional resource to training teachers in supporting children with difficulties with hyperactivity and inattention, particularly if labelling is likely to occur.

Levels of Conduct Problems also increased in this period. This increase in the prevalence of Conduct Problems is contrary to previous research, which shows that children generally become less aggressive as they get older (Tremblay, 2000).   The mean Conduct Problems score, however, stayed the same for the population between preschool and P3, suggesting that while some children moved up into the abnormal range, other children's scores decreased, possibly indicating different trajectories, possibly influenced by other variables, such as social environment or comorbidity. Indeed, previous research has found different trajectories for conduct problems between middle childhood and adolescence. These trajectories were based on gender and a number of child characteristics, such as levels of hyperactivity and helpfulness in children. The six trajectories explored followed different patterns over the years, with some groups having consistently high or rising profiles, whilst other groups followed decreasing or consistently low patterns of conduct problems. For both genders, children were more likely to have elevated levels of conduct problems throughout childhood if they were hyperactive as well (Cötë et al., 2002). This may suggest that the higher levels of hyperactivity difficulties in Glasgow City may be altering the trajectories of conduct problems for some children within the city.

Conduct problems and hyperactivity have also been found to be exacerbated by environment in which the child lives, such as living in poverty, with coercive or aggressive parenting and being exposed to neighbourhood violence and drug use (Beauchaine, Hinshaw, & Pang, 2010; Morrell & Murray, 2003). The fact that Glasgow City children are more likely to live in poverty and to be exposed to domestic violence and drugs (Landy et al., 2010; Taulbut & Walsh, 2013) may therefore, at least partly, explain why Glasgow City may be displaying continuing higher prevalence levels of hyperactivity and conduct difficulties at age 7-8. The effect of Glasgow's particular demographic profile will be explored in Chapter 11. Furthermore, it could be that some children are genetically susceptible to hyperactivity and that being put in an adverse environment could increase the chances of symptoms developing, compared to if they had been born into more advantaged circumstances (Belsky & Pluess, 2009).

Emotional symptoms barely registered at preschool, but were reported more frequently by teachers at P3, almost doubling the prevalence levels between these time points. Children are normally in their preschool place for 2.5 hours a day. It may be that this is not enough contact time for staff to pick up patterns in more subtle behaviour captured in the emotional symptoms domain e.g. having lots of tummy aches. Indeed, in the qualitative work on this study, staff reported that the completion of the SDQ had made them more aware of such behaviours as potentially emotional symptoms rather than physical health symptoms (White et al., 2013). As this was the first year of data collection, it may be that staff were still not identifying or recognising some elements within the children. Other research has found that teachers are less likely to detect internalising symptoms overall, compared with parents (Goodman et al., 2000).

Previous evidence has also shown that overall levels of emotional problems, such as depression and anxiety, tend to increase over childhood in the population. Adolescent girls have been found to be at greater risk for depression in particular, and onset in girls can be much younger than in boys (Dekker et al., 2007). However, other research suggests that at age eight, the age of the P3s in this current study, there is no difference in depression scores by gender, and that this difference does not emerge until age twelve (Angold et al., 2002). It would therefore be worthwhile to explore whether differences exist in prevalence of emotional symptoms between boys and girls and whether differences are starting to emerge at age 7-8 or not. This will be explored in Chapter 12.

In contrast to the other scales, children in Glasgow City had higher levels of abnormal Prosocial behaviours at Preschool, as well as a higher mean score, which were shown to decrease by Primary 3. This decrease may be related to a naturally growing level of maturity in the children over these years, whereby children become more empathic and outward looking. This domain on the SDQ covers statements such as ‘volunteers to help others’ and ‘helpful if someone is hurt, upset or feeling ill’, which may be expected more of older children. It has been suggested that the capacity for prosocial behaviour is developed in the second year of life, and from that point onwards, such behaviours become regulated. Furthermore, from this stage an increasing difference between boys and girls becomes apparent (Hay, 1994; Scourfield, John, Martin, & McGuffin, 2004). A lack of ability to regulate prosocial behaviours has been linked to a higher risk of behavioural and affective disorders (Hay, 1994). The decrease in abnormal prosocial behaviours in the first few years of school could also be related to the success of ‘nurture’ groups in some Glasgow schools, which give children experiencing difficulties with social skills and emotional regulation extra support within the school environment (Gerrard, 2006).

Over the same time period, levels and mean scores on the Peer Relationships scale remained fairly stable over time. This is in line with previous evidence which shows that children who experience exclusion by their peers frequently first experience this in the preschool phase, and that this remains relatively stable throughout primary school, often leading to internalising problems in later childhood (Gazelle & Ladd, 2003). Previous work with 8-9 year old children suggests that being either a ‘bully’ or a ‘victim’ (one element of this scale) is also relatively stable over time, in line with the findings above (Boulton & Smith, 1994).

Comorbidity of difficulties was also assessed. More than two-fifths of children with an abnormal score also had a comorbid problem at each time point. These figures were much higher than previous UK statistics, where around 30% of children had a comorbid disorder, however, the UK figures are based on children meeting diagnostic criteria, rather than a broader overview of symptoms, as collected in the Glasgow SDQ work (Green et al., 2005). Norwegian comorbidity figures were provided by condition: these showed far higher comorbidity for disorders such as ADHD, where 78% of children had a comorbidity, and 48% for behavioural disorders (Heiervang et al., 2007).

Indeed, in the Glasgow City data, Hyperactivity/inattention difficulties were the most strongly correlated with other scales, reflecting the Norwegian data for 8-10 year olds (Heiervang et al., 2007). In particular, strong correlations were seen with difficulties with Prosocial Behaviours, Conduct Problems and Peer Relationship Problems. The relationship between Hyperactivity/inattention and Conduct problems has been well documented (Costello et al., 2003; Ford et al., 2003; Heiervang et al., 2007), with research suggesting that about a third of boys with high levels of ADHD at preschool will go onto develop Conduct Disorder in later childhood (Beauchaine et al., 2010). The high levels of comorbidity with hyperactivity disorders has been shown to be due to substantial levels of heritability of both hyperactivity and, separately, of conditions such as anxiety and learning disorders (Pliszka, 1997). It has been suggested that having a comorbidity alongside a hyperactivity disorder in childhood may lead, along with other factors such as maternal psychopathology and family size, to worse outcomes in adulthood (Spencer, Biederman, & Mick, 2007). It may be therefore, that interventions in Glasgow City, such as nurture groups, should specifically target children with abnormal Hyperactivity/inattention scores along with a comorbidity.

Overlap between symptoms appeared more likely at age 7-8 than at age 4-5. There is little evidence on prevalence of comorbidities across early to middle childhood. However, the overall level of difficulties is likely to be higher at this age than at preschool (Green et al., 2005), which may mean that it is more likely that a child will have more than one difficulty by age 7-8.

Differences could be seen in homotypic continuity depending on the domain of the SDQ being examined. Continuity of difficulties was highest for children on the Hyperactivity/inattention scale. This is in line with previous research which has found high levels of stability in hyperactivity disorders, even from preschool. One study reported that children who were diagnosed with ADHD at preschool were 22.3 times more likely to have a diagnosis of ADHD two years later, than children with no ADHD diagnosis at preschool (Tandon, Si, & Luby, 2011).

Homotypic continuity was lowest on the Emotional Symptoms subscale which may suggest that the issues being picked up at preschool around Emotional Symptoms were development-related rather than being a sign of continuing problems per se. Prevalence of children with an abnormal Emotional Symptoms score at preschool was extremely low however. There is little research in this area with children this young. The little that there is explores continuity in diagnoses of preschool depression. Results though show a substantial amount of continuity: children with depression at preschool were 11.3 times as likely to have a diagnosis of depression two years later, compared with preschoolers without depression (Luby, Si, Belden, Tandon, & Spitznagel, 2009). The SDQ was good at predicting which children would remain in the abnormal category, with 95% of those who had a normal score at preschool also having a normal score at P3, in line with other findings, as discussed above. Previous studies have also found that parents are better at predicting internalising symptoms than teachers (Goodman et al., 2000). It may be that this is even more the case at preschool where staff spend less time with the children than at school, and some of these symptoms are perhaps less obvious at this age than they are in later childhood.

10.6 Conclusions

In conclusion, it was clear that prevalence of social, emotional and behavioural difficulties had changed during the first few years of school. The most striking of these was the increase in levels of hyperactivity and inattention problems, which had risen even more than anticipated given the age of the children. In line with previous research, both conduct problems and emotional symptoms had also increased in the same period, whilst prosocial behaviours had fallen in line with the maturation of the children. Comorbidity was high in the sample, with more than two-fifths of children with a difficulty having a comorbid difficulty at each time point, higher than previous reports from the UK. This may be related to the high levels of hyperactivity in Glasgow City, as overlaps between hyperactivity and other conditions were high. Whether this increase in hyperactivity levels is part of the ‘Glasgow Effect’ or whether it can be explained by the higher rates of poverty and other demographics in Glasgow City shall be explored in the following chapter.

11 Results: Is the ‘Glasgow Effect’ evident in social, emotional and behavioural development in early to middle childhood?

11.1 Introduction

This chapter compares the SDQ results from Glasgow City with results from the rest of the UK. Following on from the work of Walsh et al. (Walsh et al., 2010) and Landy et al. (Landy et al., 2010) which found unexplained variance, known as the “Glasgow Effect” in adult health and mental health outcomes, it is hypothesised that this Glasgow Effect may be found in childhood, potentially fuelled by the higher rates of parental stress, drug and alcohol abuse, and witnessing of violence, which children in Glasgow City may be subject to. Results are compared at a binary level, but then also within a cohort, taking into account the different demographics of the populations, in order to gauge whether any “Glasgow Effect” exists in a preschool sample of SDQ scores. This is important to establish so that the generalisability of the results are known, in order to indicate whether specific solutions may be needed to support children’s needs in Glasgow City, and whether these results can be applied to other UK and international populations of children.

11.2 Methods

In order to ascertain if the data from Glasgow City were similar to data for children in the rest of Scotland and the UK, and therefore if the data were potentially generalisable, comparisons were made between the Glasgow City data and data from the British Mental Health Survey of Children and Young People 2004 at an aggregate level. Both means and percentages of abnormal scores were compared. This was also broken down by gender.

The Growing Up in Scotland dataset was then explored in order to ascertain whether there appeared to be any difference in SDQ scores at preschool age once demographic factors were controlled for.

Demographic differences between children living in the NHS Greater Glasgow and Clyde (NHS GGC) area and other Scottish health authority regions were first assessed, before going on to examine whether there appears to be a Glasgow Effect. Spearman's rank order correlations were performed to explore binary relationships between continuous SDQ scores, socio-demographic characteristics of the family and area in which the child lives, and Health Board. Binary scores were also explored as it was hypothesized that there may be differences between Health Boards in the proportions of children scoring in the 'abnormal' range on the scales, compared with the spread across the whole scale. Children's SDQ scores were grouped into 'normal' and 'abnormal' scores, using the standard SDQ cut-off points (Goodman, 2013b). Binary 'abnormal' and 'normal' SDQ scores were analysed and binary Spearman's correlations examined between Health Board and SDQ means and abnormal scores. The data were weighted using the Birth Cohort Sweep 4 specific weight, which helps to control for both the differential response and attrition experienced in the survey.

Multivariate analysis was then carried out in order to assess if any Glasgow Effect can be found once adjustments are applied for socio-demographic variables. The square roots of the continuous scores were used as the dependent variables, in an attempt to 'normalise' what would otherwise be heavily skewed data (Osborne, 2002). Weighted forward stepwise linear regression models were fitted for the Total Difficulties scale and the individual sub-scales using the continuous scores, in order to examine whether differences were evident between GGC and the rest of Scotland in terms of where children fall on the Total Difficulties scale once other demographic variables were taken account of.

Second, a series of models was constructed for the binary SDQ banded scores. These models explored relationships between being in the 'abnormal' range on each of the subscales, demographic factors and Health board, using a weighted forward stepwise logistic regression model. The regression coefficients produced can be viewed in Supplementary Table 4. Following this model, any variables which were not significant in Model 1, or which had small numbers of cases, were removed and the remaining significant variables were entered into a weighted forward stepwise logistic regression model. The final model produced by this forward stepwise regression, along with the Health Board indicator, was then re-run as a forced entry model using the complex survey module, which takes account of the clustered and stratified nature of the sample.

The last section of the analysis attempted to restrict the GGC sample as far as possible to Glasgow City, by restricting analysis to children living in Large Urban areas and in the most deprived quintile of the SIMD. These children were compared with children living in large urban areas out with GGC.

11.3 Results: Comparing the Glasgow Cohort with UK teacher-rated norms

11.3.1 Mean scores

Mean scores and standard deviations were compared to the UK norms, taken from the Mental Health of Children and Young People in Great Britain Survey (Green et al., 2005). Mean scores were similar to the UK norms at both stages. At Preschool, children in Glasgow City had slightly lower mean scores on the Total Difficulties Domain, Emotional Symptoms and on the Hyperactivity/inattention domain, indicating lower levels of difficulties in Glasgow City when compared with the UK norms. On the Conduct problems, Peer Relationship Problems and Pro-social Behaviours domains, the means were very similar (Table 6). It should be noted that the UK norms are based on older children, aged 5-10, compared with the cohort who are aged 4-5, and thus different results may be seen if comparable age data was available.

Mean scores at P3 were also similar to the UK norms for 5-10 year olds. The mean Total Difficulties score in Glasgow City was 6.1, compared with 6.7 in the UK, suggesting slight lower scores for the children in Glasgow city overall. In terms of the subdomains, mean scores on the Peer Relationship Problems scale were lower in Glasgow city (1.0 vs. 1.4 for the UK), whilst the Emotional Symptoms, Conduct Problems and Hyperactivity/inattention means were very similar. In terms of continuous SDQ scores then, there does not appear to be a difference, particularly a negative one, in Glasgow City in early Primary school.

Table 6 2010 Preschool and P3 Means and Standard Deviations by SDQ Sub-scale and Cohort

Scale	Glasgow Preschool Mean (SD)	Glasgow P3 Mean (SD)	UK 5-10 year old Mean
Total Difficulties	5.6 (5.2)	6.1 (6.1)	6.7 (5.9)
Emotional Symptoms	1.1 (1.7)	1.3 (2.0)	1.5 (1.9)
Conduct Problems	0.8 (1.3)	0.8 (1.6)	0.9 (1.6)
Hyperactivity/Inattention	2.5 (2.5)	3.0 (3.1)	3.0 (2.8)
Peer Relationship Problems	1.3 (1.7)	1.0 (1.5)	1.4 (1.8)
Pro-social Behaviours	7.6 (2.4)	8.2 (2.3)	7.3 (2.4)

Separate means were examined for boys and girls at each stage and compared with the respective UK norms for each gender, in order to explore whether mean scores were comparable at this level, or whether one gender was doing worse than the other in relation to the UK norms. Mean scores on the Total Difficulties scale were lower in Glasgow City at both stages for boys and girls. Mean scores for girls in Glasgow City stayed relatively level (4.5 and 4.7), compared with a mean of 5.6 for 5-10 year girls in the UK. Boys' mean scores increased between preschool and P3 (from 6.7 to 7.4), but still remained lower than the UK norm for 5-10 year old boys of 8.0. On the subdomains, mean scores were relatively similar for both boys and girls. Boys had a much lower Hyperactivity / inattention score at preschool (3.1) than the UK norm, though this increased to 3.9 at P3, en par with the UK score (3.8). Girls, on the other hand, had mean Hyperactivity / inattention scores which remained steady over time and which were comparable with the UK norm. Again then, when examining mean scores by gender for Glasgow City compared with the UK norms, there does not appear to be a Glasgow Effect.

Figure 17 2010 Preschool & 2013 P3 Means and Standard Deviations by SDQ Sub-scale, Sex of child and Cohort

Scale	Glasgow Presch Boys Mean (SD)	Glasgow P3 Boys Mean (SD)	UK 5-10 yr olds Boys Mean (SD)	Glasgow Presch Girls Mean (SD)	Glasgow P3 Girls Mean (SD)	UK 5-10 yr olds Girls Mean (SD)
Total Difficulties	6.7 (5.7)	7.4 (6.5)	8.0 (6.2)	4.5 (4.5)	4.7 (5.3)	5.6 (5.3)
Emotional Symptoms	1.1 (1.7)	1.3 (2.1)	1.5 (1.9)	1.0 (1.6)	1.2 (1.8)	1.5 (1.9)
Conduct Problems	1.0 (1.7)	1.1 (1.8)	1.2 (1.8)	0.5 (1.1)	0.6 (1.3)	0.6 (1.3)
Hyperactivity/ Inattention	3.1 (2.8)	3.9 (3.3)	3.8 (3.0)	1.8 (2.2)	2.0 (2.6)	2.2 (2.4)
Peer Relationship Problems	1.5 (1.8)	1.1 (1.6)	1.5 (1.8)	1.2 (1.6)	0.9 (1.5)	1.2 (1.7)
Prosocial Behaviours	7.0 (2.6)	7.6 (2.5)	6.8 (2.5)	8.2 (2.1)	8.8 (1.8)	8.0 (2.1)

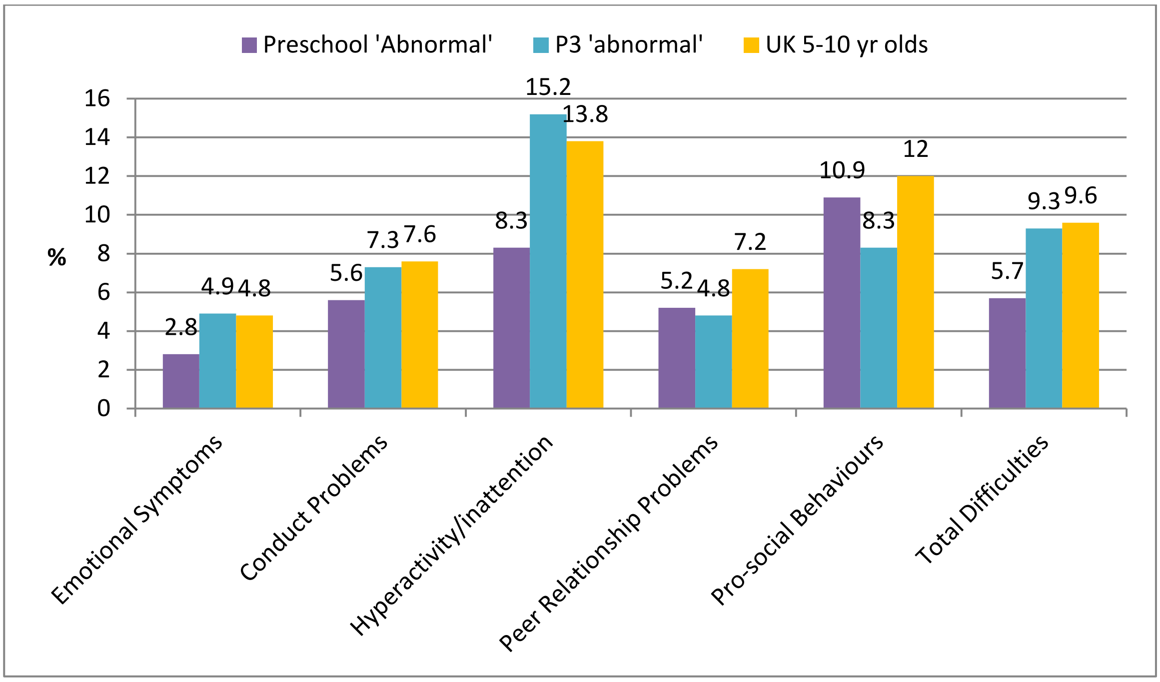
11.3.2 Binary ‘abnormal’ scores

Results for the Glasgow City cohort and the UK were then compared in relation to the proportion of children scoring in the ‘abnormal’ range of the Total Difficulties scale and each subdomain. Comparing firstly prevalence rates at preschool in Glasgow City with the UK, the Glasgow cohort appear to have slightly lower rates of difficulties on the Total Difficulties scale (5.7% with difficulties, compared with 7.9% in the UK), as well as on the Hyperactivity/inattention scale (8.3% vs. 10.1%) and the Prosocial behaviour scale (10.9% vs. 12%). In contrast, levels of Conduct Problems were slightly higher at preschool in Glasgow City compared with UK 5-10 year olds (5.6% compared with 4.3% in the UK), as were levels of Peer Relationship Problems at the same stage (5.2% vs. 3.9%). Rates of abnormal Emotional Symptoms scores were similar: 2.8% having problems in Glasgow City preschoolers and 2.6% in UK 5-10 year olds.

The proportion of reported abnormal scores at P3 was also similar in comparison with UK norms for 5-10 year olds. Overall, 9.3% of P3s in Glasgow City were reported to have scored in the abnormal range on the Total Difficulties scale, compared with 9.6% of 5-10 year olds in the UK. On the

Hyperactivity/inattention domain, 15.2% of children at P3 in Glasgow City had reported difficulties, slightly higher than the 13.8% in the UK. Levels of Emotional Symptoms were also similar at this stage (4.9% vs. 4.8%), as were levels of Conduct Problems (7.3% vs. 7.6%). In two areas, children in Glasgow City were doing better in P3 than the UK norms: these were in the domain of Prosocial Behaviours, where only 8.3% had reported difficulties in this area in Glasgow City, compared with 12% in the UK sample, and Peer Relationship Problems, where 4.8% of P3s in Glasgow city had reported difficulties in contrast to 7.2% of UK 5-10 year olds.

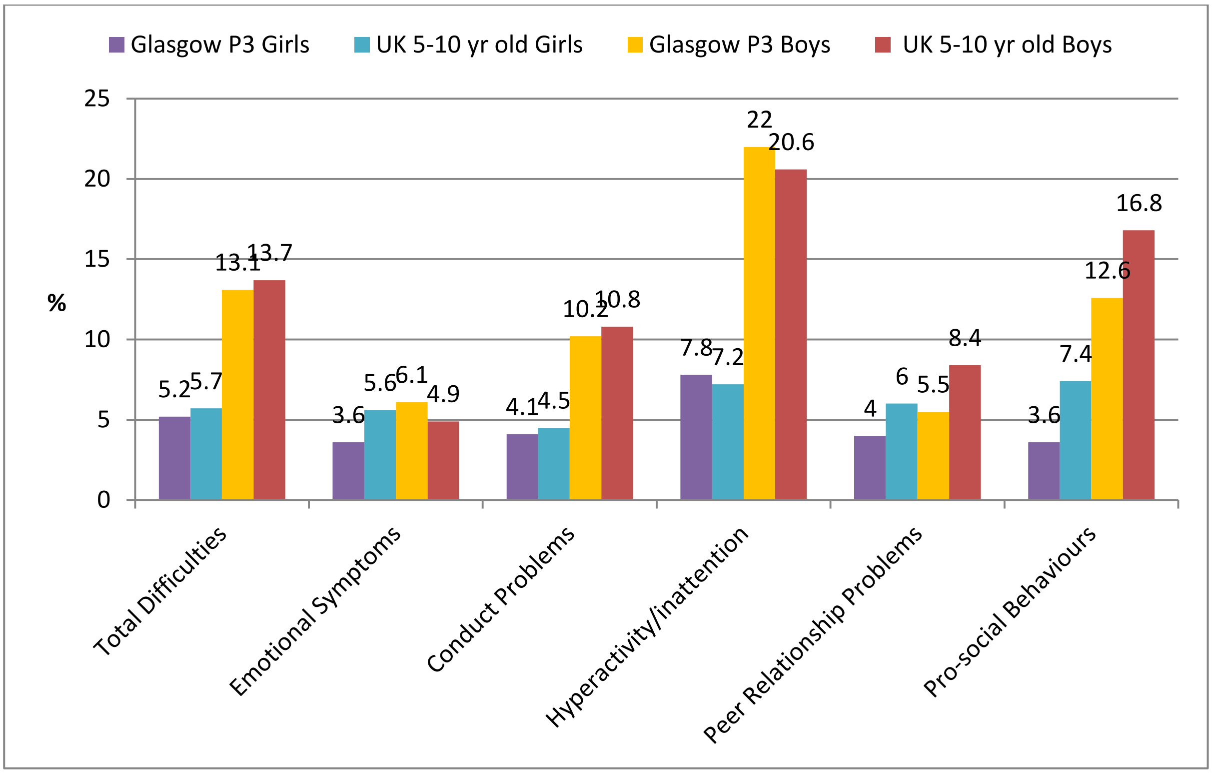
Figure 18 Proportions of children scoring in the 'abnormal' range by stage and cohort



Prevalence rates were investigated for each gender separately, in order to see if patterns were the same for boys and girls. The rates of reported abnormal scores on the Total Difficulties scale and the Conduct Problems scale were similar in both datasets, with boys having much higher rates than girls in both samples. In the Hyperactivity/inattention domain, boys in Glasgow City at P3 had higher rates of difficulties (22%) than 5-10 year old boys in the UK sample (20.6%). Girls in the two samples had fairly similar levels of Hyperactivity/inattention (7.8% and 7.2%, respectively). The Emotional Symptoms domain showed different patterns for boys and girls when comparing the two datasets. Girls in P3 in Glasgow City were less likely to have difficulties with Emotional Symptoms than children in the UK sample (3.6% vs. 5.6%), whereas boys in Glasgow City were more likely to have difficulties in this area (6.1% vs. 4.9%).

Both abnormal scores on the Peer Relationship Problems scale and the Pro-social Behaviours scale were substantially lower for boys and girls, respectively, in Glasgow City. This was particularly the case for Prosocial Behaviours, where just 3.6% of girls in Glasgow City had reported abnormal scores, compared with 7.4% of girls in the UK sample. For boys the comparative figures were 12.6% and 16.8%.

Figure 19 Proportions of children with abnormal SDQ scores by SDQ sub-scale, gender and cohort



11.4 Exploring a 'Glasgow Effect': Parent-rated SDQ data for preschool children using the Growing Up in Scotland birth cohort

The 'Glasgow Effect' is not just a difference in outcome measures, but rather it is an unexplained difference once demographic information is taken into account. The UK normative data do not come with enough similar demographic information in order to make a direct comparison with the Glasgow City data in order to establish this link. Within the UK normative dataset, there is a Glasgow City indicator, which could be used to look at differences between Glasgow City and other areas within just that dataset. However, the sample size for Glasgow City is extremely small once that data are narrowed to the age bands of interest, particularly when exploring children scoring in the 'abnormal' range in Glasgow City. For these reasons, both of these options were ruled out. To explore this phenomenon further, therefore, a third dataset was utilized. This dataset contained children of preschool age from the Growing Up in Scotland Study (described in Chapter 9).

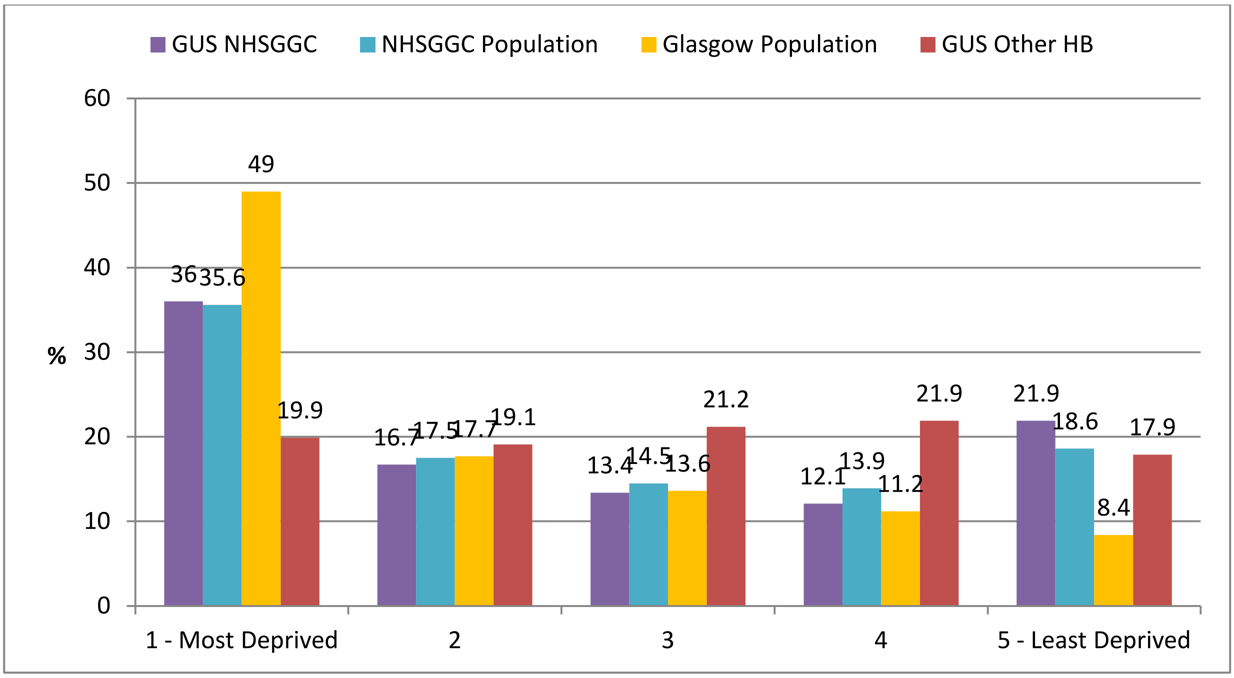
11.4.1 Demographic characteristics of Preschool aged children in GGC and the rest of Scotland

The Greater Glasgow and Clyde (GGC) sample of families in GUS appeared to differ from the rest of the Scottish GUS sample demographically. The GGC participants were substantially more likely to live in an area of high deprivation than families from other Scottish health boards (36% in GGC, in contrast to 19.1% in other health boards). Nevertheless, the proportion of families living in the *least* deprived areas in the GGC GUS sample is also slightly higher compared to other Scottish health boards (21.9% vs. 17.9%). When exploring household income in the weighted data, 29% of the GGC children lived in a household with an equivalised[2] household income in the lowest 20% of the sample population, whilst in other Health boards there was 24.3% ($p<0.01$). Again, as with the area level deprivation data, GGC families were also slightly more likely to be in the highest income group, compared with families in other Scottish health boards (19.2% compared with 15.9%). Mirroring this was the socio-economic

[2] Equivalised Household Income is when the total income is adjusted for the number of adults and the number of children of different ages in the household. The equivalised income quintiles are based on unweighted data.

classification of families, with larger proportions of GGC families being in the 'Not Working' group (7.1% vs. 3%), but also in the Managerial and Professional Group (37% vs. 33.6%).

Figure 2 Scottish Index of Multiple Deprivation Quintiles by Area and Sample



Base: 3593

The GUS GGC participants were also more likely to have a mother with no educational qualifications (13% compared with 7.5% in other health boards), though they were equally likely to have a mother with a degree level qualification or higher. The mother was also more likely to be working full time in GGC (58.1% vs. 54.6%), less likely to work part time (6% compared with 10.5%), and equally likely to not work (35.9% and 34.9%, respectively).

There were no significant differences found between GGC families and other families in terms of the proportions of lone parents or age of mother at the birth of the cohort child in the sample.

11.4.2 Levels of social, emotional and behavioural difficulties

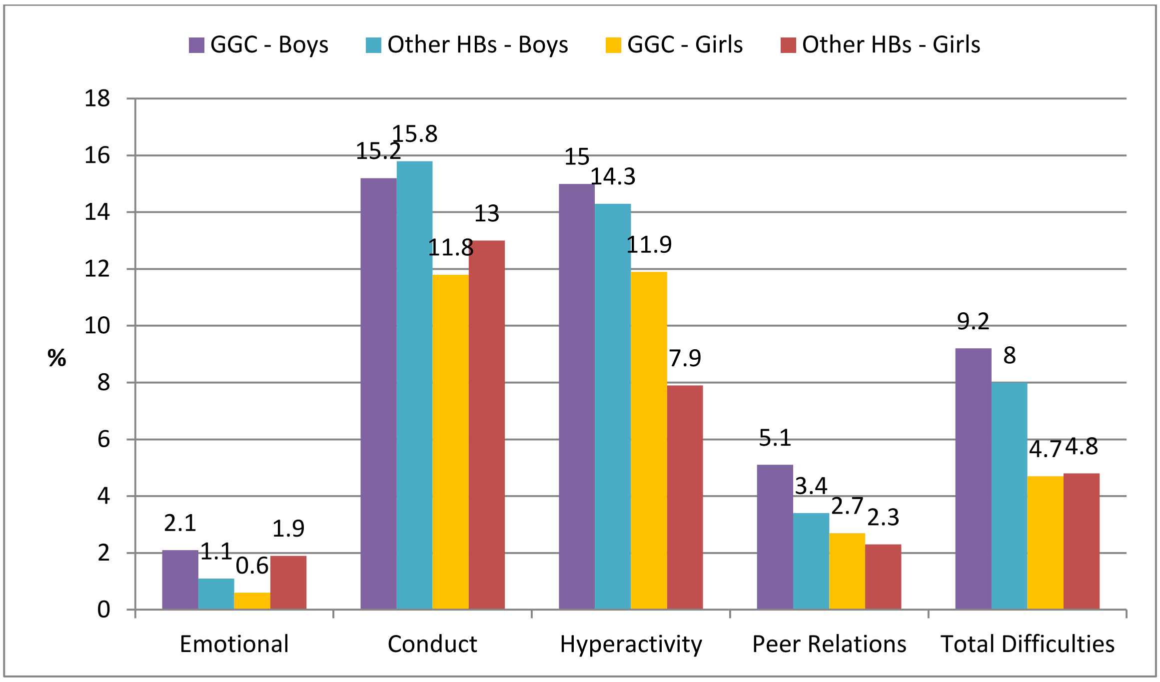
Mean raw scores for the Total Difficulties scale and its respective subscales were assessed to see if there were any differences between children residing in GGC and those in other Health Boards. We found no difference between children from GGC and other Health Boards on any of the SDQ subscales or on the Total Difficulties scale in relation to mean scores. In comparison to the UK norms, based on parent-rated data for 5-10 year olds in the British Mental Health Survey of Children and Young People (Green et al., 2005), both GGC and other health boards in Scotland had slightly lower scores on Emotional Symptoms and the Total Difficulties scale, with slightly higher scores on the Conduct Problems scale. The GGC and Rest of Scotland samples from GUS had a reported mean of 8.0 on the Total Difficulties scale, respectively, slightly lower than the reported mean of 8.6 for the UK sample. In contrast the mean for Conduct problems in GGC and the rest of Scotland in the GUS sample was 2.0, respectively, compared with a mean of 1.6 in the UK sample (Table 7).

Table 7 Means for SDQ subscales and Total Difficulties for GUS GGC, GUS Other Health Boards and UK Norms

	Greater Glasgow and Clyde Mean (SD)	**Other Health Boards Mean (SD)**	**UK norms (5-10 year olds) Mean (SD)**
Emotional symptoms	1.2 (1.4)	1.2 (1.4)	1.9 (2.0)
Conduct problems	2.0 (1.5)	2.0 (1.4)	1.6 (1.7)
Hyperactivity/Inattention	3.7 (2.3)	3.7 (2.2)	3.6 (2.7)
Peer Problems	1.2 (1.5)	1.2 (1.4)	1.4 (1.7)
Total Difficulties	8.0 (4.7)	8.0 (4.5)	8.6 (5.7)
Pro-social	7.8 (1.7)	7.9 (1.8)	8.6 (1.6)
Bases	919 – 925	3016 – 3044	5855

When proportions of children in the abnormal range of the scales were explored, no statistically significant differences were found. Children in GGC actually had slightly lower levels of reported Conduct Problems in the abnormal range (13.4% in GGC vs. 14.4% in other Scottish Health Boards), though this was not significant. A higher proportion of GGC children were in the abnormal range on the Hyperactivity/inattention scale (13.4% vs. 11.1%), and, to a lesser extent, in the areas of Peer Relations (3.9% vs. 2.9%) and Total difficulties (7% vs. 6.5%). Abnormal Emotional difficulties scores are rare at this age and little difference can be seen between areas (3.1% of GGC children with an 'abnormal' score compared with 3.3% in other Health boards).

Figure 20 Proportions of Children with Abnormal Scores on each subscale by Health Board and Sex



Bases: GGC - 879; Rest of Scotland - 2714

11.4.3 What variables are associated with higher levels of difficulties at preschool?

Pearson correlations were performed using the continuous scores to analyse significant associations between SDQ scores, Health Board and demographic characteristics of the children and their families. Living in the GGC Health Board showed no significant unadjusted correlation with any continuous SDQ score. The GGC population of families in GUS did appear to differ demographically from the rest of the Scottish GUS sample however. Pearson correlations using continuous scores showed GGC children differed from those in other Health Boards in terms of the lower educational qualifications of the mother, the increased number of children from Ethnic Minorities in the population, the higher level of area deprivation and the greater proportion of large urban areas within the Health Boards. Aside from the negative correlation between being in a rural area and living in GGC (-0.34), correlations for demographic differences between areas were small. In terms of demographic correlations with SDQ continuous scores, a wide variety of demographic factors, such as the sex of the child, household income, and maternal education, were demonstrated to have significant correlations with the various scales (see Chapter 16).

As with the treatment of continuous scores, Spearman correlations were used to examine unadjusted significant correlations between binary SDQ groups and both Health board and demographic characteristics of the children and their families. There was a very small but significant correlation between being in the abnormal Hyperactivity/Inattention group and Health board, with children living outwith GGC being less likely to have an abnormal Hyperactivity/inattention score. As with the continuous scores, a wide range of demographic factors was associated with being in the various abnormal difficulties groups (Chapter 16).

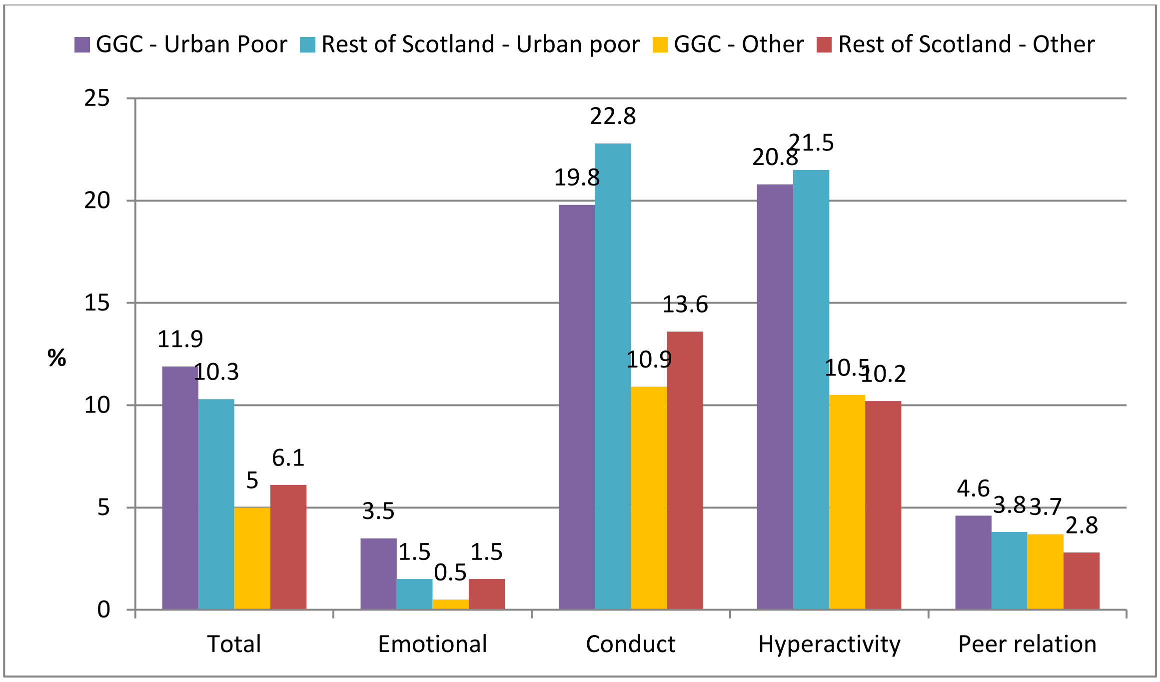
11.4.4 Multivariate analysis

Linear regression models were fitted in relation to the continuous Total Difficulties scores and its four constituent sub-scales in order to assess whether differences were present between GGC and other Health Boards when adjusted for demographic profiles of the areas' samples. Controlling for the difference in demographics, it was evident that living in the GGC area was independently associated with one sub-scale – Conduct Problems. However, this was a negative association (ß=-0.14), meaning that living in the Greater Glasgow and Clyde area was significantly associated with a lower Conduct Problems score, when compared with living in another Scottish health board, once levels of deprivation etc. were taken account of. The models only explained 4% of the variation on the Emotional Symptoms scale to 12% on the Total Difficulties scale.

Logistic regression models were then fitted in order to investigate whether there were any significant differences in terms of the levels of social, emotional and behavioural difficulties classified as 'abnormal' for children living in the GGC health board area, once demographics were controlled for. Living in GGC was not independently correlated with any type of social, emotional or behavioural abnormal score, once demographics such as area deprivation were taken account of. Being in the abnormal range of the SDQ scales was associated with a range of demographic characteristics. Children were more likely to fall into the abnormal range of the Total Difficulties score, for example, if they were male, had a non-White UK ethnicity, had a mother with lower educational qualifications and had a lower household equivalised income (i.e. adjusted for the number of people in the household). This model explained the largest proportion of the variation in terms of abnormal scores, though this was still only 11%.

In order to explore whether the 'Glasgow Effect' was simply an artifact of Glasgow City being both a large urban area and very deprived, the analysis was then restricted to just children who lived in a Large Urban Area, as classified by the Scottish Government, and to children who lived in an area in the most deprived quintile on the Scottish Index of Multiple Deprivation (Scottish Government, 2013). This therefore excluded most of the surrounding areas of Glasgow City, with the exception of some large towns, such as Renfrew, which arguably share characteristics with Glasgow City. On all scales with the exception of Emotional Symptoms, living in a Large Urban area in the most deprived area Quintile, regardless of Health Board, was associated with a substantial increase in the proportion of children with abnormal scores: for example, 11.9% of GGC urban-poor children and 10.3% of other Health Board urban-poor scored in the abnormal range of the Total Difficulties scale, compared with 5% of non-urban poor GGC children and 6.1% of other Health Board non-Urban-poor, suggesting that it is both living in a large Scottish city and experiencing poverty that affects children's development, both in Glasgow City and elsewhere. The Emotional Symptoms abnormal scores were the exception to this. Although proportions of children scoring in the abnormal range are very low across the board, children in GGC Urban-poor areas appear to be more likely to have an abnormal score (3.5% abnormal) compared with all other children, including those from Urban-Poor areas in the rest of Scotland (1.5%), however numbers, particularly in the GGC sample, were very small and differences were not significant.

Figure 21 Proportion of children in the abnormal range of each scale by GGC and Rest of Scotland by Urban-Deprivation status



Bases: GGC - 879; Rest of Scotland - 2714

11.5 Discussion

Comparisons between the Glasgow Cohort and UK normative data showed mixed results. Mean scores for Glaswegian preschoolers and Primary 3s were similar, if not slightly better than the UK norms for 5-10 year olds. However, the proportion of children who had abnormal scores in Glasgow City was substantially different from the UK teacher-rated data. This was particularly the case at P3, where hyperactivity levels, whilst being expected to increase at this age, rose substantially more than anticipated.

However, these binary correlations did not take into account the distinctive demography of Glaswegian children, whereby more than half live in areas in the most deprived SIMD quintile in Scotland. Data from the Growing Up in Scotland study, which produces parent-rated SDQs at age 4-5, was used to explore whether a Glasgow Effect, beyond that produced by demographics, exists at this age. There appears to be a small association between living in the GGC area and SDQ scores, though only on the continuous SDQ Conduct Problems scale. Contrary to expectation, this appears to be a negative effect, whereby continuous Conduct Problem scores in GGC are actually slightly better than those in the rest of Scotland, once demographic characteristics of the family and area are accounted for. Furthermore, when exploring the adjusted 'abnormal' and 'normal' SDQ scores and all other continuous SDQ scores, GGC preschoolers do not differ from the those in the rest of Scotland, indicating no specific Glasgow Effect in these areas at this age. It would appear, therefore, that the differences in the unadjusted proportions of children scoring in the abnormal range in GGC, particularly in terms of Conduct Problems, Hyperactivity/inattention and Peer Relationship Problems, are completely accounted for by the differences which can be seen in the demographic profiles of the two samples i.e. the differences in levels of deprivation, education levels of mothers and ethnicity explain all of the variance between the GGC and other areas.

The lack of other differences between GGC and other Scottish regional health boards (both in terms of continuous and banded scores) raises questions about whether a "Glasgow Effect" is present during childhood for Glasgow's children, or whether any effect is masked by the sample in the Growing Up in Scotland Study. In line with the little evidence there is in this area, it could be that there is no "Glasgow Effect" at this age in terms of child social, emotional and behavioural difficulties (Levin, 2012). Another theory is that the differences in the early experiences of children in Glasgow, such as witnessing more violence and experiencing greater deprivation, may have an impact, but that this may be a 'sleeper effect' i.e. that the impact of these experiences may not be seen until adolescence or beyond (Rutter, 1982). There has been considerable debate about sleeper effects in child development , with some academics now disputing their existence (Clarke & Clarke, 1981). For others though there is a view that early adverse experiences may lie dormant for years before materializing as mental health issues, violence or delinquency (Loeber & Stouthamer-Loeber, 1986; Noll, 2005). If the latter view is correct, it could be that these early adversities play a role in the adult "Glasgow Effect", which can be seen in terms of the excess premature mortality through violence, drug and alcohol misuse and suicide, particularly in the male population (Whyte, 2006). A recent tentative finding suggested that children in Glasgow City may be more likely to have witnessed domestic violence than their counter-parts in other, demographically similar, cities (Taulbut & Walsh, 2013). The impact of witnessing domestic violence on children's emotional development has been well-documented (Holtzworth-Munroe et al., 1997; Margolin & Gordis, 2000b; Sternberg et al., 1993).

The lack of a "Glasgow Effect", in terms of unexplained poorer scores for children in Glasgow, could also be an artefact of the sampling frame. The GUS sample was demonstrated in the analysis to be different to that of the population of GGC, with more children sitting at the extremes of each end of the deprivation scale. The fact that this is a cohort sample which, as with the majority of cohort studies, suffers from differential attrition across the years, may exacerbate this sampling issue (Wolke et al., 2009). GUS disproportionately loses the most vulnerable families e.g. those with younger mothers and those from more deprived areas, however, these characteristics are, on the whole, accounted for by the survey weighting. Evidence from other cohort studies though suggests that there may be selective attrition from families containing children with more behavioural problems, which would not be picked up in the weight over and above deprivation (Wolke et al., 2009).

Furthermore, GUS is only able to explore differences at a Health Board level, due to small numbers at the city level. Previous "Glasgow Effects" have been present when looking at Glasgow City alone. As the analysis showed, the population of GGC is substantially different to Glasgow City in terms of its demographic characteristics. Furthermore, in the mid-Twentieth Century, families were cleared out of the slum areas of Glasgow City and by 1972, approximately 14,000 families were moved out with the City boundaries in the Glasgow City over-spill scheme. Movement was not uniform: more highly skilled workers and those from higher social categories were moved out of Glasgow City into the surrounding suburban and rural areas of GGC, whereas unskilled and lower social class families were re-housed in the North East and South of the city. Through adding into the sample Glasgow City's more affluent and potentially more highly educated neighbours from surrounding areas, it may be that any "Glasgow Effect" has been diluted.

In an attempt to isolate the GUS GGC sample to Glasgow City as far as possible, the analysis was split by families living in both Large Urban areas and in the most deprived area quintile, and all others. Using these criteria, GGC and Other Health Boards were shown to both have fairly similar levels of difficulties, with substantially higher levels of abnormal scores seen for families in all areas living in Urban-Poor areas compared with other areas. The analysis therefore indicates that the "Glasgow Effect", which refers to adult outcomes, may not be a Glasgow effect at all but the effect of living in a Large Urban Deprived area of Scotland. Studies exploring the "Glasgow Effect" have looked at Glasgow City versus the rest of Scotland and Glasgow City versus demographically similar cities in England (e.g. Manchester and Liverpool). However, until now, no studies have compared Large Urban Deprived areas within Scotland. It may be that there is something systematically different about these areas in Scotland in comparison with their counterparts in England, for example the geographical distance between some urban centres in Scotland may have an isolating effect on people living within these areas which may lead to poorer outcomes. Further analysis using larger datasets is required in this area.

Finally, this survey uses parent-rated SDQs. If parents are used to seeing different levels of problematic behaviours in different areas then their view of 'normality' may be very different. If parents view their child's aggressive behaviour, for example, as 'normal' in relation to his or her peers, they may give lower scores than parents living in areas with less aggression. It is therefore possible that children in GGC do have poorer social and emotional functioning, but this is not perceived/expressed as such by their parents. Social desirability, i.e. the wish to present oneself or one's family in a desirable light (Nederhof, 1985), is another potential issue in survey research, particularly with parents. It may be that some parents would like to portray their child's behaviour more positively than may be the reality, particularly in front of an interviewer. GUS attempts to minimize the impact of this through the parent/carer completing the SDQ in a self-completion module on a laptop, so that their answers are kept private from the interviewer. Results on the effect of mode of questionnaire delivery on social desirability are mixed however, with some studies finding under-reporting in face-to-face administered questionnaires, compared to self-complete, with others finding no difference between the two methods (Bowling, 2005). It is unclear why social desirability should have a greater impact in GGC than in other areas, although there is some evidence that more vulnerable families are more likely to attempt to give a favourable impression due to the fear of third party involvement (Nederhof, 1985).

11.6 Conclusions

Prevalence of children's social, emotional and behavioural difficulties in Glasgow City appeared higher than in the UK as a whole, particularly at Primary 3, when the children are aged 7-8. However, this did not take into account the fact that children in Glasgow experience far greater disadvantage than children in most parts of the UK. Using data from the Growing Up in Scotland study, it was therefore explored whether any variance was present between children in the greater Glasgow area and their counterparts in the rest of Scotland at preschool age (46 months).

No "Glasgow Effect" on 46 month old children's social, emotional or behavioural difficulties was found in this analysis. The only difference between children living in Greater Glasgow and Clyde's levels of difficulties and other children's, was slightly lower scores on the Conduct Problems domain, after adjustment for other demographic factors. A range of theories was put forward as to why no effect was found. One theory is that effects do not materialise until adolescence: it is questionable whether this is because of differences in experiences during adolescence, or whether a 'sleeper effect' is at work. It could be that the lack of an effect found is related to the particular sample used during analysis: the GUS GGC sample is both more affluent and more deprived than the GGC population and, as a cohort, suffers from differential attrition, which may mean that children with difficulties may be more likely to drop out. Furthermore, the analysis was limited to examining Greater Glasgow and Clyde versus other Health Boards due to insufficient numbers in Glasgow City: it may be that using this wider sample masks any effect of living in Glasgow City itself. Finally, the fact that parents were rating the SDQs may introduce forms of bias particular to an area, again diluting the results. Further research is required which looks at the effects of living in Glasgow City, specifically, in relation to social, emotional and behavioural difficulties throughout childhood, in order to establish whether and when a "Glasgow Effect" emerges during childhood. Further exploration of the impact of living in large urban areas in Scotland on social, emotional and behavioural development would also be beneficial. In addition, the Glasgow Effect was only explored in relation to preschool aged children. The comparisons of the Glasgow City data with the UK norms showed a greater disparity between prevalence rates at P3. Further research looking at later sweeps of GUS data, which are gradually becoming available, may find evidence of a Glasgow Effect.

This chapter has focused on the city-level macro effects on children's social, emotional and behavioural functioning at preschool age. The next chapter will move on to look at micro-system influences such as individual, family and school-level factors.

12 What factors are associated with maladaptive social, emotional and behavioural development in the first three years of school?

12.1 Introduction

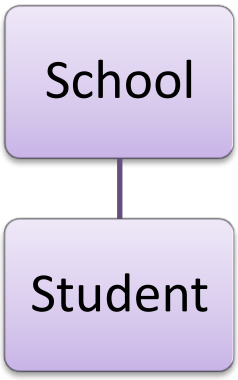
Previous research has demonstrated associations between characteristics of children and schools and social, emotional and behavioural development (e.g. (Silver et al., 2005; Hoglund & Leadbeater, 2004; Kellam, Ling, Merisca, Brown, & Lalongo, 1998). However, this evidence is often contradictory, is frequently based on small samples and much of it has been focused on secondary schools and schools in the US, which are arguably different from Primary schools in the UK, for example in terms of size and culture. This chapter firstly explores associations between explanatory variables and SDQ change scores and abnormal scores at P3, before going on to investigate whether schools have an impact on social, emotional and behavioural development in the first three years, controlling for SDQ scores at intake and characteristics of the children and schools.

12.2 Methods

12.2.1 Investigating the impact of schools and other factors on SDQ scores

Correlations between demographic factors and abnormal scores on the SDQ subscales at both Pre-school and P3 were investigated. Pearson correlations were run in order to examine unadjusted associations between explanatory variables and SDQ change scores at a binary level, whilst Spearman correlations (which are more appropriate for binomial dependent variables) were performed for the abnormal SDQ scores. Correlations were analysed in IBM SPSS v19. Significant correlations were explored further visually, through histograms and line graphs, and statistically, through tables.

A series of multi-level models were fitted using MLwiN version 2.27. These were hierarchical two-level models, looking at students within schools:



12.2.2 Predicting higher change scores on the SDQ at age 7-8: multilevel linear models

The first of these sets of models were linear models with the outcome measure as the continuous Total Difficulties change score. Each child level variable was individually entered into an unadjusted model, in order to assess the significance of each factor at a binary level. The variables were first fitted as fixed effects and then, if statistically significant to the $p<0.05$ level and with a significant loglikelihood ratio, were fitted as random slopes. If the variable was significant, it had a significant loglikelihood ratio and the random slope was also significant, then the random slope was selected over the fixed effect in the multivariate model.

The Level 2 (school-level) variables were then each entered into multilevel models one at a time as fixed effects. This time random slopes were not examined, as the variables were at level 2 (the highest level of the model) and so there was no variation within the variable at an individual level.

The significant variables were then entered into the multivariable multilevel linear model in clusters by type of variable. Child characteristics, such as gender and ethnicity, were entered into the model first, followed by any significant family characteristics at the child level (e.g. home area deprivation). The third model added in the baseline raw Total Difficulties score, and this was followed by a fourth model containing any significant school-level variables. Throughout this process the loglikelihood ratio was continuously checked to see if it was decreasing and thus showing a better fitting model with each new set of variables. Furthermore, each variable was checked for statistical significance and any variables which lost significance were removed from the model.

Residuals were examined visually through caterpillar plots in both the empty model and the final model. This gives an idea of whether some schools are doing better or worse than other schools before and after other factors are controlled for. Any schools which had their confidence intervals (CI) not overlapping the '0' line were judged to be significantly different from the norm. At the 95% CI, we would expect 6 schools out of the 120 schools to be not overlapping purely by chance. If there are more than six schools without their CIs overlapping, therefore, we would assume this to be an indicator that some schools were in fact significantly different. Where fewer than 6 schools had overlapping CIs, the 99% confidence intervals were also explored. In this case we would only expect to see 2 out of the 120 schools not overlapping the '0' line if this was just by chance.

In order to confirm what was found in the caterpillar plot, the Variance Partition Coefficient (VPC) was also examined. This allowed the researcher to see how much of the variance was explained by differences between schools, once the child and school-level factors were controlled for. If the VPC was more than 10% at level two, this indicated that there was a substantial amount of variation between schools and consequently, multilevel modelling was more appropriate than single level regression modelling.

12.2.3 Predicting abnormal scores at age 7-8: multilevel binomial models

A binary variable was derived for the Total Difficulties scale and all subscales, using Goodman's standard cut-offs for the teacher-rated SDQs (Goodman, 2013b). This produced two groups: an 'abnormal' group (those with likely difficulties) and a 'normal group' (those without difficulties or only showing borderline difficulties). It is important to examine the binary groups in models as well as the continuous scores, as the effect of being in this group may arguably be greater than simply having a higher score at any section of the scale. Furthermore, previous research has demonstrated that, of 5-10 year old children who are rated by their teacher as being in the 'abnormal' group, 59.8% will go onto have a psychiatric diagnosis (Goodman et al., 2004). This is arguably the group that we are most interested in, both in predicting what may be associated with such outcomes, and in following up over time in Glasgow City.

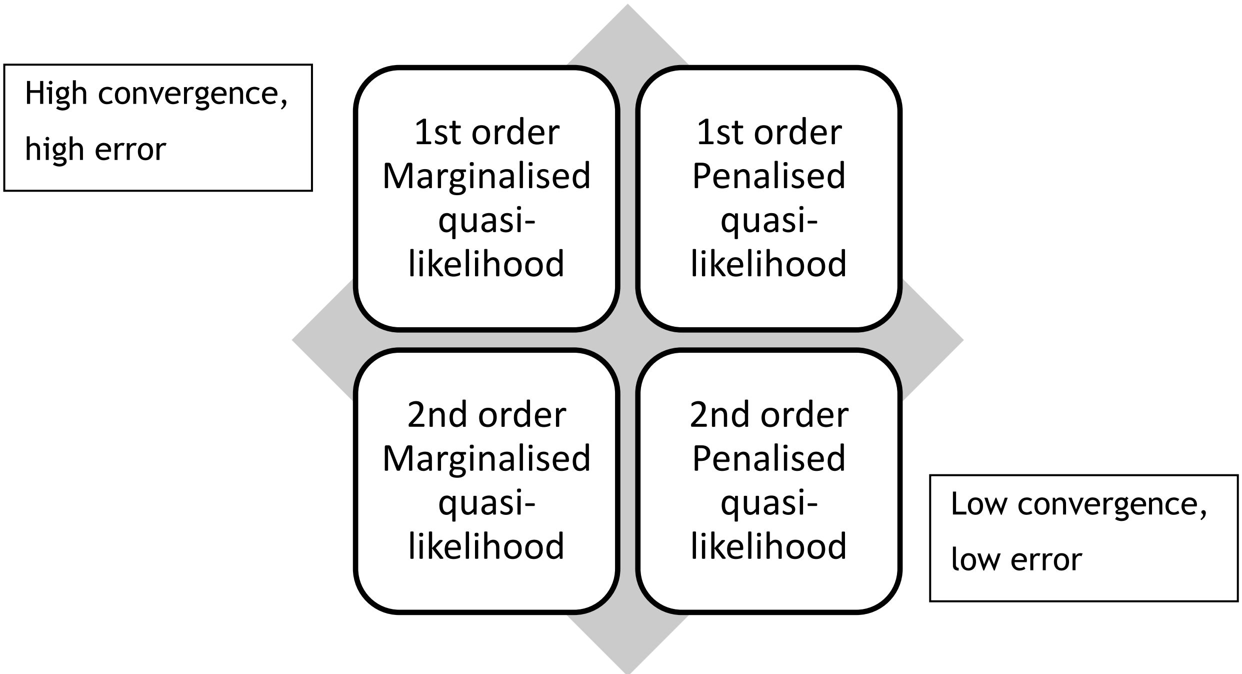
There are a range of methods available for estimating multilevel logistic models which are available to statisticians and able to be produced in MLwiN. Generalised Linear models are estimated using maximum likelihood methods. Maximum Likelihood estimation estimates the mean and variance (the parameters) of the model based on the information that is known from the sample, assuming that these data are normally distributed. The prevailing approach in multilevel modelling is to approximate the non-linear link using quasi-likelihood methods.

Quasi-likelihood is a way of allowing for overdispersion i.e. greater variability in the data than the statistical model would normally use (e.g. the number of boys vs. girls in a family does not tend to conform to a 50:50 split, as may be expected, but rather each family may have a skew towards one gender, thus yielding an estimated variance which is larger than predicted by a binomial model). The downside of quasi-likelihood models in general is that they tend to produce estimates which are downwardly biased. This is particularly the case in datasets with few level 1 units per level 2 unit (i.e. few students per school in this case) (Everitt & Palmer, 2011).

In quasi-likelihood models, the non-linear function is 'linearised' using an approximation know as the Taylor series expansion. This approximates a non-linear function by an infinite series of terms. Analysts can choose whether to use only the first term of the series, known as the first order Taylor approximation, or to use the second term to give the second order Taylor approximation (Hox, 2002). Generally speaking first order algorithms tend to slightly underestimate the size of the effect (Rodriguez & Goldman, 2001). In order to get the most precise estimates I will therefore use the second order algorithm.

The Taylor series linearization of a non-linear function depends on the value of its parameters. In multilevel modelling, the maximum likelihood is iterative, so it starts with approximate parameter values which are improved with each iteration. This means that the Taylor series linearization must be repeated after each iteration, using the latest parameter estimates. There are two options at this point. The analyst can choose to fit the Taylor series linearization using the current values of the fixed part of the model only – this is called 'marginalised quasi-likelihood' (MQL). The other option is to use the fixed part in conjunction with the residual values – this is referred to as 'penalised (or sometimes, predictive) quasi-likelihood' (Hox, 2002). After applying the chosen quasi-likelihood method, the model is then estimated using iterative generalised least squares (IGLS) (Khan & Shaw, 2011).

The combination of these two methods gives us four options for estimating the models:



Rodriguez and Goldman explored these different quasi-likelihood algorithms and concluded that all methods applied were severely biased with the exception of 2^{nd} order PQL methods. They found that 1^{st} order MQL models produce estimates which are little different to a standard logit model, whilst MQL-2 and PQL-1 'offer only slight improvements'. They therefore recommend the use of 2^{nd} order PQL models for giving the most precise estimates (Rodriguez & Goldman, 2001). However, PQL-2 models can suffer from convergence problems (Khan & Shaw, 2011). For this reason, all unadjusted and adjusted models were fitted as MQL – 1 models in the first instance. The final model produced was then extended into a PQL-2 model.

In order to gain an even higher level of accuracy in the models, the final stage was re-run using Bayesian methods. Bayesian statistics are based around probabilities or 'degrees of belief'. In particular Bayesian models require a formulation of a set of prior probability distributions for unknown parameters: that is the probability distribution of the uncertainty of a value before some evidence is taken into account. The most common of these in multilevel modelling is Marcov Chain Monte Carlo methods. These methods have been found to eliminate the bias seen in quasi-likelihood models (Rodriguez & Goldman, 2001). However, they are computationally intensive, so are not recommended for exploratory models (Hox, 2002), hence fitting only the final model in this way.

The multilevel binomial models were fitted in the same order as the linear models, with individual level factors and school level factors entered individually into models first of all, before gradually building the final model. As explained above, in order to get the best model estimates, the model was then re-run first as a PQL-2nd order model, and finally as an MCMC model.

The fitting of cross-classification models, which take into account the fact that a student is a member of both a school and a home area, was also considered. Both of these membership categories may have a relationship with the child's social, emotional and behavioural development at P3, however they are not necessarily distinct groups: children from the same area may go to different schools, and equally, a school may take in children from a number of neighbourhoods. However, following the fitting of the first set of multilevel models, it was found that area effects were considerably weaker than those at an individual level. Indeed, area level deprivation was not a significant factor in any of the multilevel models, once other factors were controlled for. For this reason it was decided that it would not be of benefit to fit cross-classification models for either the linear or binomial models.

12.3 Results

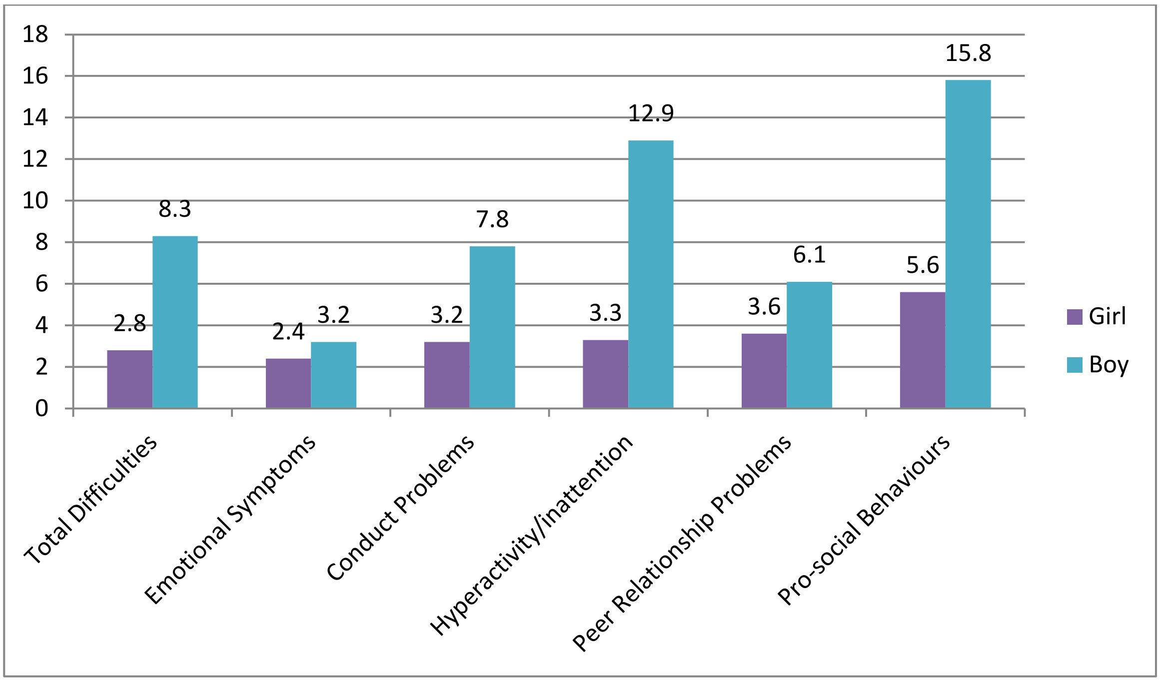
12.3.1 Binary correlations at Preschool

12.3.1.1 Gender

Gender was not related to any other demographic variables, but was significantly associated with all abnormal SDQ sub-scale scores and the Total

Difficulties score at preschool and P3. The one exception to this was the Emotional Symptoms scale at Preschool, which was not significantly associated with gender, though there was a relatively weak correlation at P3 ($r=0.06$, $p<0.01$). The correlations between gender and all binary SDQ scores were positive, indicating that being a boy was associated with being in the abnormal group on all scales. The strength of the correlations with the abnormal Total Difficulties scores was similar at preschool and P3 ($r=0.12$ at preschool and $r=0.14$ at P3, both significant to $p<0.01$). Figure 22 visually represents the proportions of boys and girls in the abnormal range on each scale. At Preschool level, boys are around four times more likely to be in the abnormal range of the Hyperactivity/inattention scale, around three times more likely to display abnormal pro-social behaviours and approximately twice as likely to have an abnormal score on the Conduct Problems, Peer Relationship Problems or Total Difficulties scales, compared with girls. All associations except for that with Emotional Symptoms were significant to the $p<0.01$ degree.

Figure 22 Proportion of abnormal scores on the SDQ subscales at Preschool by Sex



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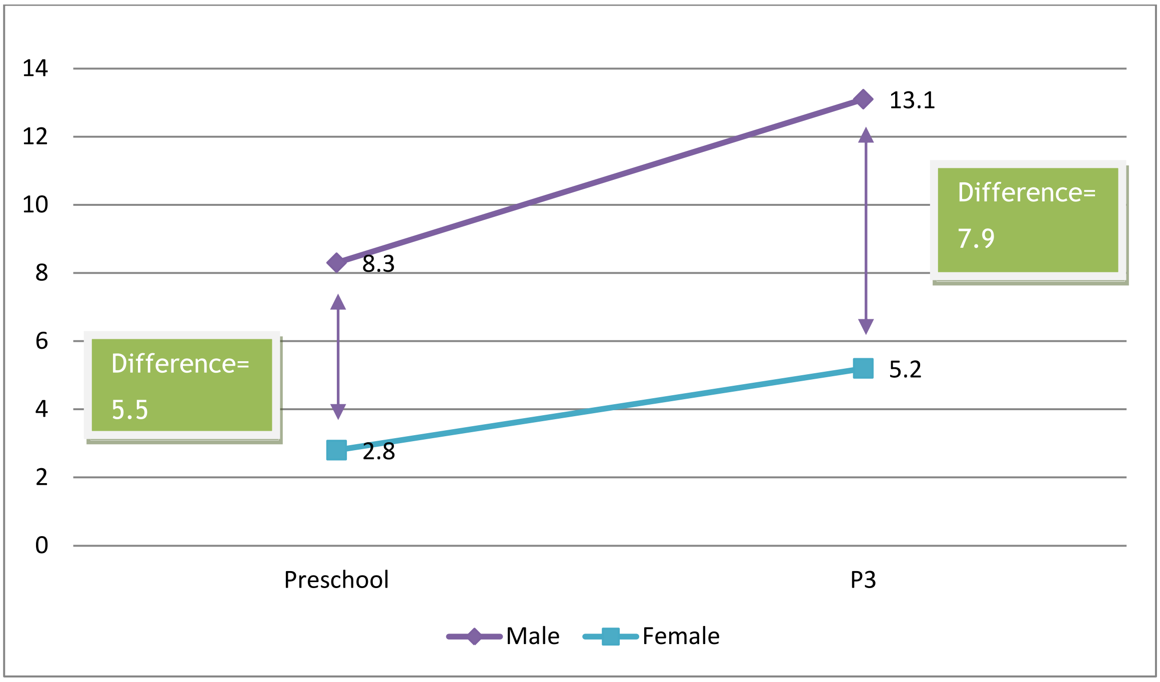
Inequalities between the sexes were seen to widen between preschool and P3 on the Total Difficulties scale, in terms of the proportions of children in the abnormal range of the scale. At preschool, the proportion of boys in the abnormal range was 5.5% higher than girls, which widened to 7.9% by P3 (Figure 23). This was also the case on the Conduct Problems, Hyperactivity/inattention and Emotional Symptoms scales.

Figure 23 Proportions of children in the abnormal Total Difficulties scores group by stage and sex



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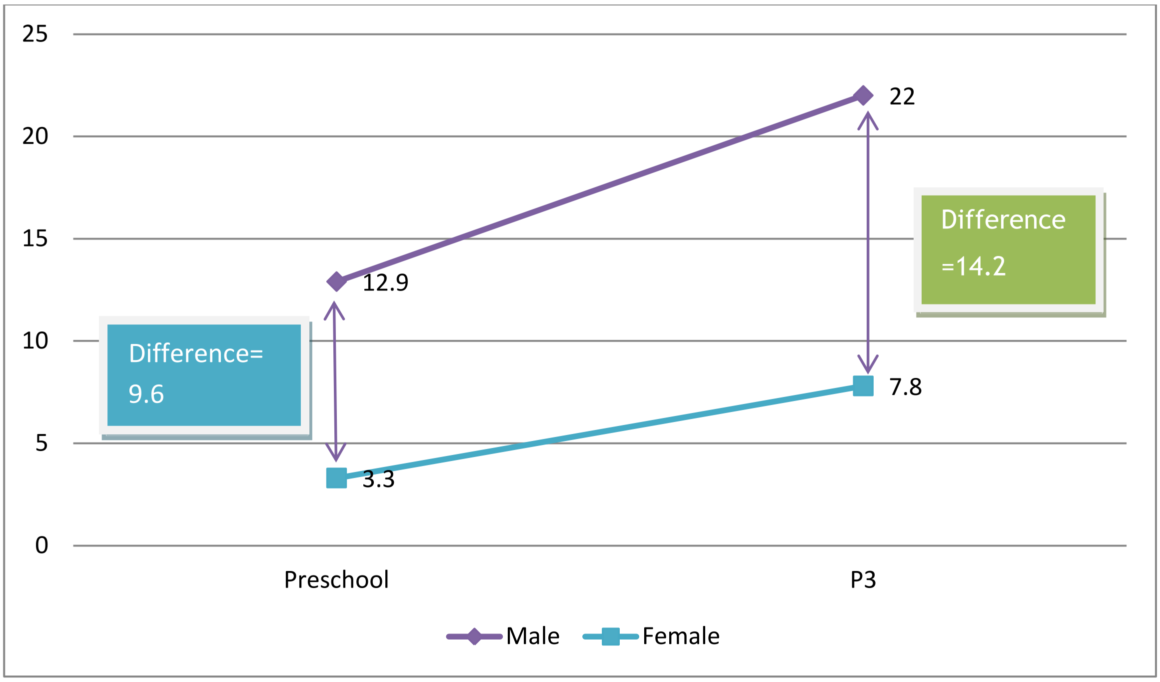
Although both sexes had a higher proportion of abnormal Hyperactivity/inattention scores at P3, it was clear that the gender gap had widened on this scale: at preschool the difference in the proportions of boys and girls in the abnormal Hyperactivity/inattention group was 9.6%. This inequality increased by almost a third over the three years to 14.2%, with 22% of boys in the abnormal Hyperactivity/inattention group compared with just 7.8% of girls at P3.

Figure 24 Proportions of children in the abnormal Hyperactivity/inattention group by stage and sex

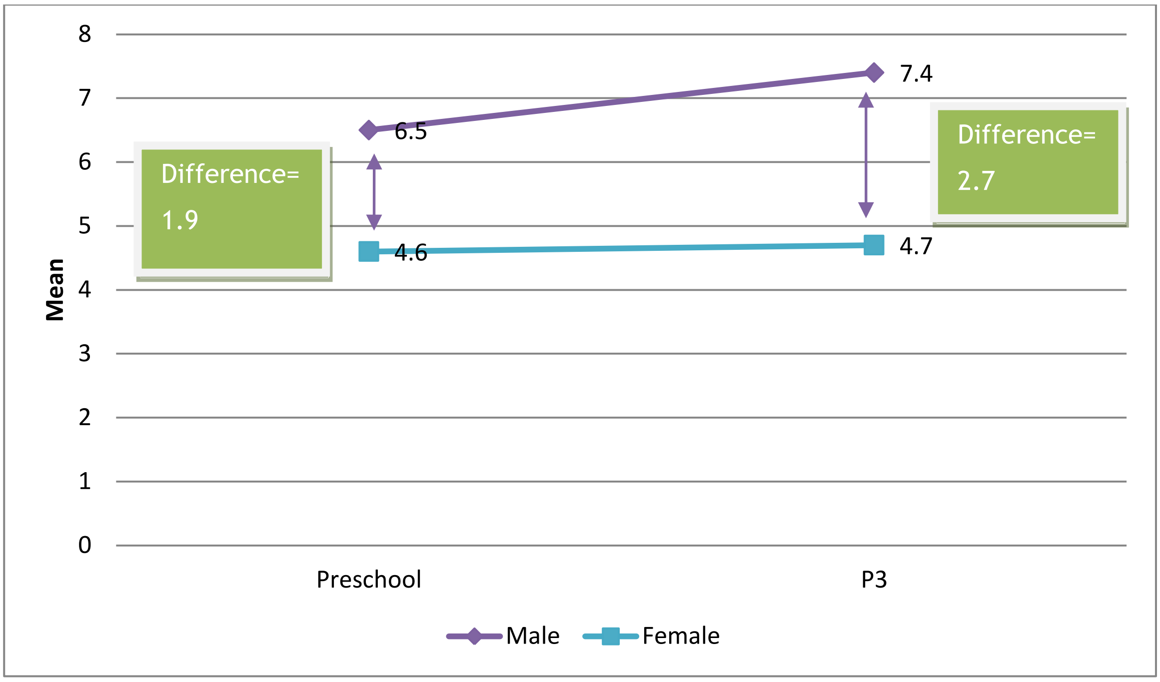


Base; 2129

In contrast, on the Peer Relationship Problems scale, the proportion of boys in the abnormal group fell, whilst the proportion of girls, though still lower than boys at P3, rose slightly. This meant that the difference between the sexes halved over the three years. In relation to children in the abnormal Pro-social Behaviours band, proportions fell for both sexes, from 15.8% to 12.7% for boys and from 5.6% to 3.6% for girls, again leading to a slight decrease in inequalities between the sexes.

Continuous change scores between preschool and P3 showed that being a boy was significantly correlated with increases in continuous scores on the Total Difficulties scale, the Conduct Problems scale and the Hyperactivity/inattention scale. When mean raw Total Difficulties scores by gender are examined, the mean score for girls has barely changed, whereas the mean score for boys rose from 6.5 to 7.4 over the three years (Figure 25).

Figure 25 Mean Total Difficulties scores group by stage and sex



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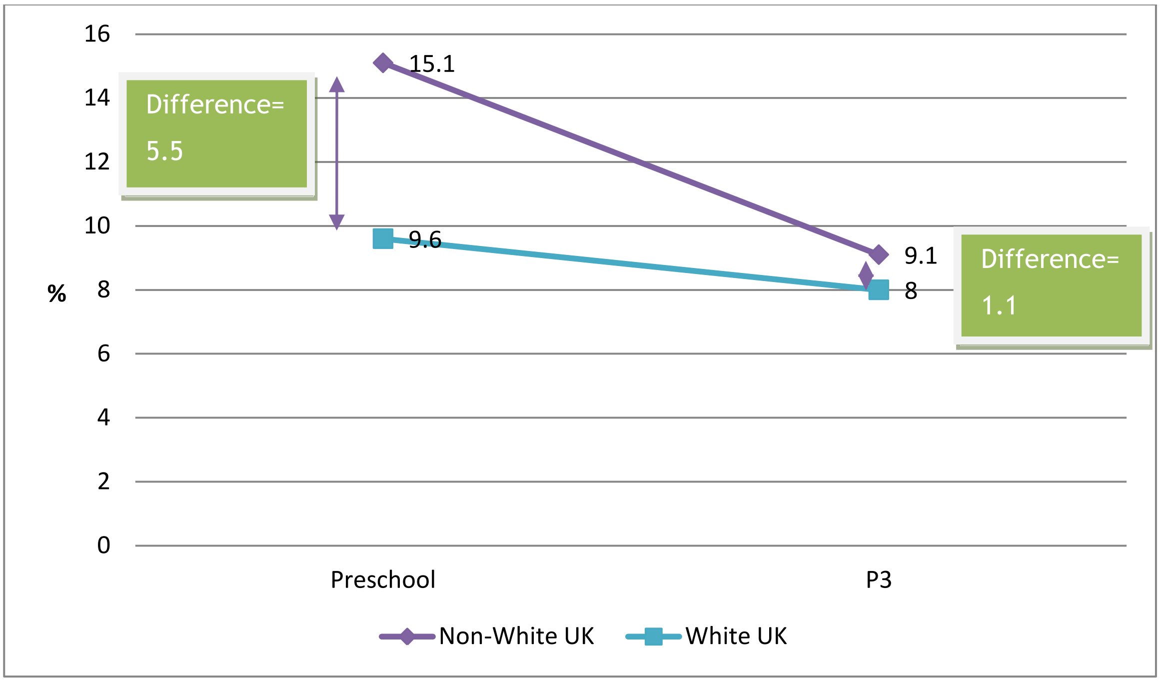
12.3.1.2 Ethnicity

Ethnicity was associated with the level of area deprivation (at both preschool and P3) and Looked After Status at P3: being of a White UK background was related to living in a more deprived area and to having had Looked After status by P3.

In relation to correlations with abnormal scores, ethnicity was associated with Pro-social behaviours at preschool (but not at P3): with a White UK origin being related to *not* having an abnormal Prosocial Behaviours abnormal score, suggesting that children from ethnic minorities are more likely to have difficulties in this area at preschool. Cross-tabulations between ethnicity and Prosocial behaviours binary scores show that 15.1% of non-White UK children had an abnormal score at preschool, compared with 8.5% of White UK children. This reduced to 9.1% and 8%, respectively, by P3 (Figure 26).

Figure 26 Proportions of children with abnormal Prosocial Behaviours scores by stage and sex



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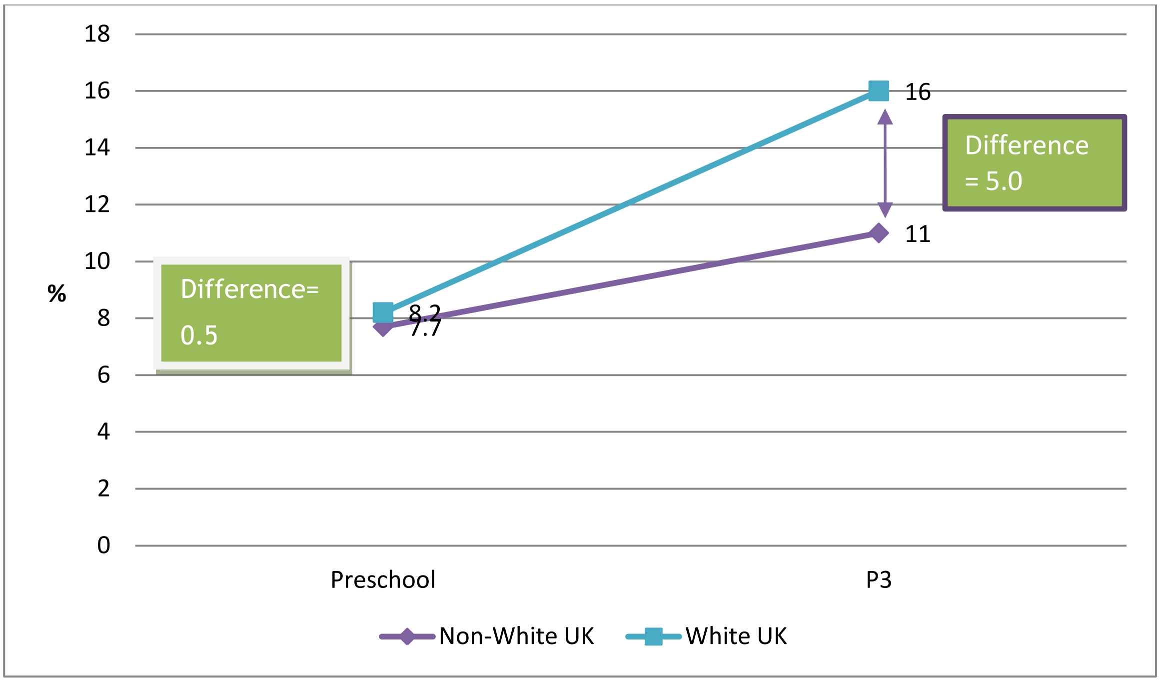
Ethnicity was also associated with Hyperactivity/inattention problems at P3 (but not at preschool). This was a positive correlation, suggesting that White-UK children were more likely to have difficulties in this area at P3: 16% of White-UK children had difficulties with Hyperactivity/inattention at P3 in Glasgow City, compared with 11% of children from non-White-UK ethnicities.

Figure 27 Proportions of children with abnormal Hyperactivity/inattention scores by stage and sex



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Ethnicity showed several associations with having an increasing score between preschool and P3. Being of a White-UK origin was associated with having an increasing Total Difficulties score (r=0.07); an increasing Conduct Problems score (r=0.05); an increasing Hyperactivity/inattention score (r=0.07) and an increasing Peer relationships score (r=0.08). Overall therefore, it appears that White UK children have scores which are getting worse over the first three years of school, however, this isn't leading to them disproportionately falling into the abnormal group, with the exception of the Hyperactivity/inattention scale.

12.3.1.3 Looked After Status

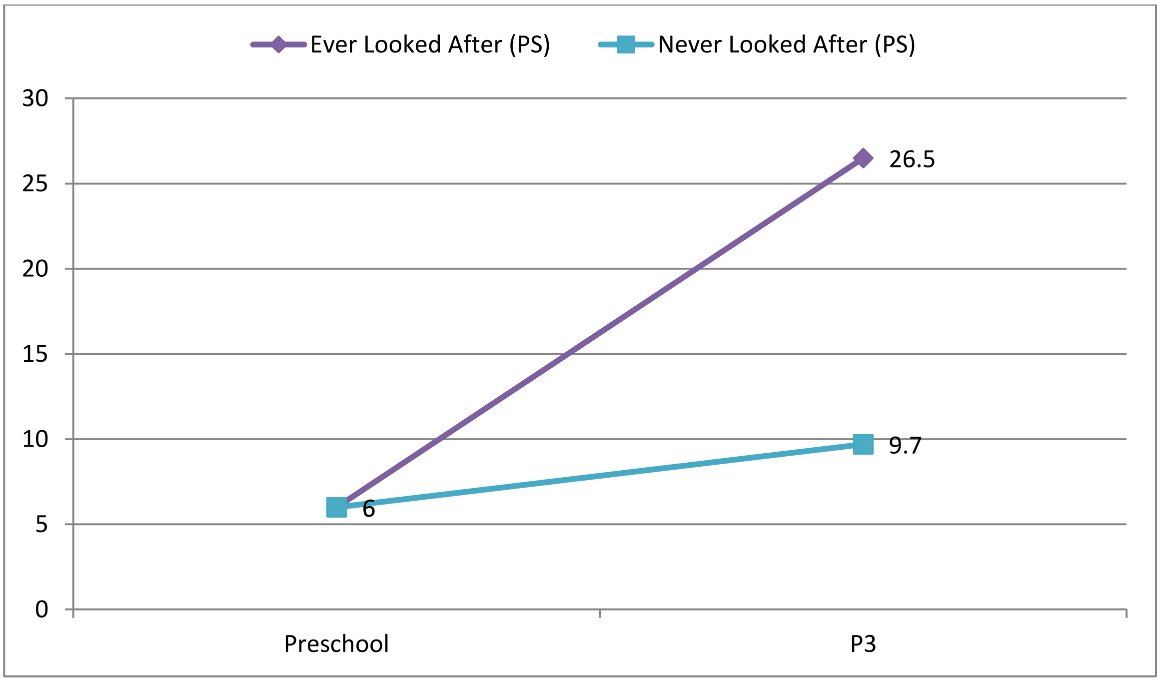
Looked After status at preschool was significantly related to living in a more deprived area (r=0.08), but not to any other demographics. Looked After status at P3 was also correlated with area level deprivation, as well as being strongly associated with Looked After status at preschool. Looked After status at preschool was not associated with any abnormal scores at Preschool.

Having been Looked After at the preschool stage though, was related to being in the abnormal SDQ group at P3 on the Total Difficulties scale (r=0.09); Emotional Symptoms scale (r=0.07); Conduct Problems scale (r=0.11) and the

Hyperactivity/inattention scale (r=0.08). Correlations between Looked After Status at P3 and SDQ abnormal scores at P3 were similar, though the association with abnormal Hyperactivity scores was far stronger (r=0.16 in relation to P3 Looked After status, compared with r=0.08 for Preschool Looked After status).

Proportions of children who had ever had Looked After status by preschool and those who had never had Looked After status at the preschool stage were identical on the Total Difficulties scale when they started school. However, by Primary 3, children who had been Looked After by the time they were in preschool were almost three times more likely to be in the abnormal Total Difficulties group, compared to children who had not had Looked After status by preschool age (Figure 28). These figures should be taken with caution however, as the number of children who had been Looked After by preschool was small.

Figure 28 Proportions of Abnormal Total Difficulties scores at preschool and P3 by preschool Looked After Status



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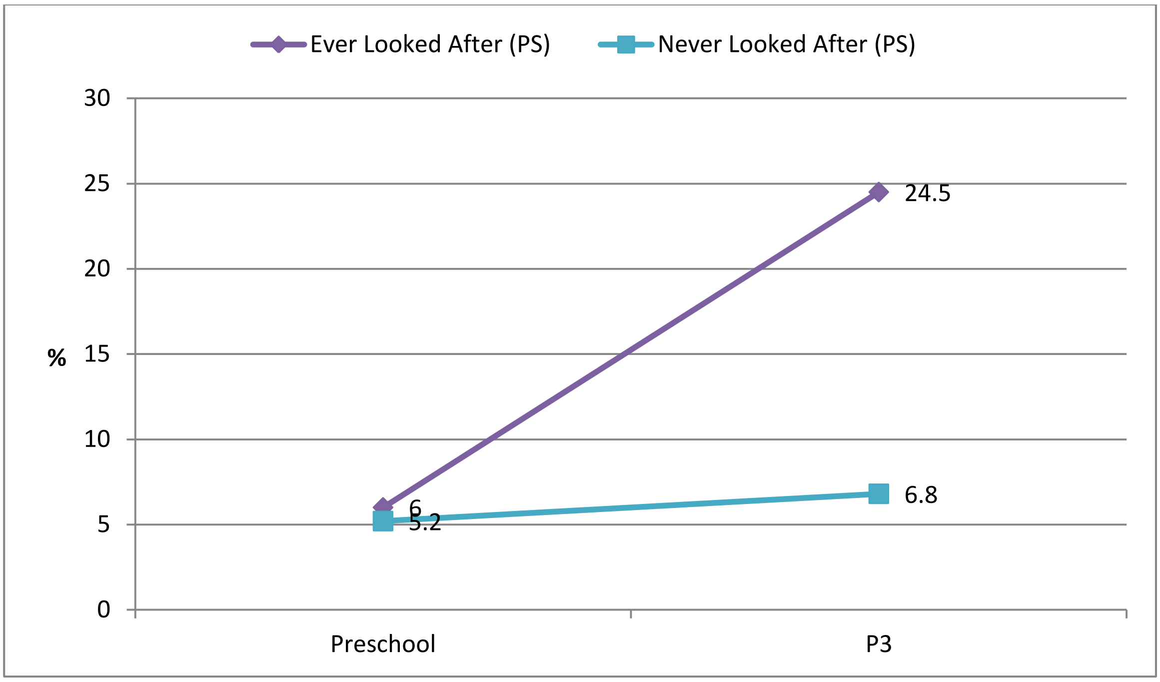
Similar results could be seen in relation to the Conduct Problems scale where the proportion of children in the abnormal range who had been Looked After by preschool rose from 6% to 24.5% by P3, compared with children who had not been Looked After by preschool, the comparable figures being 5.2% rising very slightly to 6.8%.

Figure 29 Proportions of Abnormal Conduct Problems scores at preschool and P3 by preschool Looked After Status



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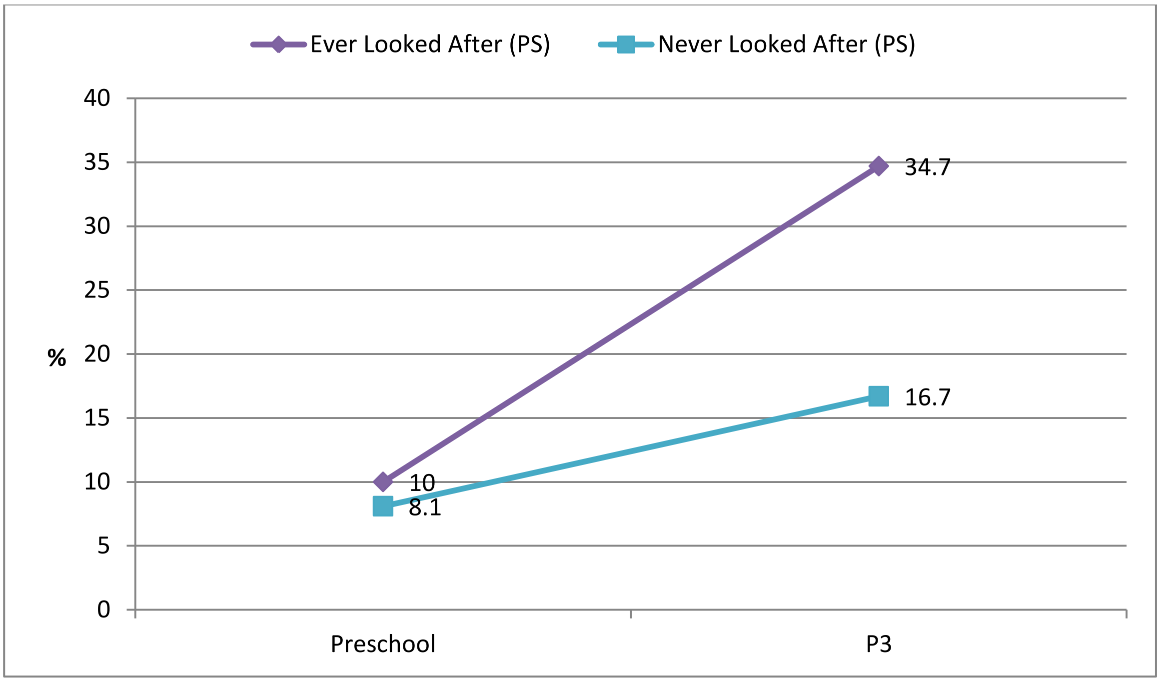
Inequalities in the proportions of Looked After and non-Looked After children with an abnormal Hyperactivity/inattention score also began to emerge by P3: although the proportion of children in the abnormal Hyperactivity/inattention range who had not been Looked After by preschool doubled between these time points, for children who had been Looked After by preschool, the proportions in the abnormal group more than tripled in the same period.

Figure 30 Proportions of Abnormal Hyperactivity/inattention scores at preschool and P3 by preschool Looked After Status



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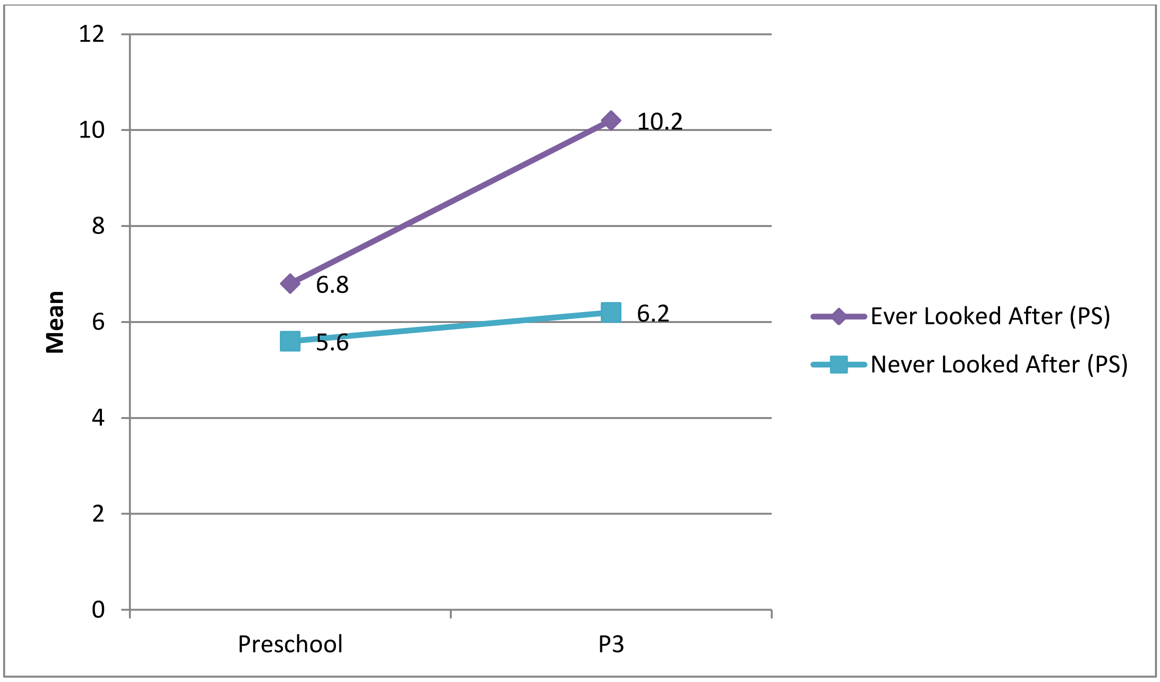
The other subscales followed similar patterns however it is important to note that differences on the Prosocial Behaviours and Peer Relationship scales were not statistically significant, even by P3. On the Emotional Symptoms scale (on which differences at P3 were significant) the proportions of Looked After children by preschool who were in the abnormal range increased from 2% to 14.3% at P3, while the proportions of non-Looked After children in the abnormal range increased from 3% at preschool to 4.8% at P3.

Proportions of children in the abnormal range of the Peer Relationship problems scale increased from 4% to 10.2% for Looked After children, in contrast to non-Looked After children, whose equivalent proportions were 5.6%, falling to 4.4%. Proportions of children in the abnormal group on the Prosocial Behaviours scale started at a comparable level: 10% (for Looked After children by preschool) and 11% (non-Looked After children by preschool). However, these proportions increased to 12.2% of Looked After children and 8.0% of non-Looked After children.

Looking at the continuous change score correlations, Looked After status at preschool was associated with an increasing score on the Total Difficulties, Conduct Problems, Hyperactivity and Peer Relationship Problems domains.

Figure 31 shows that children who had been classified as having Looked After status by preschool had slightly higher mean scores at preschool (6.8 for ever Looked After children, compared with 5.6 for never Looked After children), and that these mean scores rose significantly more than they did for children who were never Looked After by preschool, to a mean of 10.2 for ever Looked After children, in contrast to 6.2 for non-Looked After children.

Figure 31 Mean Total Difficulties scores at preschool and P3 by preschool Looked After Status at preschool



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12.3.1.4 Area Deprivation

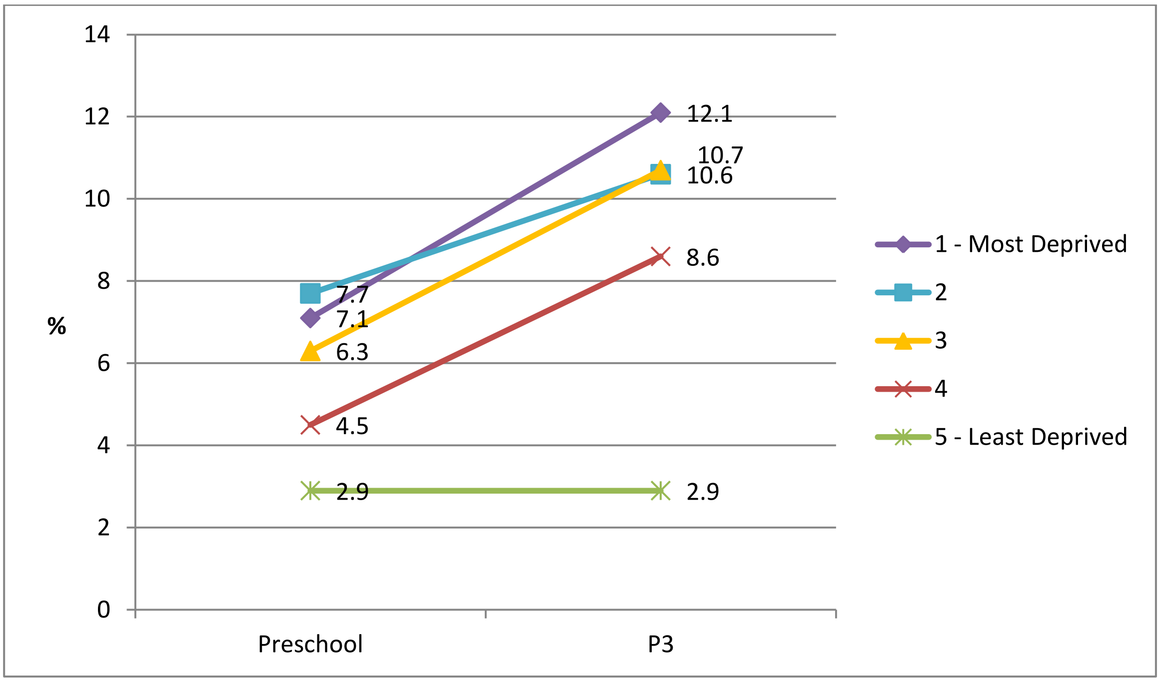
Area level deprivation was explored using the Glasgow Index of Multiple Deprivation. As explained in section 1, Glasgow quintiles use the same methodology as the Scottish Index of Multiple Deprivation but split the Glaswegian population into five equal groups. If we didn't do this, more than half of children in Glasgow would be in the most deprived quintile, and thus differences within this group could not be explored.

Living in a more deprived area at preschool was only related to having an abnormal Total Difficulties score (r=0.05) and an abnormal Conduct Problems score (r=0.05) at preschool, and to having an abnormal score on the Total Difficulties scale (r=0.07) and Hyperactivity/inattention scale (r=0.07) at P3.

Living in a more deprived area at P3 was associated with having an abnormal Total Difficulties score (r=0.06), an abnormal emotional symptoms score (r=0.05) and an abnormal Peer Relationships score (r=0.06).

%Proportions of children scoring in the abnormal range of the Total Difficulties scale were explored at the two time points in the context of their Preschool level of home area deprivation. Results demonstrated that children living in the areas of highest deprivation (using the Glasgow Quintiles) were significantly more likely to have an abnormal Total Difficulties score at preschool (7.1% having an abnormal score), compared with children from the most affluent areas (2.9% of whom had difficulties at preschool), and that by P3 they were even more likely to have an abnormal score (12.1%). Although children in quintiles two to four also were increasingly likely to be in the abnormal group by P3, children living in the least deprived areas demonstrated a completely different pattern. Children in the most affluent areas had low levels of overall difficulties at Preschool which remained level at 2.9% at P3 (Figure 32).

Figure 32 Proportions of Abnormal Total Difficulties scores at preschool and P3 by Level of area deprivation (Glasgow Quintiles)



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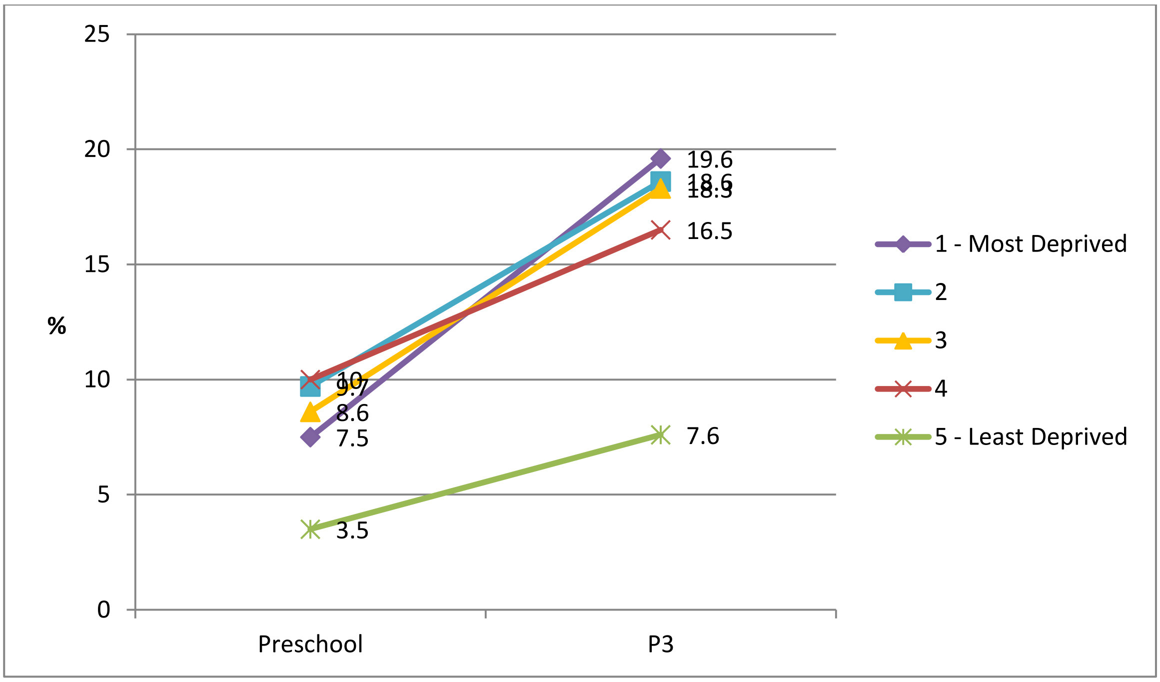
In terms of the proportion of children with abnormal Hyperactivity/inattention scores, a similar pattern could be seen, with higher proportions of children in the most deprived areas at Preschool having an abnormal

Hyperactivity/inattention score and the proportion doubling for this group by P3. In contrast, the proportion of children in the abnormal Hyperactivity/inattention group who lived in the least deprived area started far lower at 3.5% and rose to just 7.6%. The result of this is a widening in the inequalities gap between children living in the most deprived and least deprived areas by two and a half times (Figure 33).

Figure 33 Proportions of Abnormal Hyperactivity scores at Preschool and P3 by Level of area deprivation (Glasgow Quintiles)



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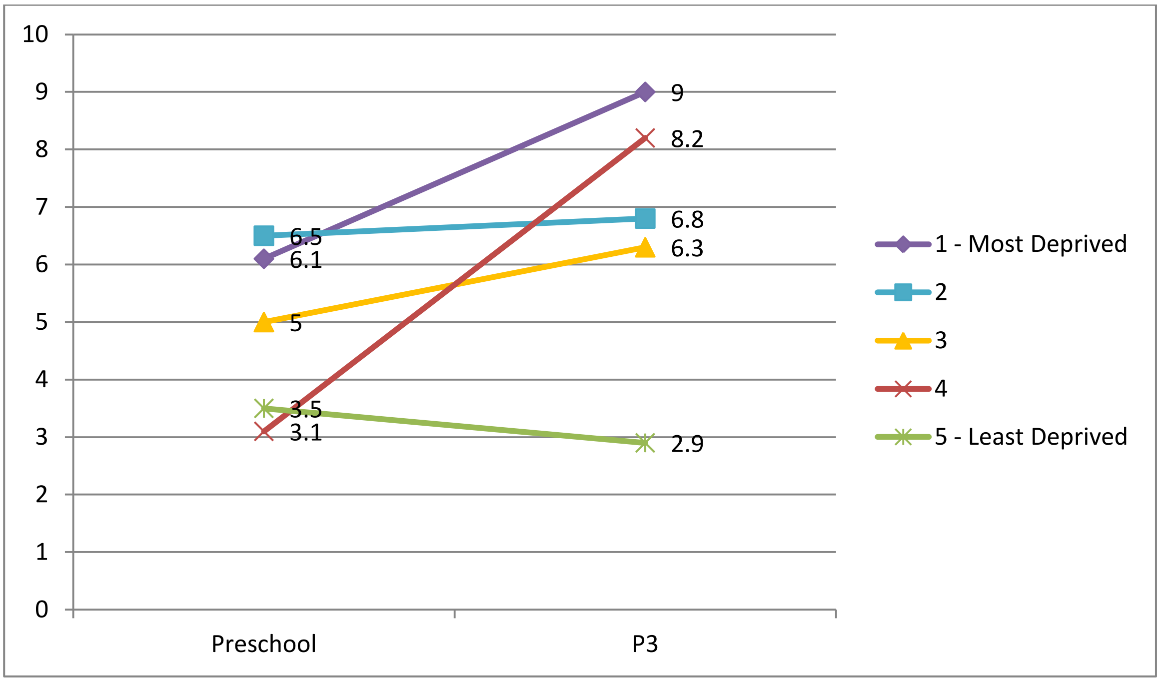
In relation to conduct problems, children in the four most deprived quintiles all saw an increase in the levels of abnormal scores between preschool and P3. In contrast, the children in the least deprived quintile actually started with a higher proportion of abnormal scores than quintile two, and saw a slight decline in levels of abnormal scores from 3.5% to 2.9% (Figure 34).

Figure 34 Proportions of Abnormal Conduct scores at Preschool and P3 by Level of area deprivation (Glasgow Quintiles)



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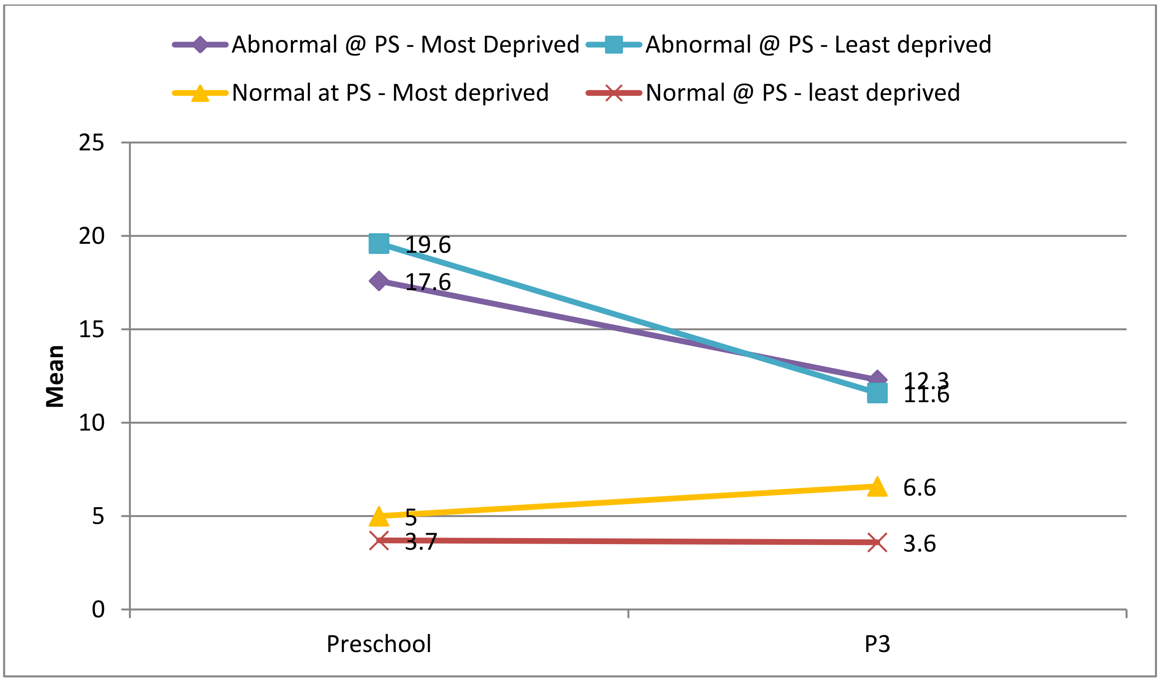
Emotional difficulties scores demonstrated a similar, although not so linear, pattern, with GIMD two to four showing increases in abnormal scores in contrast to GIMD one which showed a decrease. However, at P3, those in the second least deprived quintile had almost identical proportions scoring in the abnormal range as those in the most deprived quintile.

Differences between abnormal Prosocial Behaviours and the five area deprivation quintiles were significant at P3 though not at Preschool. With the exception of the second most deprived group, which showed no change in the levels of children in the abnormal group between preschool and P3, all other quintiles showed a decrease in the proportions of children scoring in the abnormal range. However, children in the three most deprived areas still had much higher levels of abnormal scores, compared with those in the two least deprived quintiles.

In order to explore whether children from different levels of area deprivation have similar mean scores within the normal and abnormal ranges, further tables were produced. Results showed that even within the normal and abnormal ranges, differences in mean scores by level of deprivation could be seen. Children from the most deprived areas, who were in the abnormal range at preschool, started with lower mean scores (17.6) than children from the least deprived areas in the abnormal range (19.6), however, by P3 this had reversed (means of 12.3 and 11.6, respectively). In the normal range, mean scores operated more as anticipated, with children from the most deprived areas having a higher mean (5.0) than children from the least deprived areas at preschool (3.7). By P3, the mean for children in the most deprived areas and in the normal range at preschool had risen to 6.6, whilst the mean for children from the least deprived areas remained steady at 3.6.

Figure 35 Mean Total Difficulties scores at Preschool and P3 by Banded Area Deprivation and Preschool banded score

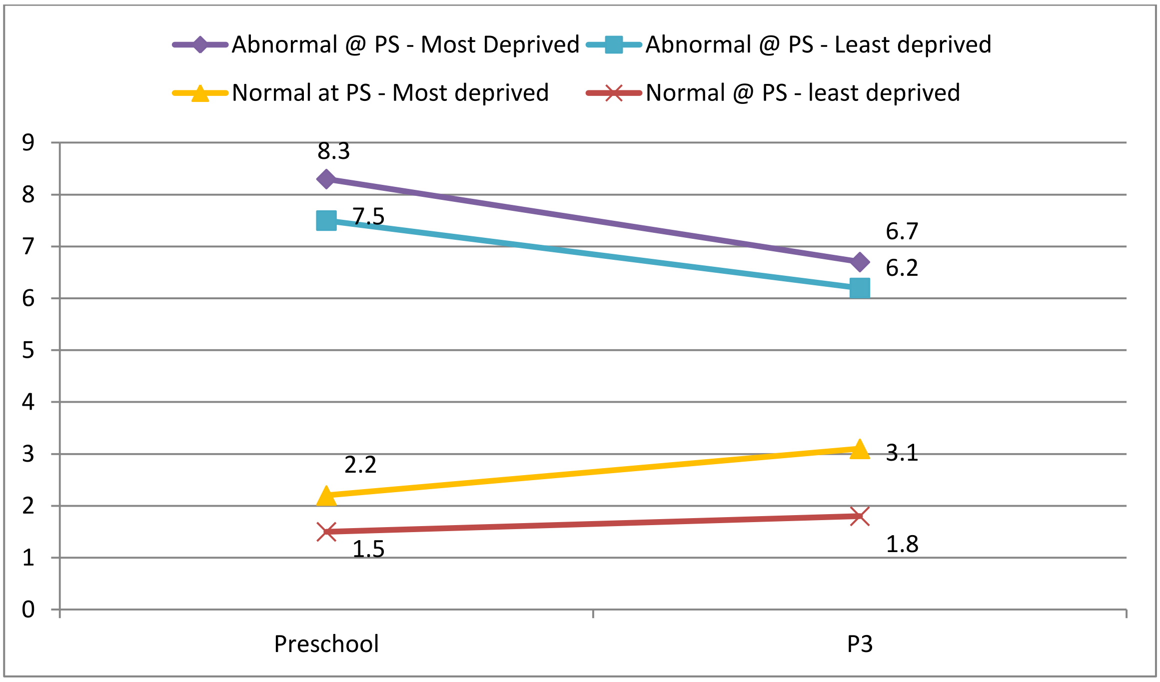


Base; 1738

Children living in the most deprived areas had higher mean Hyperactivity/inattention scores within the normal and abnormal ranges at preschool, compared with children from the least deprived areas. Children in the abnormal range at preschool, who lived in the most deprived areas, had a mean of 8.3, compared with a mean of 7.5 for children from the least deprived areas.

This fell for both groups at P3, though children from the most deprived areas had a higher mean still, at 6.7, compared with 6.2 for the least deprived children. Scores for children from deprived areas within the normal range at preschool also started higher than for children in the least deprived areas (2.2 vs. 1.5). Whereas scores in this range for children from the least deprived areas remained fairly steady (rising slightly to 1.8), scores for children from the most deprived areas increased to 3.1 (Figure 36).

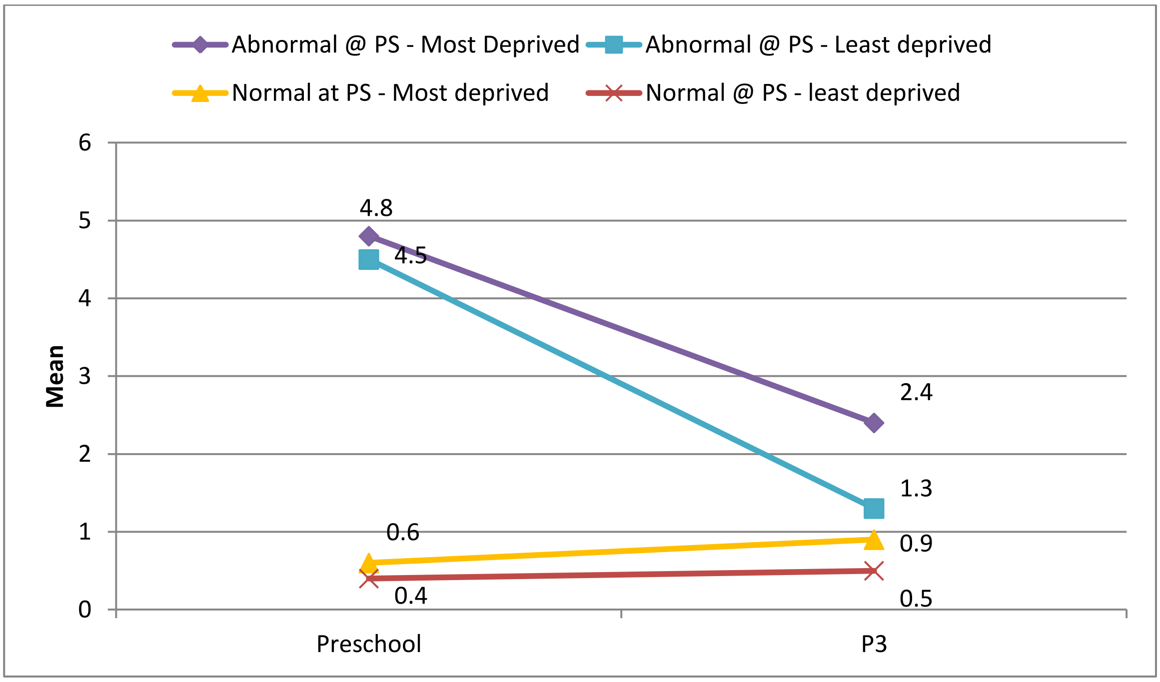
Figure 36 Mean Hyperactivity scores at Preschool and P3 by Banded Area Deprivation Preschool banded score



Base; 1738

Conduct Problems scores were examined in the same way. They showed similar patterns to Hyperactivity/inattention for children from different backgrounds, however results were more extreme. Children within the abnormal range started at a relatively similar level (4.8 for those from the most deprived areas vs. 4.5 for those from the least deprived). However, whereas mean scores for children from the least deprived areas fell to 1.3, scores for children in the most deprived areas only decreased to a mean of 2.4. Conversely, mean scores within the normal range increased, but increased more for children from the most deprived areas (Figure 37).

Figure 37 Mean Conduct Problem scores at Preschool and P3 by Banded Area Deprivation Preschool banded score



Base; 1738

12.3.1.5 Schools

Schools were associated with area level deprivation at both preschool and P3, but were not associated with any other demographics. At a binary level, schools were only correlated with differences in levels of abnormal scores in Peer Relationship Problems at P3 ($r=0.05$, $p<0.01$). Schools were also related to increases in Emotional Symptoms scores between preschool and P3. School level variation is best assessed through multilevel modelling, which takes into account the differences in intake and characteristics of schools. The next section explores these multivariate and multilevel models.

Table 8 Spearman Correlations between Binary (abnormal/normal) Preschool SDQ scores and Preschool demographic

	1	2	3	4	5	6	7	8	9	10
1. Sex (Female)	1									
2. Ethnicity (Non-White)	-0.02	1								
3. Looked After Status (Never LA)	0.03	0.05	1							
4. Area Deprivation – Glasgow Quintile (Least Deprived)	-0.01	0.13**	0.08*	1						
5. SDQ: Total Difficulties (Normal)	0.12**	0.02	0.00	0.05*	1					
6. SDQ: Emotional Symptoms (Normal)	0.02	0.00	-0.01	0.04	0.30**	1				
7. SDQ: Conduct Problems (Normal)	0.10**	0.01	0.01	0.05*	0.41**	0.05*	1			
8. SDQ: Hyperactivity/ inattention (Normal)	0.17**	0.01	0.01	0.01	0.50**	0.04	0.32**	1		
9. SDQ: Peer Relationship Problems (Normal)	0.07**	-0.04	-0.01	-0.00	0.39**	0.23**	0.12**	0.19**	1	
10. SDQ: Pro-social Behaviours (Normal)	0.16**	-0.07**	-0.01	-0.03	0.36**	0.10**	0.28**	0.40**	0.25**	1

Table 9 Spearman correlations between SDQ binary (abnormal/normal) scores at P3 and explanatory variable

	1	2	3	4	5	6	7	8	9	10	11	12
1. Sex (Female)	1											
2. Ethnicity (Non-White)	-0.02	1										
3. Looked After Status at Preschool (Never LA)	-0.03	0.05	1									
4. Area Deprivation at Preschool – Glasgow Quintile (Least Deprived)	-0.09	0.13**	0.08**	1								
5. Looked After Status at P3 (Never LA)	0.01	0.07**	0.58**	0.16**	1							
6. Area Deprivation at P3 – Glasgow Quintile (Least Deprived)	-0.04	0.11**	0.09**	0.84**	0.14**	1						
6. School	-0.02	-0.04	-0.02	0.09**	-0.02	0.09**	1					
7. SDQ: Total Difficulties (Normal)	-0.14**	0.03	0.09**	0.07**	0.11**	0.06**	-0.02	1				
8. SDQ: Emotional Symptoms (Normal)	0.06**	0.02	0.07**	0.05	0.06**	0.05*	-0.03	0.37**	1			
9. SDQ: Conduct Problems (Normal)	0.12**	0.04	0.11**	0.05	0.10**	0.04	0.00	0.56**	0.10**	1		
10. SDQ: Hyperactivity/ inattention (Normal)	0.20**	0.06**	0.08**	0.07**	0.16**	0.06*	0.01	0.58**	0.18**	0.35**	1	
11. SDQ: Peer Relationship Problems (Normal)	0.04*	0.01	0.04	0.00	0.04	0.00	-0.05**	0.39**	0.15**	0.23**	0.18**	1
12. SDQ: Pro-social Behaviours (Normal)	0.16**	-0.02	0.02	-0.00	0.04	-0.01	-0.01	0.40**	0.11**	0.35**	0.35**	0.23**

Table 10 Pearson correlations between SDQ changes scores at P3 and explanatory variables

	1	2	3	4	5	6	7	8	9	10	11	12
1. Sex (Female)	1											
2. Ethnicity (Non-White)	-0.02	1										
3. Looked After Status at Preschool (Never LA)	-0.03	0.05	1									
4. Area Deprivation at Preschool – Glasgow Quintile (Least Deprived)	-0.01	0.13**	0.08**	1								
5. Looked After Status at P3 (Never LA)	0.01	0.07**	0.58**	0.16**	1							
6. Area Deprivation at P3 – Glasgow Quintile (Least Deprived)	0.00	0.11**	0.08**	0.85**	0.14**	1						
7. School	-0.02	-0.04	-0.02	0.09**	-0.02	0.09**	1					
8. SDQ: Total Difficulties	0.05*	0.07**	0.07**	0.06**	0.07**	0.05*	-0.03	1				
9. SDQ: Emotional Symptoms	0.00	0.01	0.03	0.04	0.04	0.05*	-0.06*	0.66**	1			
10. SDQ: Conduct Problems	0.04*	0.05*	0.08**	0.01	0.05*	-0.00	-0.03	0.68**	0.23**	1		
11. SDQ: Hyperactivity/ inattention	0.10**	0.07**	0.05*	0.05	0.06**	0.03	0.01	0.78**	0.25**	0.47**	1	
12. SDQ: Peer Relationship Problems	-0.02	0.08**	0.05*	0.06*	0.03	0.06**	-0.03	0.66**	0.35**	0.33**	0.28**	1
13. SDQ: Pro-social Behaviours	-0.02	-0.03	-0.02	-0.03	-0.01	-0.04	0.02	-0.52**	-0.14**	0.46**	-0.47**	-0.38**

The 2131 children in the dataset attended 120 different schools, which complies with the ideal of more than 100 schools in a model in order that standard errors at level 2 are calculated accurately. The Maximum likelihood estimation methods used in multilevel modelling are asymptotic, which basically means that a sufficiently large sample size is necessary. In multilevel models though, the main concern is usually the sample size at the group level, because the group level sample size is always smaller than the individual level sample size (Maas & Hox, 2005). Indeed, previous research into sample sizes has found that a large number of groups is more important than a large number of individuals per group (Maas & Hox, 1999). In particular, experiments have demonstrated that the number of level 1 units per level 2 unit made little difference to the estimates produced, as long as there were enough units at level 2 (Bell, Morgan, Kromrey, & Ferron, 2010). The numbers of children for whom both a preschool and P3 SDQ were collected ranged from 1 to 59 pupils per school, with a mean of 17.9 and an interquartile range of 9 to 25.

12.4 Linear Multilevel Models exploring the Total Difficulties Change Scores

'Change scores' were calculated for each pupil, by subtracting the Preschool SDQ score from the P3 SDQ score. Pupils whose levels of difficulties between these two time points decreased (indicating a lower level of difficulties at P3) have a negative score, whilst those pupils whose score increased (indicating a higher level of difficulties at P3) between the time points have a positive change score. The average change score per school was calculated. Change scores by school varied substantially, from -7.64 to +10.50, with a mean of 0.924 and an interquartile range of -0.839 to 2.54.

The first step in the analysis was to explore whether an empty multilevel model (that is, one without any explanatory variables) produced a better fitting model than a single level linear regression model. In order to do this a single level empty model and a multilevel empty model were fitted.

The multilevel model demonstrated that the overall mean change in Total Difficulties scores across schools was estimated as 0.755 (note that change could be either negative or positive in this model). The mean for school *j* was estimated as 0.755+$\hat{u}_{0j}$. A school with $\hat{u}_{0j}>0$ has a mean that is higher than average, while a school with a mean of $\hat{u}_{0j}<0$ is lower than average.

The between school variance was estimated as $\sigma^2_{u0}=4.413$. The within school, between student variance was estimated as $\sigma^2_e=36.478$. The total variance therefore was 4.413+36.478=40.891.

The variance partition coefficient (VPC) is 4.413/40.891=0.11, which indicates that 11% of the variance in change scores on the Total Difficulties scale can be attributed to differences between schools. As this level of school variance was above 10%, there is an indication that a simple regression model which did not account for school variance would be problematic. Variance at the individual pupil level was 89%.

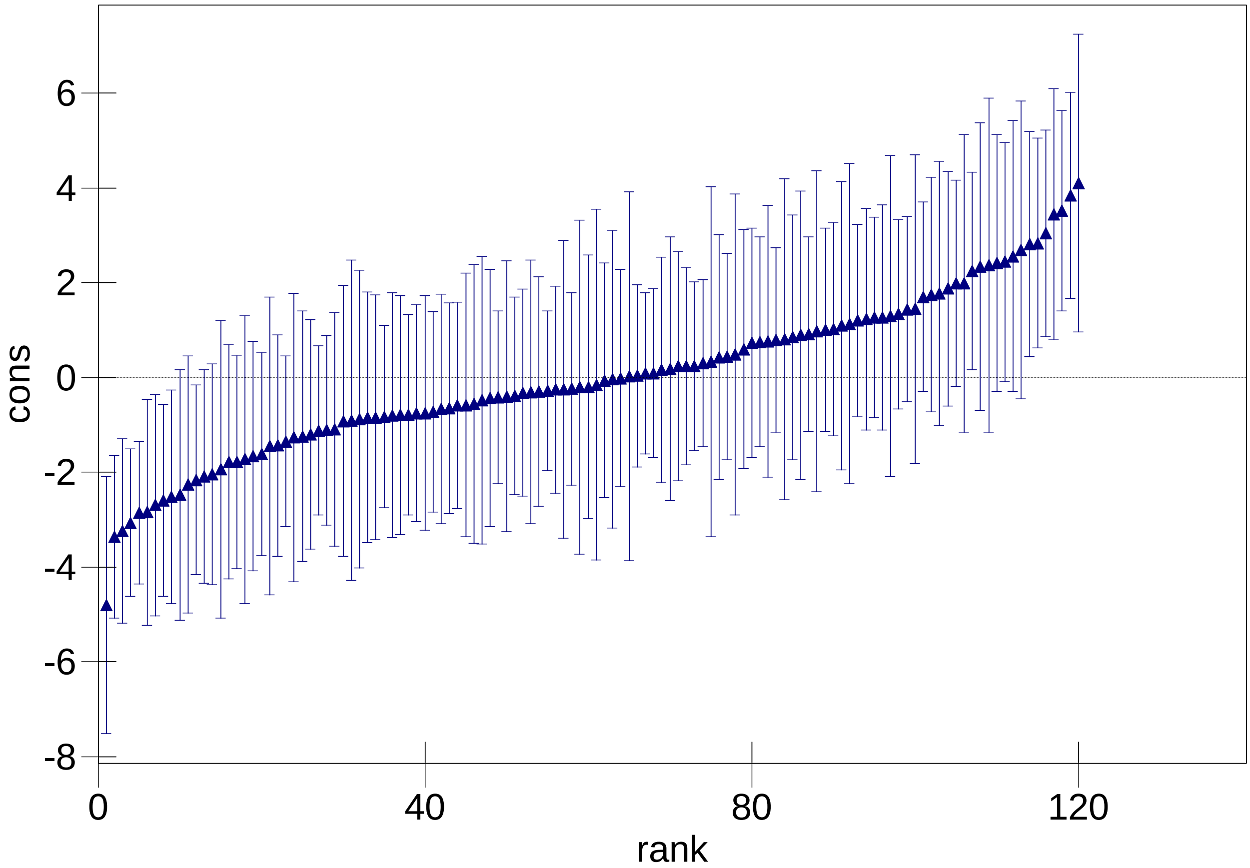
To test the significance of the school effects (and double-check which model was most appropriate to use), a likelihood ratio test was also carried out comparing the null multilevel model with a null-single level model (see Table 11). The school effect was removed which gave the loglikelihood as 13917.262. The likelihood ratio test was calculated as the difference between the multiple and single level model log likelihoods: 13917-13813=104 on 1 degree of freedom (as there was only one level of difference between the models). As the result is more than 3.84, which is the chi^2 statistic with one degree of freedom, this agreed with the VPC that there is substantial evidence of significant school effects. The null hypothesis was therefore rejected and multilevel models were fitted.

Table 11 MLwiN Null Single Level change model vs. Two-level change model

Parameter	Null (Single level)	Multi-level
β_0	0.532 (0.138)	0.755 (0.243)
u_{oj}		4.413 (0.886)
e_{ij}	40.661 (1.247)	34.478 (1.150)
Base	2127	2127
% variance between schools (VPC)	N/A	11%
Loglikelihood	13917.262	13813.263

In order to further explore the differences between schools, residuals for each school were displayed in a caterpillar plot. Residuals are the differences between the observed value for each school in the sample and the sample mean. Figure 38 graphically illustrates these residual differences, with confidence intervals set at 95%. This demonstrates the significant differences in scores by school. A cluster of schools at each end can be seen with confidence intervals that do not overlap the '0' line, thus indicating that they are significantly different from the norm. In a sample of 120 schools with 95% confidence intervals, one would expect to see six schools (5%) not overlapping the '0' line purely by chance. As this plot shows 17 schools with confidence intervals either below or above this line, there is an indication that some schools are significantly different from others in terms of children's Total Difficulties change scores.

Figure 38 Unadjusted Multilevel Total Difficulties Change Score Residuals Plotted by school



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Level 1 (child-level) variables were then individually entered into multiple unadjusted models in order to establish where binary associations with the change score existed, once school was controlled for. Two models were fitted for each variable: the first had a fixed effect for the explanatory variable, whilst the second explored whether a Random Slope model was a better fit. In a fixed effect model, the group lines (for school in this instance) all have the same slope as the overall regression line. The random slope allows for a difference in the effect of the explanatory variable from group to group.

Table 12 details the results from these models. The variables with the strongest and most significant associations with the Total Difficulties change score, at a binary level, are highlighted in bold. Where the random element was stronger and the slope statistically significant, these variables were selected over the fixed effect model to be put into the adjusted model and highlighted accordingly.

The strongest association was between having had Looked After status at some point up to and including at preschool and having a higher Total Difficulties change score (ß=2.990). Looked After status was significant at both preschool and P3, however the association between having ever had Looked After Status and change score was stronger at preschool (ß=2.990 at preschool vs. ß=1.720 at P3). Being of a White UK ethnicity also had a strong positive relationship with the Total Difficulties change score (ß=1.401). When fitted as Random Slopes, the random slope element was not significant for either variable. Being male was associated with a significantly higher change score (ß=0.523) and this was also a better fit as a fixed effect. Area deprivation (GIMD) was not significant at either stage.

Table 12 Unadjusted Total Difficulties Change score Models with P-value and Wald Test statistic by Level 1 variables

	Unadjusted Coefficients - Fixed Effect β (S.E)	***Loglikelihood Ratio Statistic***	**Unadjusted Coefficients - Random slope β (S.E)**	***Loglikelihood Ratio Statistic***	**P-value of random slope**
Constant	0.775 (0.243)				
Sex of child					
Female	**0**	**108**		111	0.313
Male	**0.523 (0.268)***		0.595 (0.290)*		
Ethnicity					
Non-White UK	0	**602**		522	0.535
White UK	**1.401 (0.357)***		1.409 (0.341)*		
Ever Looked After by Preschool					
Never Looked After	**0**	**1865**		1871	0.050
Ever Looked After	**2.990 (0.910)***		2.633 (1.268)*		
Home Area Deprivation at Preschool (GIMD)					
5 - Least Deprived	0	2585			
4	0.241 (0.636)		-		
3	0.602 (0.611)		-		
2	0.583 (0.612)		-		
1 - Most Deprived	0.816 (0.617)		-		
Ever Looked after by P3					
	Unadjusted Coefficients - Fixed Effect β (S.E)	***Loglikelihood Ratio Statistic***	**Unadjusted Coefficients - Random slope β (S.E)**	***Loglikelihood Ratio Statistic***	**P-value of random slope**
Never Looked After	0				

Ever Looked After	1.720 (0.591)**	117	1.906 (0.708)*	122	0.177
Area Deprivation at P3					
5 – Least Deprived	0	2284			
4	-0.023 (0.619)		-		
3	0.029 (0.614)		-		
2	0.019 (0.607)		-		
1 – Most Deprived	0.532 (0.616)		-		

*=p>0.05; **=p>0.01

Level 2 (School level) variables were then entered into models individually. As there is no variation within a level two variable (i.e. at an individual level), only fixed effects models were fitted. Two variables demonstrated significant associations: these were the proportion of children entitled to Free School meals (FSMs) in a school (ß=0.053) and the size of the school roll (ß=-0.009), both of which were centred around the grand mean. This is recommended where there is no possible '0' value within a variable, in order to improve the accuracy of the estimates. The proportion of FSMs was strongest in the models with a 1% increase in the percentage of children eligible within a school being related to an increased in the change score of 0.053. The size of school roll had less effect, with a reduction of -0.009 in the change score for every additional pupil in the school. The number of exclusions per 1000 pupils, the inspectorate report score, attendance and school denomination were not significantly associated with the Total Difficulties change score.

Table 13 Unadjusted Multilevel Linear Total Difficulties change score models by Level 2 variables

	Unadjusted Coefficients - fixed effects β (S.E)	**Loglikelihood ratio statistic**
Constant	0.755 (0.243)**	-
% Free school meals – centred around grand mean		
(cont.)	**0.053 (0.016)****	489
No. of Exclusions per 1000 pupils		
(cont.)	0.004 (0.006)	692
School size – centred around grand mean		
(cont.)	**-0.009 (0.002)****	495
HMIe Report Score		
Cont.	-0.122 (0.365)	2336
Attendance		
Above average	0	4794
Average	1.008 (1.183)	
Below average	0.974 (1.068)	
Well below average	1.858 (1.647)	
Denomination		
Non-denominational	0	0
Catholic	-0.222 (0.495)	

p>0.05=; p>0.01=***

The next stage involved entering the variables which were statistically significant in the unadjusted models into adjusted models in several stages.

Model A was an empty model for comparative purposes.

Model B contained the significant child characteristics, namely sex and ethnicity. These were both significant in the model and the decreasing of the log likelihood ratio statistic suggested that model B was a better fit than model A.

Model C added to model B the only significant family characteristic (at the child level – level 1); namely Looked After status at preschool. When Looked After status was added to the model, child sex became non-significant. The loglikelihood ratio decreased between the models though, indicating a better fitting model at model C.

In Model D, sex was therefore removed from the model. Interactions between terms were tested but none were significant. This model included the significant school-level variables: the proportion of children in a school eligible for free school meals and the school size in terms of pupil numbers. Whilst school size remained significant when ethnicity and Looked After status at preschool were controlled for (ß=-0.008), the proportion of children eligible for free school meals did not.

The final model therefore comprised ethnicity, Looked After status at preschool and school size. Being Looked After at preschool remained the strongest predictor of a higher change score in the adjusted model (ß=2.521). Being of a White-UK ethnicity was associated with a higher score (ß=1.404), whilst being in a larger school was associated with having a lower change score (ß=-0.009) (Table 14).

Table 14 Adjusted Multilevel Continuous change Models for Total Difficulties Scores

	A - Null 2 level	**B - Sex (F.E); ethnicity (F.E)**	**C - Sex (F.E); ethnicity (F.E); PS Looked After Status (F.E)**	**D - Ethnicity (F.E); PS Looked After Status (F.E); PS SDQ score (R.S); % FSMs-gm (F.E) & School size-gm (F.E)**	**E - Ethnicity (F.E); PS Looked After Status (F.E)& School size-gm (F.E)**
Fixed Part					
Constant	0.775 (0.243)**	-0.648 (0.402)	-0.542 (0.428)	-0.463 (0.393)**	-0.459 (0.394)
Sex of child					
Female		0	0	-	-
Male		0.554 (0.270)*	0.457 (0.295)	-	-
Ethnicity					
Non-White UK		0	0	0	0
White UK		1.413 (0.357)**	1.409 (0.381)**	1.393 (0.387)**	1.404 (0.387)**
Ever Looked after (PS)					
Never Looked After			0	0	0
Ever Looked After			3.168 (0.921)**	2.448 (0.936)**	2.521 (0.933)**
% Free school meals					
(cont.)	-		-	0.022 (0.020)	-

	A - Null 2 level	**B - Sex (F.E);**	**C - Sex (F.E);**	**E - Ethnicity (F.E); PS**	**F - Ethnicity (F.E); PS**

		ethnicity (F.E)	ethnicity (F.E); PS Looked After Status (F.E)	Looked After Status (F.E); % FSMs-gm (F.E) & School size-gm (F.E)	Looked After Status (F.E) & School size-gm (F.E)
School Size (centred around grand mean)					
(cont.)	-		-	-0.008 (0.003)**	-0.009 (0.002)**
Random part p-values					
cons/cons				3.529 (0.851)	3.584 (0.857)
Loglikelihood ratio	*13813*	*13392*	*11650*	*11276*	*11275*
No. of Schools	*120*	*120*	*118*	*115*	*115*
No. of cases	*2127*	*2068*	*1790*	*1732*	*1732*

The between school variance was estimated as σ^2_{u0}=3.584. The within school, between student variance was estimated as σ^2_e=37.257. The total variance therefore was 3.584+37.257=40.841.

The variance partition coefficient (VPC) is 3.584/40.841=0.09, which indicates that 9% of the variance in change scores on the Total Difficulties scale can be attributed to differences between schools, once the characteristics of the children and schools were controlled for. This suggests that there are some differences in change scores between schools, but that a substantial proportion of the variance seen between schools in the empty model was actually a result of the different characteristics of the children within the schools.

In order to be sure of this result, residuals were examined with 95% confidence intervals for the adjusted Total Difficulties Change scores by school. Figure 40 shows that the relationship between school and change score is less striking once explanatory factors are controlled for. There are still six schools with change scores and confidence intervals above the ‘0’ line, and two schools with confidence intervals below, even once these other factors are adjusted for. We would expect that, at this level of confidence and with 120 schools, six schools would be outliers by chance. In order to further explore whether these schools were 'true' outliers, residuals were also examined with 99% confidence intervals (Figure 41). At this level, two schools were found to sit above the 0 line, and two below. We would anticipate seeing two schools as outliers by chance at this point. As there are four outlier schools, these results suggest that there may be some significant differences between schools at either end of the spectrum of change, however, the majority of the difference between schools in terms of value added difference may be accounted for by the demographics of the child and school.

Figure 39 Residuals from Linear Total Difficulties Change score model, adjusted for sex, ethnicity, Looked after status at Preschool and school roll, ranked by school with *95% confidence intervals*

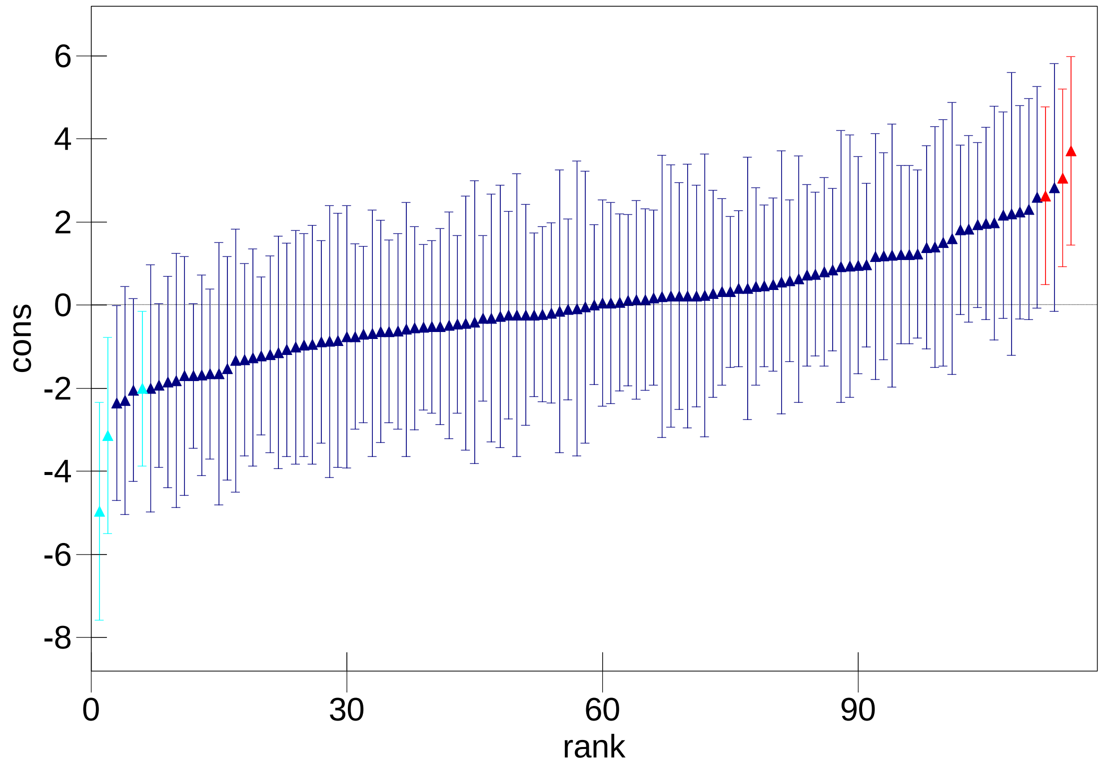

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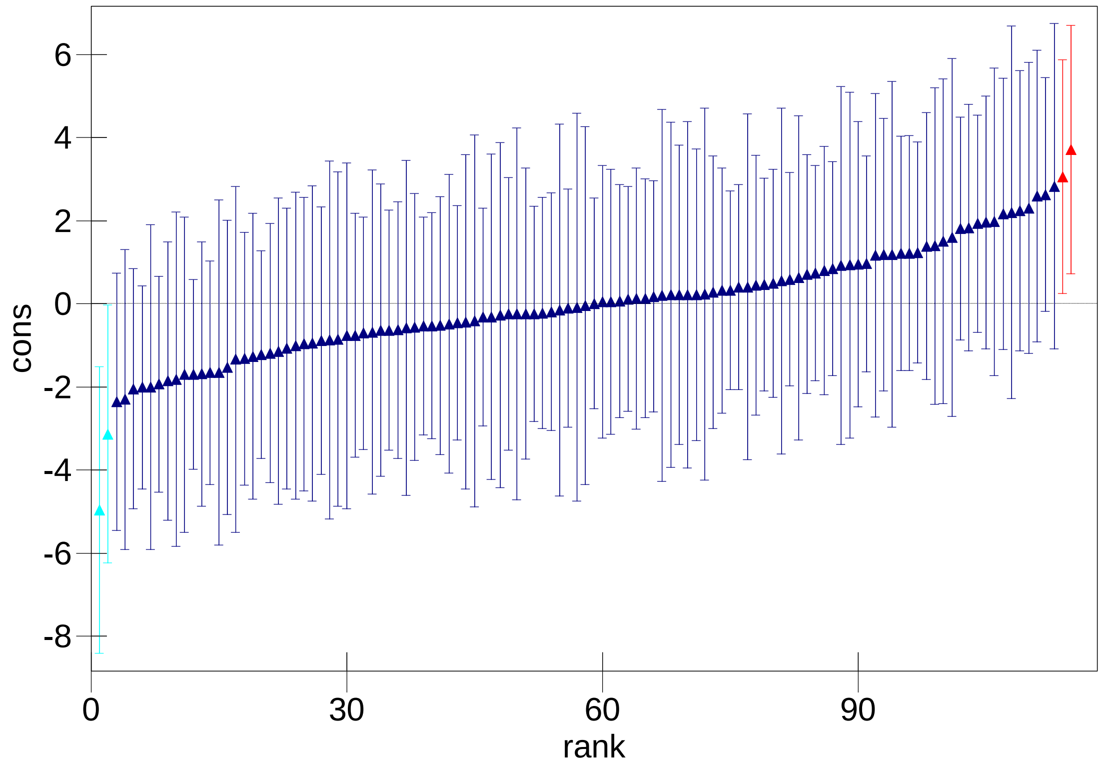
Figure 40 Residuals from Linear Total Difficulties Change score model, adjusted for sex, ethnicity, Looked after status at Preschool and school roll, ranked by school with *99% confidence intervals*



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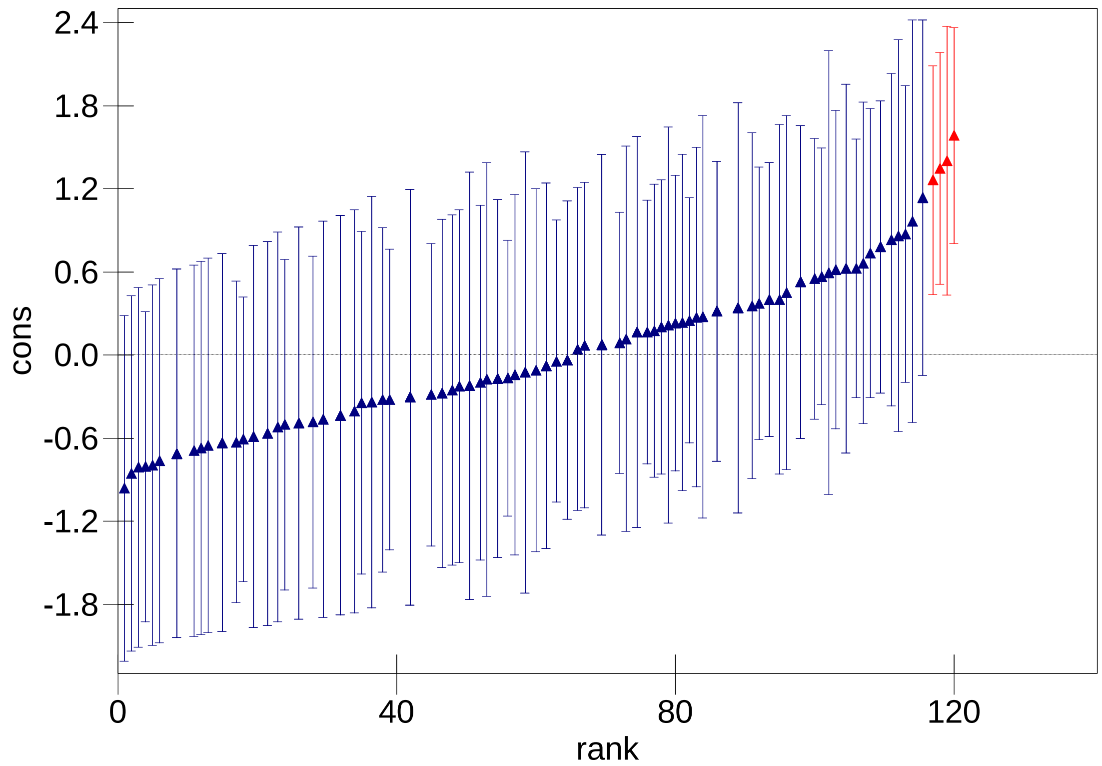
12.5 Binomial models predicting abnormal SDQ Total Difficulties scores at Primary 3

A binomial multi-level model was fitted firstly in MLwiN without any explanatory variables using the MQL-1 algorithm. The Chi^2 statistic for the variance between schools in this model was 12.558, substantially above the 3.84 figure (the chi square test statistic for one degree of freedom), thus indicating significant differences in P3 binary SDQ scores between schools. Loglikelihood ratios cannot be produced for binomial models in MLwiN, so this is the best way we have of telling whether a multilevel model is a better fit.

The plot shows the estimated residuals for all 120 schools in the dataset (Figure 41). For a group of schools at the right of the plot, the 95% confidence interval does not overlap the horizontal line at zero, which indicates that the proportion of children in the abnormal group in these schools is significantly above average. No schools were sitting fully below the '0' line in this model. The fact that only four schools out of our 120 were significantly different may indicate that this is purely there by chance (as 5% of schools may appear significantly different but in reality may not be). It is worth noting though, that confidence intervals are far wider on this measure than they were in the continuous change score model. However, because the Chi squared result suggested that the multilevel model was a significantly better fit, further models were fitted in order to see if the schools stayed significantly different (or potentially, if more schools were found to be significantly different from the mean) once characteristics of the child and school were accounted for.

Figure 41 Binary Unadjusted Residuals for abnormal Total Difficulties scores by school (null model)



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A series of binomial multilevel models (MQL-1) were then fitted with the binary P3 outcome measure, in order to produce unadjusted coefficients in relation to each child level factor, with their respective p-values and odds ratios in order to ascertain which variables demonstrated an association with the binary outcome measure. Both fixed effect and (where applicable) random intercept models were fitted.

Table 15 details results from the child level explanatory unadjusted models predicting abnormal scores at age 7-8. The strongest unadjusted relationship was between the child's binary SDQ score at preschool and their score at P3. Children with an abnormal score in preschool were more likely to score in the abnormal range at P3 (β=1.525), meaning that the odds of having an abnormal score at P3 were more than four and a half times higher if the child had an abnormal score at preschool (O.R.= 4.56).

Sex of the child was also found to be associated, with boys being more likely to have an abnormal SDQ score at P3 (β=0.986, O.R.=2.68). Looked After status at both preschool and P3 were associated with the outcome measure to a statistically significant degree. However, the Wald test statistic would suggest that the preschool measure was a slightly stronger association (ß=1.087, O.R.=2.97). In relation to area deprivation (GIMD quintile), there was a statistically significant correlation between living in the three most deprived areas at preschool, in comparison with the least deprived area. Quintile 4 was not found to be significantly different to Quintile 5 – least deprived. There appeared to be a gradient effect of living in more deprived quintiles at preschool, with the odds of an abnormal score at P3 being 3.96 higher compared with those in the most deprived areas than for children in the least deprived areas, an odds of 3.54 for Quintile 2 and 3.52 for quintile 3. Once again, on this measure, both the preschool and P3 measures were correlated, however the Wald test statistic would suggest that area deprivation at preschool demonstrated a stronger relationship. Ethnicity also showed a significant, positive association, though only as a random slope model (ß=0.391, O.R.= 1.48).

Table 15 Unadjusted Binary P3 Total Difficulties Score Models with P-value and Odds Ratios by Level 1 variables (1st order MQL)

	Unadjusted Coefficients - Fixed Effect ß (S.E)	***Odds Ratio***	**Unadjusted Coefficients - Random slope ß (S.E)**	***Odds Ratio***	***P value of random part***
Constant	-2.208 (0.107)				
Sex of child					
Female	0				
Male	**0.986 (0.164)****	**2.68**	1.005 (0.152)**	2.73	0.267
Ethnicity					
Non-White UK	0		**0**		
White UK	0.351 (0.213)	1.42	**0.391 (0.167)***	1.48	0.003
Ever Looked After (PS)					
Never Looked After	0				
Ever Looked After	**1.087 (0.348)****	2.97	0.664 (0.038)**	1.94	0.000
Home Area Deprivation (PS) (GIMD)					
5 – Least Deprived	**0**		0		
4	**1.030 (0.477)***	2.80	1.011 (0.430)*	2.75	0.776
3	**1.259 (0.461)****	3.52	1.355 (0.370)**	3.88	0.013
2	**1.264 (0.460)****	3.54	1.297 (0.402)**	3.66	0.810
1 - Most Deprived	**1.375 (0.457)****	3.96	1.371 (0.386)**	3.94	0.808
SDQ Total Difficulties (PS)					
Normal	0				
Abnormal	**1.525 (0.222)****	**4.56**	1.530 (0.189)**	4.62	0.363
Ever Looked after (P3)					
Never Looked After	0				
Ever Looked After	1.063 (0.244)**	3.19	0.894 (0.108)**	2.44	0.004
Area Deprivation (P3)					
5 – Least Deprived	0				
4	0.691 (0.400)	2.00	0.770 (0.412)	2.16	0.638
3	0.781 (0.392)	2.18	0.894 (0.400)*	2.44	0.721
2	0.866 (0.387)*	2.38	0.995 (0.393)*	2.70	0.000
1 - Most Deprived	0.924 (0.386)*	2.52	1.089 (0.395)**	2.97	0.216

*=p>0.05; **=p>0.01

Unadjusted multilevel models were also fitted for each of the school level variables. Again, as there is no variance within a level 2 variable in this model, only random intercept models were fitted.

The strongest association at the school level was between the school attendance record and being in an abnormal group, whereby the lower the attendance in relation to the Scottish national average, the more likely a child was to have an abnormal Total Difficulties score at P3. A child at a school reported to have 'below average' attendance had odds 3.27 times higher of being in the abnormal group, whilst a child in a school with 'well below' average attendance had odds 5.11 times higher. In addition, the proportion of children eligible for Free School Meals was positively associated with having an abnormal score (β=0.038, O.R.=1.04), as was the number of exclusions per 1000 pupils (β=0.004,O.R.=1.004), whilst the size of the school roll was negatively associated (β=-0.004,O.R.=1.004). Neither the score which was derived from the school inspection reports, nor the denomination of the school, were statistically significant at a binary level.

Table 16 Unadjusted Multilevel Binary Total Difficulties models by Level 2 (school level) variables (1st order – MLQ)

	Unadjusted Coefficients - Fixed Effect β (S.E)	***Odds Ratio***
Constant	-2.208 (0.107)	
% Free school meals		
(cont.)	**0.038 (0.007)****	**1.04**
No. of Exclusions per 1000 pupils		
(cont.)	**0.004 (0.002)***	**1.004**
School size		
(cont.)	**-0.004 (0.001)****	**1.004**
HMIe Report Score		
Cont. (centred around Grand Mean)	-0.163 (0.149)	-
Attendance		
Above average		
Average	**1.069 (0.571)**	**2.91**
Below average	**1.184 (0.533)**	**3.27**
Well below average	**1.632 (0.684)**	**5.11**
Denomination		
Non-denominational	0	
Catholic	0.000 (0.000)	-

p>0.05=; p>0.01=***

A series of adjusted multilevel Binomial Logit models were then fitted. Firstly an empty two-level model was fitted (Model A). In the multilevel Logit model without any explanatory variables, the between schools variance was 0.757. By the final model this had decreased to 0.166, as an increasing amount of the variation was explained by other variables.

Model B contained significant child characteristics, namely sex of the child and ethnicity. Sex was fitted as a fixed effect, with ethnicity fitted as random slope. Sex showed a fairly strong association with having an abnormal Total Difficulties score at P3 in this model (β=0.973, O.R.=2.65). Ethnicity had a weaker, though still significant association (β=0.422, O.R.=1.53). The random element of the ethnicity variable was also significant.

Model C was fitted with additional family characteristics (Glasgow Index of Multiple Deprivation quintiles and Looked After status of the child, both measured at preschool) at the child level. These were fitted as fixed effects. All variables remained significant in the model.

Model D added in the child's baseline level of difficulties (whether they had an abnormal Total Difficulties score at preschool or not). All previously significant variables from Model C remained significant, though the associations between P3 score and all demographic variables were weakened substantially by the inclusion of the baseline score. The baseline score showed a strong association with having an abnormal Total Difficulties score at P3, once child variables were controlled for: ß=1.132/OR=3.10.

Model E was then fitted with additional significant school-level characteristics added in. Ethnicity failed to converge as a random slope in this model, so it was returned to a fixed effect. The fixed effect for ethnicity was not significant in this model. Furthermore, three of the four school-level variables which were significant at a binary level, lost their significance. Of the school-level variables, only the proportion of children entitled to Free School Meals remained significant. Once this was added into the model, the area level index of multiple deprivation lost its significance. This is likely to be due to the proportion of free school meals being a more accurate measure (i.e. an individual rather than area measure) of poverty for this population, rather than the wider area level deprivation variable. The association of the proportion of children entitled to a free school meal was fairly weak though, with a 1% rise being associated with a rise in the odds of having an abnormal score at P3 of 1.03.

Model F was then re-fitted with only the significant variables included in the model, all as fixed effects. All remained significant. The strongest predictor of having an abnormal Total Difficulties score in this final model was having been rated as having an abnormal score by staff at preschool (ß=1.388, O.R.=4.01). Having had Looked After status by preschool was associated with an odds ratio of 2.90 (ß=1.063), whilst being male carried an odds ratio of 2.47 (ß=0.903). A 1% increase in the proportion of children in a school eligible for Free School Meals was associated with an increase in the ß coefficient of 0.032 (O.R.=1.03). This means that a school with a 10% difference in the proportion of children eligible for Free School Meals would have an Odds Ratio 1.38 higher than a school with 10% fewer eligible children.

Table 17 Adjusted Multilevel Binomial Models for Binary P3 Total Difficulties Scores

	A - Null 2 level	B - Sex (F.E) & Ethnicity (R.S)	C - Sex (F.E); Ethnicity (R.S); PS LA status (F.E) & PS GIMD (F.E)	D - Sex (F.E) ; Ethnicity (R.S); PS LA status (F.E); PS GIMD (F.E) & PS Binary TD score (F.E)	E - Sex (F.E) ; Ethnicity (F.E); PS LA status (F.E); PS GIMD (F.E) & PS TD score (F.E); % FSM - gm (F.E); Exclusions (F.E); School size - gm (F.E) & Attendance (F.E)	F - Sex (F.E); PS LA status (F.E); PS Binary TD score (F.E) & % FSM (F.E)
Constant	-2.208 (0.107)	-3.167 (0.203)**	-4.324 (0.462)**	-4.424 (0.483)**	-4.882 (0.859)**	-3.015 (0.169)**
Sex of child						
Female		0	0	0	0	0
Male		0.973 (0.165)**	1.104 (0.185)**	1.029 (0.190)**	0.939 (0.242)**	0.903 (0.180)**
Ethnicity						
Non-white UK		0	0	0	0	-
White UK		0.422 (0.165)*	0.347 (0.121)**	0.448 (0.191)*	0.413 (0.300)	-
Looked after by PS						
Non-Looked After			0	0	0	0
Ever Looked After			1.155 (0.400)**	1.222 (0.403)**	1.132 (0.474)**	1.063 (0.366)**
Area Deprivation (PS) (GIMD)						
5 – Least Deprived			0	0	0	-
4			0.997 (0.467)*	0.916 (0.486)	0.763 (0.678)	-
3			1.237 (0.462)**	1.161 (0.468)*	1.037 (0.652)	-
2			1.229 (0.464)**	1.115 (0.469)*	0.534 (0.661)	-
1- Most Deprived			1.280 (0.460)**	1.179 (0.467)*	0.547 (0.662)	-

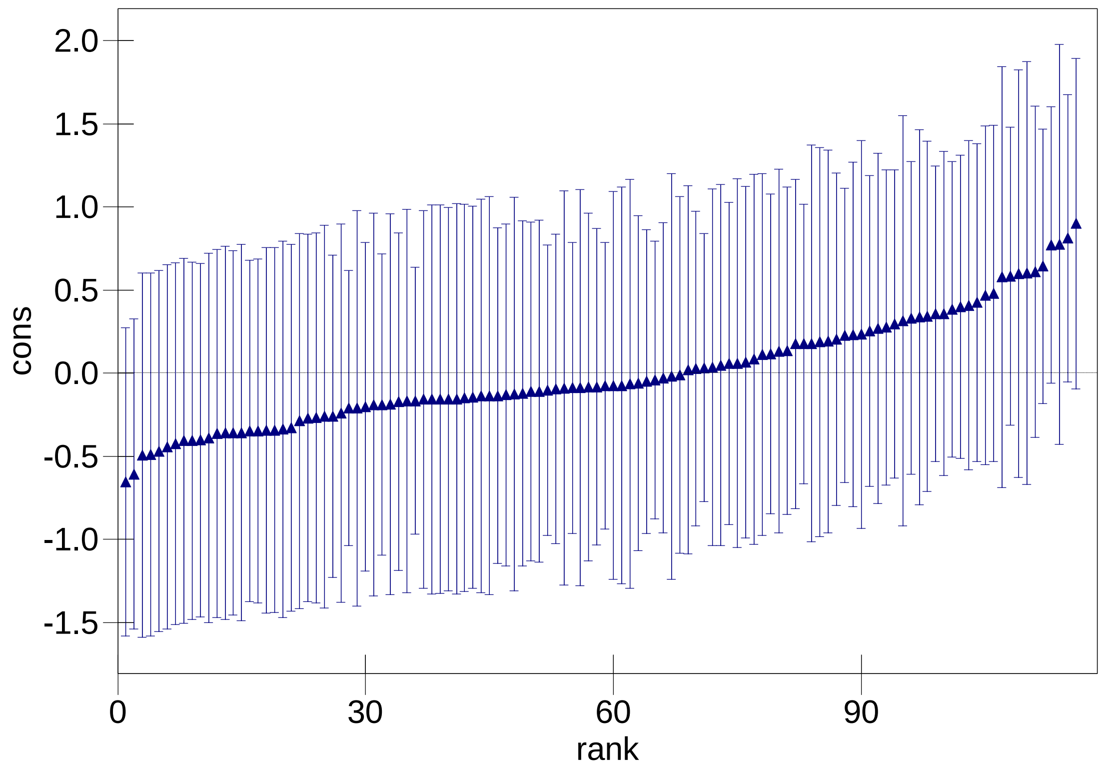
Table 18 gives the coefficients by algorithm used – MQL-1, MQL-2, PQL-1, PQL-2, MCMC. The estimates are similar across all models, as would be expected, with the estimates in the PQL-2 and MCMC models in particular being slightly stronger.

Table 18 Final Binomial Adjusted Model for Abnormal Total Difficulties at P3, by algorithms used

	FINAL MODEL: Sex (F.E); PS LA status (F.E); PS Binary TD score (F.E) & % FSM (F.E)				
	1st order - MQL	**2nd order - MQL**	**1st order - PQL**	**2nd order - PQL**	**MCMC (20000 iterations)**
Constant	-3.015 (0.169)**	- 3.196 (0.187)**	-3.055 (0.172)**	-3.167 (0.181)	-3.185 (0.190)
Sex of child					
Female	0	0	0	0	0
Male	0.903 (0.180)**	0.928 (0.192)**	0.909 (0.183)	0.926 (0.189)**	0.927 (0.188)**
Ever Looked after by PS					
Never Looked After	0	0	0	0	0
Ever Looked After	1.063 (0.366)**	1.131 (0.377)**	1.077 (0.373)**	1.116 (0.379)**	1.096 (0.390)**
SDQ Total Difficulties at Preschool					
Normal	0	0	0	0	0
Abnormal	1.388 (0.242)**	1.475 (0.249)**	1.410 (0.245)**	1.463 (0.249)**	1.461 (0.251)**
% Free school meals					
(cont.)	0.032 (0.007)**	0.033 (0.008)**	0.032 (0.007)**	0.033 (0.008)	0.034 (0.008)**

Figure 42 displays the residual difference in the proportion of children with an abnormal Total Difficulties score by school, controlling for sex, Looked after status at Preschool, Baseline score and, at the school level, the proportion of children eligible for Free School Meals in the school (using the final MCMC model). This caterpillar plot shows that once these variables are accounted for in the model, there are no schools which differ significantly from the norm in either direction. We can conclude from this then that, whilst there are differences between schools in terms of P3 children's social, emotional and behavioural difficulties, the majority of this variance is accounted for by the demographics of the children within the school.

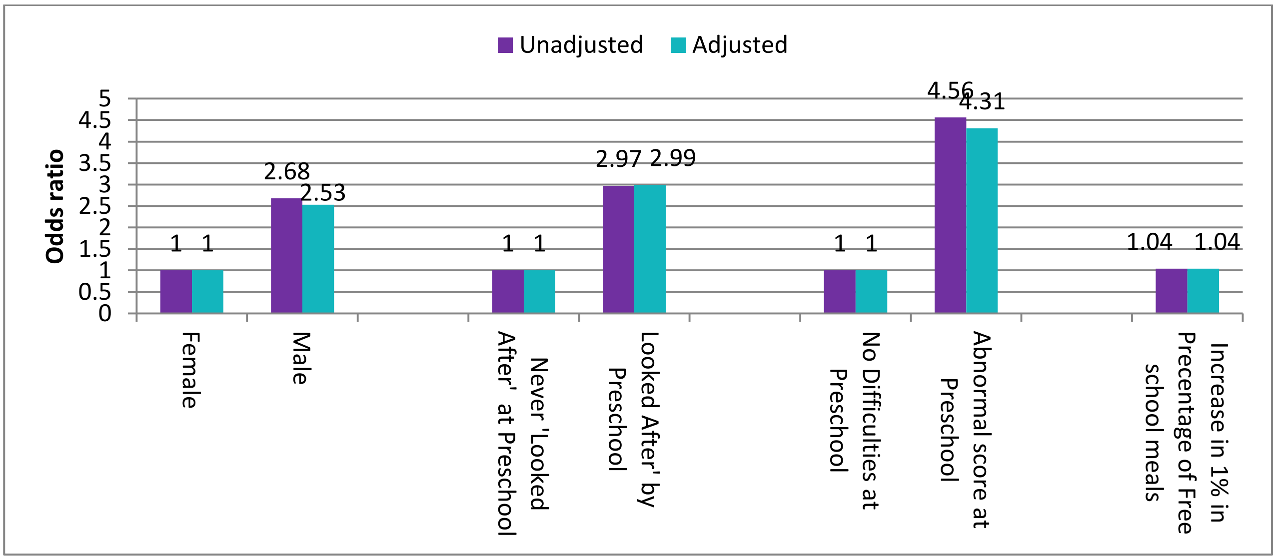
Figure 42 School based Fixed effect residuals for the Binary Total Difficulties Group at P3, adjusted for Sex of child, Looked After status at Preschool, Baseline Total Difficulties group and Percentage of children on Free School Meals within each school (MCMC), with 95% confidence intervals



Base: 1786

Odds ratios were derived for the significant variables in the final multilevel binary Total Difficulties score model (using MCMC). Odds ratios in this model give the log odds of the outcome for each unit increase in the value of the exposure (Szumilas, 2010). The original unadjusted odds ratios are shown alongside the adjusted odds ratios for the final binary model in Figure 43. Odds ratios were similar when they were unadjusted and adjusted. The odds of having an Abnormal Total Difficulties score at P3 was more than four times higher if the child also had an abnormal Total Difficulties score at preschool, than if a child had a normal score at preschool, once other factors were controlled for. Being currently or previously Looked After when the child was at preschool was associated with odds of having an abnormal score at P3 of around three times higher than for a child who had not been Looked After at that stage. Being male was also associated with higher odds: boys had odds of having an abnormal score two and a half times higher than girls, even once factors such as their baseline score were taken into account. Finally, there was a very small effect of the proportion of children eligible for free school meals (adjusted O.R.=1.04). Although this appears to be just a small effect, it has the potential to make a big difference in outcomes between schools because of the variance in their intake: the proportions of children eligible for free school meals varied substantially by school: percentages eligible ranged from 4% to 72.7%, with a mean of 37.8% and an interquartile range of 27.2% to 48.9%.

Figure 43 Unadjusted and Adjusted Odds Ratios for significant explanatory variables in relation to Total Difficulties Group at Primary 3



Base: 1786

12.6 Multilevel models for subdomains

Multilevel models were deemed to be statistically appropriate for all subdomain models, applying the same criteria as set out for the Total Difficulties models. Both linear change score models and binomial models predicting maladaptive development at P3 were fitted for each domain. Table 19 provides a summary of significant and non-significant factors from the subdomain models. Full results can be viewed in –Appendix B.

Differences could be seen between schools in terms of maladaptive emotional development during the first three years of school where, after controlling for other factors, the variance between schools was 13%. School variance was not found at a significant level in terms of any other change scores or abnormal scores at P3.

In terms of child characteristics, gender (being male, specifically) was associated with having an abnormal Conduct Problems, Hyperactivity/inattention, Emotional Symptoms and Prosocial Behaviours score at P3, but it was only associated with a higher change score on the Hyperactivity/inattention domain. Ethnicity (being of a White-UK origin) was associated with having an abnormal score at P3 in relation to Hyperactivity/inattention, and with having a higher change score on the Conduct Problems, Hyperactivity/inattention scale and Peer Relationship Problems scale.

Looked After status was strongly associated with social, emotional and behavioural development at P3. Looked After status at preschool was generally a stronger predictor than current Looked After status at P3. Looked After status at preschool was associated with abnormal scores at P3 on the Conduct Problems and Emotional Symptoms scales, whilst Looked After Status at P3 was related to having an abnormal score on the Hyperactivity/inattention domain. In terms of the linear change models, Looked After status at preschool was associated with having a higher Conduct Problems and Hyperactivity/inattention change score.

Area level deprivation was significant at a binary level on many of the subdomains, particularly deprivation measured at preschool, however it frequently lost significance when the proportion of children eligible for Free School Meals (FSM) within a school was entered into the multivariate model. Area level deprivation was not significant in any of the final linear or binomial models. A higher percentage of FSMs predicted abnormal scores at P3 on the Conduct Problems and Peer Relationships domain, but was not associated with any change scores, once other characteristics were controlled for.

School size, in terms of school pupil roll, was the most frequently significant school level predictor in the models. Small schools were associated with difficulties at P3 with Conduct Problems and Hyperactivity/inattention. Small schools were also related to higher change scores on the Hyperactivity/inattention domain and the Emotional Symptoms domain. Finally, having well below average attendance at a school, in comparison with the Scottish national average, was associated with having a higher Emotional Symptoms change score.

Denomination, school inspection report score and the number of exclusions per 1000 pupils were not found to be related to either social, emotional and behavioural development in the first three years of school, or to functioning on any of the subscales at age 7-8.

Table 19 Summary table of results from SDQ subdomain multilevel models

	Total Difficulties		Conduct Problems		Hyperactivity/ inattention		Emotional Symptoms		Peer Relationship Problems		Pro-social Behaviours	
	Cont	Bin	Cont	Bin	Cont	Bin	Cont	Bin	Cont	Bin	Cont	Bin
School	Y						Y		Y		Y	
Male		Y		Y	Y	Y		Y				Y
White	Y		Y		Y	Y			Y			
Looked After @PS	Y	Y	Y	Y	Y			Y				
Looked After @P3						Y						
Abnormal (high) Baseline score		Y		Y		Y				Y		Y
High % FSMs		Y		Y						Y		
Small School Size	Y			Y	Y	Y	Y					
Well below average Attendance							Y					

Area level deprivation at Preschool or P3, number of exclusions per 1000 pupils, low school report score and denomination were not significant in any subdomain model.

12.7 Discussion

Results indicated variation between schools in terms of children's social, emotional and behavioural development. This was the case both in terms of the differences between the amount of change in individual children's scores between preschool and P3, and in the outcome measure in terms of an abnormal score at P3. Once intake characteristics of the children and school-level characteristics were taken into account, these differences reduced, though in the case of the change models, this reduction was slight. Previous studies have found higher levels of variance attributable to individual and class effects, rather than school level effects. For example, one study looking at the impact of schools on psychosocial adjustment in preschoolers reported that variance at the individual level was 87%, compared with 11% at the class level and just 3% at the school level (Van Den Oord & Rispens, 1999). In contrast though, other studies have found evidence of an effect of schools on behavioural problems, albeit a weaker effect than that for educational attainment (Rutter & Maughan, 2002). Rutter suggested that most schools fall in the middle range in the terms of results, because there is not a huge amount of difference in the quality of schools: most schools, like most families, are 'good enough' for children's development (Rutter & Maughan, 2002). The current study suggested that schools accounted for 9% of the variance in change scores between preschool and P3, even once other factors were controlled for. This is lower than the 10% difference which is viewed in the field as representing a significant level of variation between schools, however, it is nonetheless a substantial amount of variation at this level, particularly compared with previous studies.

It may be that more substantial differences do exist between schools, but that the number of pupils within each of the 120 schools was too small (an average of 10 per school), and thus the confidence intervals, particularly on the abnormal model were very wide. The inclusion of another year or two of SDQ data collection may therefore reduce the confidence intervals to such an extent that we may be more confident about whether there actually is a significant difference between schools or not, both before and after controlling for intake and other factors.

The model predicting change scores and the model predicting abnormal scores at age 7-8 were similar, but not identical, in terms of their influencing factors. The model examining change between the two time points contained only one significant school-level variable, which was school size, as measured by the number of pupils in the school in the year the P3 data was collected. The direction of this result was unexpected; it was anticipated that smaller schools would be able to cater better for children's needs than larger schools. However, the school effect in the model ran in the opposite direction – rather that a smaller school was associated with an increasing/worsening score. The previous research around school size has produced inconsistent results. There is some support for the above finding that smaller schools may be worse for children's social, emotional and behavioural development, with some evidence showing higher rates of bullying and victimisation in smaller schools (O'Moore et al., 1997). In contrast, in other studies, smaller schools have been found to have lower levels of victimisation, no effect on bullying, improved behavioural outcomes and increased participation and responsibility by pupils (Leithwood & Jantzi, 2009a; Barker & Gump, 1964a; Whitney & Smith, 1993a; Wolke et al., 2001; Bonnet et al., 2009) . However, it is worth noting that the majority of studies producing positive results by school size have been conducted both in the USA, and in secondary schools, where school sizes are significantly bigger than in the UK. The relatively small size of primary schools in Glasgow City may mean that the impact of larger versus smaller schools is not so dramatic. Furthermore, in many areas studied, the smaller schools tend to be found in rural areas, whereas in Glasgow City, almost all schools are categorised as being in large urban areas.

In contrast, in the UK, the focus has been more on class size, with the majority of studies concluding that being in small class sizes (less than 20 pupils) produces the best outcomes for children in the early years of school, and that this is particularly the case for disadvantaged children (Blatchford & Mortimore, 1994; Finn et al., 2003). It is worth noting however, that there are a group of studies which have either found no effect of class size or a negative effect (e.g. increases in teasing and aggression at preschool level) (Blatchford et al., 2005; Hoover-Dempsey et al., 1987; Blatchford & Mortimore, 1994). In the current study, class level information was not available. Future research in this area would benefit from having this information in order to build in class effects.

Discussions with colleagues in GCES suggested that schools which are larger in Glasgow City are those which are ‘booming’ i.e. these are popular schools which parents are submitting placing requests for their children to attend where the child lives out with the catchment area. In contrast, some of the smaller schools in Glasgow City have very few pupils in them, primarily through housing demolition in certain areas and parents moving to other areas. The pupils who remain in these schools may arguably have different characteristics – perhaps with parents who are less able to move to a new area due to housing or financial limitations – which may reflect on the children’s (and their parents’) mental health. The result of the withdrawal of large numbers of pupils, coupled with the potential threat of school closure, may also impact on staff morale which, in turn, may affect both the way in which teaching staff view pupils’ behaviour etc. and thus how they score the SDQs, but also impact on how pupils actually behave in the classroom. These aspects are difficult to untangle without further qualitative work.

The model exploring *abnormal* Total Difficulties scores at age 7-8 also only had one significant school-level variable, though this time it was the proportion of children within the school who were eligible for Free School Meals. It could be argued that this is actually a school-level reflection of individual level income and is really a proxy for the levels of deprivation among the pupils represented in the school. It is not a characteristic of the school so much as a marker of the demography of its pupils. It is notable that area-level deprivation of the child’s home at preschool was significant until the proportion of Free School Meals was added to the model. This would suggest that the proportion of Free School Meals is picking up on a similar aspect, albeit more accurately. The inclusion of a marker of poverty/income in the model was not unexpected. There exists a large body of evidence supporting the association between living in poverty and poorer psycho-social outcomes during childhood. It has been reported that living in chronic poverty had an even greater impact than living in transitional poverty (Costello et al., 2003; Gershoff et al., 2007a; Votruba-Drzal, 2006). From the exploratory results, it is clear that, of the children who were living in the highest level of area deprivation in Glasgow City at preschool, the vast majority were still living in those areas (or in areas with similar levels of area deprivation) at P3 (93.4% - Scottish Quintiles), suggesting that many of these children may have lived in chronic poverty. Furthermore, research exploring the impact of neighbourhood deprivation in comparison with individual level deprivation, have found stronger associations between mental health problems in childhood and deprivation at an individual level, compared with the neighbourhood level (Cook, Herman, Phillips, & Settersten, 2002). This may be the reason why a school with higher levels of children from families with a low income (who therefore qualify for Free School Meals) may have a stronger effect on social, emotional and behavioural difficulties than for children who live in an area of higher deprivation, but who do not necessarily live in a household with a very low income themselves. The current areas at which the SIMD information is available – the datazone – is currently being revised in Scotland, because these areas have changed so much over the years that within some datazones there are now much larger populations than there originally were, which may bring additional diversity in terms of deprivation to the area. This may also explain why the association at an area level is weaker.

The mechanisms behind the relative advantage that children growing up in more advantaged circumstances have in their social, emotional and behavioural development has been greatly debated. Children who grow up in families with lower incomes are likely to have parents who experience greater stress, which may be transmitted to children, they are also more likely to live in a poorer home environment, in terms of resources which may encourage their development, and may be more likely to witness violence and other forms of domestic abuse, all of which affect social, emotional and behavioural functioning (Gershoff et al., 2007a). Furthermore, there is a correlation between deprivation and poorer parenting which may lead to social, emotional and behavioural development (Blair et al., 2011; Zilanawala & Pilkauskas, 2012; Votruba-Drzal et al., 2010). Providing warm, supportive, responsive care-giving has been evidence to help children develop secure attachments, to regulate emotions and to learn how to develop good relationships with peers (Votruba-Drzal et al., 2010).

It could be that for relatively affluent children in the sample, starting school may act as a stimulus, improving their social, emotional and behavioural development. These children may start school ‘ahead of the game’ - with better language and social skills than their less affluent peers, as well as being physically taller (McLoyd, 1998; Hoff-Ginsberg, 1998; Peck & Lundberg, 1995). This is in contrast to children from more deprived backgrounds, who see reported levels of hyperactivity/inattention and conduct problems, in particular, worsen. Part of this may relate to the gene-environment fit, whereby children who have a genetic disposition towards hyperactivity, for example, may increase the likelihood of exhibiting symptoms when put into an environment of chronic deprivation, poor peer relationships and bullying (Belsky & Pluess, 2009).

It appears that some of the variation that could be seen between schools in both models was accounted for by differences in the demographic composition of the pupils of each school at an individual pupil-level. One of the benefits of this longitudinal analysis was having the student level score at intake. This means that one can examine the effect the actual school may have had, rather than simply measuring the impact of a school having a higher intake of children with behavioural difficulties or from low income families (Rutter, 1983). In relation to change in the overall Total Difficulties scores, being of a White-UK ethnicity and having had Looked After status in the first five years of life was associated with having a higher reported change score, or getting worse over time. Whilst in terms of having an abnormal SDQ Total Difficulties score at P3, the final model suggested that being a boy and having had Looked After status in the first five years were significantly associated with having an abnormal score.

Having had Looked After status (that is, being under the supervision of the state currently or previously, either at home or away from home) was associated with a range of detrimental outcomes. Having been Looked After in the first 4-5 years of life was associated with having an abnormal score on the Total Difficulties scale, as well as in relation to Conduct Problems and Emotional Symptoms. In addition, being Looked After by preschool was associated with having an increasing score between preschool and P3. This is in line with previous evidence which suggests that Looked After children are more likely to have poorer mental health than their non-Looked After counterparts (Minnis et al., 2006; Ford et al., 2007b). One British study found prevalence rates of any psychiatric diagnosis as 46.4% for Looked After children in the UK, compared with 14.6% of children in the most disadvantaged private households (Ford et al., 2007a), whilst a Scottish study of Looked After children cited prevalence rates of 44% of Looked After children having a psychiatric diagnosis with impaired psychosocial functioning (Blower, Addo, Hodgson, Lamington, & Towlson, 2004). In particular, the same study demonstrated considerably higher levels of any behavioural disorder (38.9% vs. 9.7%) and of any anxiety disorder (11.1% vs. 5.5%) (Ford et al., 2007a).

It is possible that it is not the fact of being Looked After that has an impact on social, emotional and behavioural development per se, but that the adverse early experiences which have led to the child being Looked After, may have resulted in impaired development in these areas (Richardson & Lelliott, 2003b). Previous longitudinal work with access to a richer set of data on child early experiences has suggested that family factors and early childcare experiences can predict social functioning in the first two years of school. The authors propose that this is as a consequence of the way in which these early experiences shape the social functioning of the child before they reach school, which then remains relatively stable (Howley & Howley, 2004). In order to explore this further, Looked After children from the 2012 preschool cohort from the same study in Glasgow City had their data matched with that from social work. This provided the broad reason that the child had Looked After status. Two fifths of children in the cohort (41.7%) had Looked After status because of a lack of parental care, 27.4% because of parent/carer alcohol or drug misuse, 11.5% because of domestic violence in the household and 12.4% because of another child protection issue. All of these factors have been linked to negative social, emotional and behavioural outcomes in children. For example, studies have shown that children with a history of maltreatment are less well liked by their peers, are more physically/verbally aggressive, more withdrawn and less pro-social compared with their classmates (Anthonysamy & Zimmer-Gembeck, 2007; Teicher et al., 2003). As with the association with poverty, the impact of Looked After status may related to attachment theory, whereby the earliest experiences of relationships with our care-givers may set the scene for social and emotional development for the rest of our lives (Bowlby, 1969; Ainsworth et al., 1978). Children who are Looked After have by definition received sub-optimal parenting, and many will have difficulties with attachment (Howe & Fearnley, 2003). This is likely to continue to affect them and may well be the reason that early Looked After status, experience during these formative stages, are appearing to be more important that later Looked After status.

Difficulties with hyperactivity/inattention, on the other hand, were associated with current Looked After status. It has been suggested that environmental adversity, such as low social class, maltreatment and negative parenting may exacerbate symptoms of hyperactivity in children who are already genetically susceptible to ADHD (Thapar, Cooper, Jefferies, & Stergiakouli, 2012). This may be why the current environment in which the child is living is so important, particularly as the majority of children who are Looked After at this age remain in the family home, with few being removed into state care, and thus may remain exposed to many of the stressors that amount to the reason they are Looked After.

There is evidence suggesting that children of a White ethnicity are more likely to have difficulties in social, emotional and behavioural development, particularly around conduct problems and hyperactivity/inattention, than children from other ethnic backgrounds living in the UK (Ford et al., 2003; Goodman et al., 2010). Glasgow City is the most racially diverse city in Scotland. It is not surprising that on the subdomains of the SDQ, ethnicity was a significant factor in both continuous models fitted for Hyperactivity/inattention and Conduct Problems, as well as being associated with an increasing Total Difficulties score.

Being male was associated with having an abnormal Total Difficulties score at P3, as well as with having an abnormal score on all other subdomains, with the exception of Peer Relationship Problems. Previous research has shown that boys are more likely than girls to have problems during childhood, particularly with conduct or hyperactivity/inattention (Cohen et al., 1993; Stipek & Miles, 2008; Kellam et al., 1994). The higher levels of reported abnormal scores were also seen in boys at preschool, which is probably why this wasn't associated with a greater increase on the change scores. The exception to this is in the domain of hyperactivity/inattention, where boys were both more likely than girls to have difficulties at preschool, but who also demonstrated a disproportionate increase in their levels of hyperactivity/inattention between these two stages.

12.8 Conclusions

Differences in social, emotional and behavioural development were found by school.This difference was partly, but not fully, accounted for by either the characteristics of the intake of the pupils or school. In terms of increasing levels of difficulties, the important factors contributing to this were the school the child was in, being of a White UK ethnicity, having been Looked After in the first four years of life and being in a smaller school. These findings were anticipated, with the exception of being in a smaller school, where the hypothesis had been that a smaller school may provide a more supportive environment in which children could develop. Various theories were proposed as to why this was not the case, including being in a school with a declining school roll and the effect that that may have on teacher, pupil and parent morale and whether children remaining in these schools were characteristically different in terms of their upbringing and parental characteristics. Furthermore, previous evidence suggests that bullying and victimisation may be greater in smaller schools.

It was perhaps not surprising to find only a slight effect by school, as previous research suggests that individual and class level variation may be stronger. Referring back to the Ecological model, the results appear to suggest that different levels of influence are operating on children's development, however micro-system influences have been found to be stronger than the macro-system cultural influences. This study was unable to control for either class characteristics, such as class size or the teacher-pupil relationship, or for 'softer' school characteristics, such as the social climate of the school. Future research would benefit from being able to take these factors into account.

13 Overall Discussion

This study has made a unique contribution to the current knowledge base, through the exploration of the impact of schools on the development of social, emotional and behavioural functioning between preschool and the third year of primary school, using teacher-reported data. This is a much neglected area of research. The previous evidence has focused on academic and cognitive development to a far greater degree than social, emotional and behavioural development. Furthermore, the evidence that does exist about children of this age is frequently based on survey data, which usually suffers from differential response and, in longitudinal research, differential attrition, meaning that the children who we are most interested in (i.e. those with problems) are most likely to be missing from the datasets (Wolke et al., 2009). The current study has discerned some effect of school on social, emotional and behavioural development or functioning at age 7-8, once demographic factors are taken into account, however, school associations are small and individual characteristics remain more important. It may be that the large confidence errors around each school are masking a more substantial effect. Rutter, however, suggested that most Local Authority schools in the UK were not vastly different from each other and thus were unlikely to uniquely influence child outcomes (Rutter & Maughan, 2002). Other research has found evidence of school effects on behavioural outcomes in primary school, albeit at a lower level than individual or school-class effects (Van Den Oord & Rispens, 1999), supporting the current findings. Research exploring the impact of schools on well-being in later childhood and adolescence has also indicated that there may be independent school effects on outcomes, once intake characteristics have been controlled for (Opdenakker & Van Damme, 2000), so it may be that schools have more of an impact in later childhood.

Indeed, in line with much previous research, the results indicate that it is the demographic make-up of the school's intake which most strongly effects children's development within the school. In particular, what happens in life before the child gets to school was found to be more important to children's functioning in school, as opposed to what occurs during the early school years. The relationship with Hyperactivity/inattention, particularly in boys, may be the exception to this. In this case, there may be an interaction with the environment in which children are living: whereas the most advantaged children, in terms of living in an affluent area and never having had Looked After status, for example, do not see any increase in their reported levels of Hyperactivity/inattention, children living in disadvantaged circumstances demonstrate large increases in levels of Hyperactivity/inattention over the three years, with the most disadvantaged children seeing the biggest increases in levels of difficulties, supporting the theory of a gene-environment interaction in children (Belsky & Pluess, 2009).

The current study identified a range of child, family and school characteristics which operated at different levels in influencing children's social, emotional and behavioural development, in support of Bronfenbrenner's Ecological Systems Theory, which posited that children's development is affected by factors working at several environmental levels (Bronfenbrenner, 1976). At an individual child level, children who were male and of a White UK ethnicity were more likely to experience maladaptive development in the first three years of school. The finding for boys is well supported by the current literature, which shows that double the proportion of boys aged 5-10 in the UK have a mental health disorder, compared with girls (Green et al., 2005). This has been found to be particularly the case with regards to hyperactivity and conduct problems (Kellam et al., 1998; Bradshaw & Tipping, 2010; Ford et al., 2003), however results are inconsistent with regards to emotional symptoms with some studies finding no significant gender difference at this age (Toumbourou et al., 2011; Ford et al., 2007b). It should be noted though that previous studies have suggested that parents and teachers may over-report problems in boys because they hold more negative views of boys' behaviour (Bhana, 2009).

In relation to ethnicity, however, UK studies have demonstrated inconsistent results, with the 1999 British Child and Adolescent Mental Health Survey indicating no differences between groups, with the exception of slightly lower levels of Oppositional Defiant Disorder among Asian children (Ford et al., 2003). Other studies meanwhile have shown marked advantages for ethnic minority groups (Goodman et al., 2010; Goodman & Richards, 1995; Maynard et al., 2007), which would support the findings in the current study, though it should be noted that these previous studies all focused on very specific ethnic minority groups. In contrast, one Scottish birth cohort study reported that non-White children actually had higher rates of Peer Relationship problems at entry to primary school (Bradshaw & Tipping, 2010). Such studies are always difficult to conduct, particularly in Scotland, due to the small numbers of ethnic minority families living in the country. It is likely that the ethnic minority children living in Glasgow City are very heterogeneous group and that future research with larger numbers may be required to drill down deeper into these data to explore differences in development between different ethnicities.

At a family level, children who were ‘Looked After’ by the time they reached preschool were also more likely to have poorer non-cognitive development in the first few years of school. Again, the higher rates of social, emotional and behavioural difficulties in this group are well documented, with one study estimating that as many as 57% of ‘Looked After’ children in Scotland have likely difficulties in this area (Minnis et al., 2006), whilst a further study indicated that 46.4% of Looked After children in Britain had a psychiatric diagnosis (Ford et al., 2007b). This is likely to be explained by both genetic and environmental factors.

School characteristics also contributed to the development of children’s social, emotional and behavioural difficulties. Although being in a school with high levels of poverty was not associated with a worsening of difficulties in the first few years of school, it was associated with having an abnormal Total Difficulties score at age 7-8. This was possibly because poverty was already having a substantial effect on the child’s development whilst at preschool. There is a large body of research supporting the finding that economically disadvantaged children have the poorest outcomes across the board (McLoyd, 1998; Bradshaw, Hall, Hill, Mabelis, & Philo, 2012b; Brooks-Gunn & Duncan, 1997; Gershoff et al., 2007a; Green et al., 2005; National Institute of Child Health, 2007).

Having a worsening score at the start of primary school was also related to being in a small school. This was discussed in detail in the discussion section of Chapter 12. The finding is interesting because it is contrary to much of the previous evidence base, which has generally found that small schools are either better for child outcomes (Leithwood & Jantzi, 2009b; Barker et al., 2008) or make no difference (Whitney & Smith, 1993a; Bonnet et al., 2009). However, it should be noted that the majority of these studies have been carried out in the

US and in secondary schools, and thus results may vary considerably from those found in Glasgow City primary schools. In support of the current finding however, there is some evidence that there may be more bullying in smaller schools (O'Moore et al., 1997), which may impact on children’s social, emotional and behavioural functioning.

13.1 Strengths of the research

This research adds to the current literature by providing a unique set of longitudinal results, based on routine monitoring data from the population, rather than data from a cohort study or cross-sectional study. The advantages of this are that, unlike cohort data taken from a sample, the sample does not start with a bias towards more affluent families and is not subject to biased attrition favouring affluent families and children without problems (Wolke et al., 2009). Indeed, if anything, non-response analysis for this study shows that we are more likely to lose affluent families. In cohort studies requiring active participation, this differential attrition causes a major problem, as the children who are lost to follow-up (i.e. the most disadvantaged and those with the greatest level of difficulties) are generally those that we, as researchers, are most interested in. This study gets around this by using routinely collected data on children and their circumstances.

Data are reported by teachers rather than parents, which also has its advantages. It can give a more objective view of a child’s level of difficulties: teachers have a norm to compare an individual’s behaviour to. Whilst this is an advantage, it could also be seen as a disadvantage in analysing data from teachers working in schools at each end of the spectrum. For example, a teacher who is used to children having a high level of conduct problems may see that as the norm, and so a child with problems but who is relatively well behaved compared with others may be rated as having fewer difficulties than if they were surrounded by peers who did not have difficulties. Previous studies have indicated that parental mental health may affect a parent’s ratings of their child’s behaviour e.g. a depressed mother is more likely to view her child’s behaviour as difficult, even if it would not be objectively rated as such (Najman et al., 2001). Teachers’ views have not been reported to have the same effect on their student's ratings and, if this did occur it would likely be evened out across pupils rather than just affecting an individual's score.

Data were collected in Glasgow City, an urban area of high deprivation. This means that exploration of the impact of the first few years of school for children living in deprivation can be examined in-depth due to the large numbers of children living in these circumstances, which is unusual in this type of longitudinal study.

The longitudinal aspect of these data is a strength for a variety of reasons. Firstly it means that individual children can be followed between the two time points, the result of which is that we can see whether social, emotional and behavioural difficulties remain steady or change for each child, compared with cross-sectional data where one can only see overall variation in levels of difficulties. The longitudinal aspect can also help with establishing causation because it can help to determine that the predictive event happened before the outcome.

13.2 Limitations

There are, however, various limitations to the study. Firstly, the data would be greatly enhanced if we also had parent scores. Parent scores were not collected at this stage due to a lack of resources. This would give a representation of the child's difficulties both at school and at home. Using multiple informants has also been evidenced to give a better predictive value for diagnosis: Goodman found that teachers' scores alone predicted 59.8% of any psychiatric diagnosis, compared with 82.2% when teacher and parent scores were taken together (Goodman et al., 2004). On the other hand, an unpublished sub-study conducted using these data, which compared the preschool teacher scores with a sample of parent ratings of the same children found a substantial overlap in ratings (White, 2011). It is highly likely, however, that response rates from parents would be far lower and that they would contain an over-representation of more affluent and educated parents, as well as of children with fewer difficulties, as has been found in other studies such as the Bergen Child Study (Niclasen et al., 2012), which may bias the results.

As mentioned above, there may be rater effects from teachers being used to different levels of behaviours as ‘normal’ and thus giving lower or higher scores to some children depending on the levels of difficulties among their peers. It could also be that teachers’ mental health and general morale has a bearing on how they view children in their class’ behaviour, in a similar way to the impact of parental mental health on their ratings of their children’s behaviour (Najman et al., 2001). Ideally, parent scores would be collected as well, as suggested above, in order that another opinion on the child’s difficulties could be examined. In addition, further measures of teacher’s mental health and burnout, such as the Maslach Burnout Inventory, may add to the explanatory potential of any future research (Maslach, Jackson, & Leiter, 1986).

Collecting the SDQs through routine monitoring data and linking these to demographic data has many advantages, as described above. However, there are also disadvantages: mainly that the demographic data to which I was able to gain access were severely restricted by what is of interest routinely to schools and education services. This meant that I did not have access to items such as household income data, parenting behaviours or to information such as school climate and pupil-teacher relationship quality, all of which may be available to survey researchers. Given the previous evidence around school effects, it would have been particularly interesting to have class level information, which appears to show a stronger association with educational outcomes in the current literature than school level variables. Indeed, the strength of the individual associations with outcomes, compared with a lack of school effects, may mask class level effects in the middle. Information around the school climate would also have been useful. The research tried to address this to some extent using inspectorate reports to explore differences within the outliers, however school inspections are not conducted very regularly, and so some reports had been conducted several years before the data collection took place. School policies and climate can change rapidly, particularly with the introduction of a new Headteacher, for example, and so data may not be reflective of the current school climate.

Although the study held data on a large number of schools, numbers of pupils within schools were small in many cases. Whilst this is not a problem statistically as the models will account for this, it does mean that the confidence intervals for many schools are very wide. Although this was the first year of data linkage, the data collection on this project is carried out annually. Once these data are combined with future cohorts, it may be that the confidence intervals around the school residuals reduce and that statistically significant differences between schools are seen. Due to time constraints, this was unable to be done within the PhD period. It is anticipated that this work will be carried out shortly after submission and will be published in due course.

In addition, it is unfortunate that within the time constraints of the PhD, a third time point of data collection is not available. This would allow an examination of trajectories of social, emotional and behavioural difficulties and to explore longer term effects of adversity in early childhood alongside the effects of schools. Furthermore, these later SDQs, collected at age 10-11, are completed by the children themselves, giving a different angle to the research. This may even out the potential effects of teacher morale or mental health, for example. Data from 10-11 year old children for this cohort will be available in Summer 2016.

13.3 Implications of the results

The current study set out to determine the impact of schools on the social, emotional and behavioural development of children in their first three years of school. The results of this investigation have shown that schools appear to have some impact on the development of social, emotional and behavioural difficulties between preschool and the third year of school, however, they were not found to be significantly associated with having abnormal social, emotional and behavioural difficulties in the third year of school. More research needs to be carried out with larger numbers of children to explore whether schools have truly different influences on children’s social, emotional and behavioural difficulties. It may also be beneficial to explore outliers using qualitative methods, to examine the mechanisms behind some schools doing better than others, which may help to improve practices in other schools.

The research has identified a substantial body of children through the SDQ who may be at risk of further mental health problems. Given the evidence of the continuity and impact of such problems, it would be irresponsible at a local level to collect this information and not do anything with it. At present there is no standard intervention pathway for children identified as being at risk at preschool or P3, though children may access Child and Adolescent Mental Health Services or may have access to whole school initiatives such as Nurture Groups within some schools. Following a new 30 month universal Health Visitor contact in Scotland, children who score highly on the Conduct Problems scale are directed towards a parenting program – Triple P – which has been rolled out in Glasgow City. One version of Triple P (Discussion Groups) has been implemented in some Glasgow City nurseries, and it may be that parents of children with difficulties are directed towards that. However, this is not a uniform initiative and this directive currently varies across preschool establishments. At present, preschool SDQs are passed to the Primary school which the child is due to attend, so that their new teachers are aware of difficulties in advance and can think about catering for children with additional support needs. In some schools in Glasgow City initiatives to help support children with social, emotional and behavioural difficulties are already happening in the form of Nurture Groups and Place2Be (Gerrard, 2006; Lee, Tiley, & White, 2009). However, these are not available in all schools. When outliers were explored, there was one school with a higher proportion of abnormal scores which did not have a Nurture program. Although the literature cautions against identifying particular schools because of the risk of errors in the models, it may be that Education Services wish to consider putting such additional resources in these schools as a priority as the program rolls out across Glasgow.

This lack of a pathway for treatment or intervention in the sample violates one of the fundamental assumptions of using the SDQ in preschool as a ‘screening’ tool. It could be argued that the children identified through the SDQ measure should then undergo a further diagnostic assessment. However, the capacity of the educational psychology team and Children and Adolescent Mental Health services in Glasgow city are already stretched, and this would create a substantial additional pressure on these services. There is also some debate about whose responsibility this is – does it fall under health and thus become NHSGGC’s responsibility, or is it an education issue, and so up to Education Services to put more resource into schools? If early adversity such as Looked After status in the early years has such an impact, should social work services be intervening and helping these families before they even get to school? Or, given the impact of deprivation, perhaps the Scottish Government or UK Government have some responsibility for the redistribution of wealth, providing good quality affordable housing for families and providing high quality childcare for an appropriate amount of time for children, both to improve their outcomes in the early years and to enable parents to go out to work to both improve their financial position and improve parental mental health. The reality is that this area is incredibly complicated and there is unlikely to be a quick fix from any one service provider. Rather, it is likely to take a range of types of support from a variety of services in order to improve children's outcomes in Glasgow City.

Thinking beyond the practicalities of local and national policy approaches, the results raise a bigger question about whether children *should* be screened for social, emotional and behavioural problems in early childhood (Wilson & Jungner, 1968)? The review of literature in the field of child mental health indicated that social, emotional and behavioural difficulties are a major public health problem across the developed world, not only causing difficulties with education and relationships in childhood, but having serious implications for future mental health and other outcomes, such as educational qualifications, criminal behaviour, relationships and employment, throughout the lifecourse. The impact to the individual and the costs to society are such that, if an effective intervention (or multiple interventions) were to be available and cost effective, then screening for such problems in childhood could make a substantial difference. There are various things which need to be considered, however, when introducing a screening program.

Sayal and colleagues have produced a body of work on the consequences of labelling children to their teachers. In the study, children were screened for parent-rated hyperactivity/inattention and results fed to their teachers: some results were given on their own and some were given with an intervention comprising a book about ADHD for teachers. These were compared with teachers who did not receive any results. Neither labelling children nor labelling with the intervention was related to any improved outcomes. In fact, labelling alone was evidenced to increase the likelihood of a child having a hyperactivity/inattention score five years later (odds ratio 2.11), compared with children for whom no information was given to teachers. The authors suggest that this may be akin to the evidence around neurodevelopmental labelling, whereby adults have lower expectations of the child and children experience reduced access to opportunities, perpetuating the situation over time (Sayal et al., 2010). This would suggest that screening children and then just giving teachers results without an evidence-based intervention may actually make the situation worse for these children. Furthermore, being labelled as hyperactive, for example, may cause distress to the child and/or their parent, who may not have previously thought of themselves as having a 'disorder' (and indeed, they may not). It has been suggested that screening frequently leads to mislabelling and false diagnosis (Sayal et al., 2010).

Looking at individual ratings, teachers were found to be better at predicting externalising symptoms, whereas parents were better at predicting internalising symptoms. It may be therefore that this study misses some internalising symptoms in children due to only have teacher-rated SDQs. Goodman found that the predictive value of the SDQ depended on the diagnosis being explored. Identification was found to be good (with a sensitivity of 70-90%) for conduct-oppositional disorders, hyperactivity disorders, depression, pervasive developmental disorders and some anxiety disorders. The SDQ was less good at detecting specific phobias, panic disorder/agoraphobia, eating disorders and separation anxiety (only having a sensitivity of 30-50%) (Goodman et al., 2000). It is worth noting that the children in Goodman's study are older than the preschool children examined in the current study, which may have an impact for the predictive value.

One way to get around the issues surrounding labelling and identifying individuals, is to take a community intervention approach, as has been seen in Hertzman's work in Canada and latterly in Australia. The Early Development Index (EDI) assesses physical health and wellbeing, emotional maturity, language and cognition, communication skills and general knowledge but, rather than use these to give an individual diagnoses, data are used for the assessment of entire classrooms, schools and communities (Guhn et al., 2007). Data are then used to support interventions at these wider levels. For example, in Australia, community data have been used to support grant applications for services such as playgroups and reading programs, and to assist in planning processes for services and programs through identifying gaps in provision (Sayers et al., 2007).

In addition, there are a range of 'whole-school' programs for improving children's social, emotional and behavioural competencies, which focus on changing the school ethos and environment. Schools are a logical setting for interventions attempting to address social, emotional and behavioural development, allowing the targeting of whole schools containing high levels of students at risk of developing difficulties, without stigmatising individual students (Hawkins et al., 2007). Studies to date, however, have mostly focused on preventing substance misuse, have been set in secondary schools and have demonstrated mixed results (Botvin et al., 2000; Griffin, Botvin, Nichols, & Doyle, 2003; Maggs & Schulenberg, 1998; Bond et al., 2004). The Australian Gatehouse Project, for example, which tried to create an environment to promote positive wellbeing through building security and trust, increasing skills and opportunities for good communication and building a sense of positive regard through participation in the school, reported benefits in reduced alcohol and tobacco use, but no benefits in relation to depression, social and school relationships (Bond et al., 2004). In contrast, the Seattle Social Development project, once of the few interventions targeting elementary school children, focused on improving teachers' classroom management, the introduction of a self-control and social competencies education program within the school and school-based workshops for parents, and has shown positive results. The results from this project indicated that boys in the intervention schools were less aggressive and had fewer externalising problems at the end of the second year of school, compared with peers in control schools, however this finding was only valid for European American boys and not for African American boys. European American girls were found to be less self-destructive at the same time point, but again this did not hold true for African American girls. Further follow-up at the end of the sixth year of school found that boys in the intervention schools demonstrated significantly better social skills and had fewer anti-social friends compared with controls. Follow-up of the cohort at age 21 suggested that benefits had lasted into adulthood, with participants from intervention schools showing fewer mental health problems, better functioning in school and work and fewer risky sexual practices (Hawkins et al., 2007). It may be therefore, that primary/elementary school interventions, particularly those targeting schools with high proportions of children with characteristics which make them at risk of developing social, emotional and behavioural difficulties, could be beneficial in reducing adverse outcomes, however, more research needs to be conducted in order to explore if whole school interventions produce positive impacts for children of this age.

Another issue raised, is what the continuity of problems in early education actually is? This study has shown fairly low continuity, with the highest level of stability in the Hyperactivity domain, where two-fifths of children remained in the abnormal group. This raises ethical issues about whether we should 'screen' children at this age. It may be that some of the issues being picked up are purely developmental: for example, difficulties with prosocial behaviours start off at a relatively high level, but decrease throughout childhood, suggesting that this may be part of normal development, rather than a true disorder. There is also work that suggests that children may be more prone to mental health difficulties at different stages as part of normative development (Bongers et al., 2003). It could be seen as being unethical to screen, label and refer children to services when these difficulties may naturally dissipate with time, as this process could do more harm than good. In this case, normal developmental variation may be wrongly interpreted as psychiatric symptoms. Furthermore, it is not clear from the current evidence whether depression and anxiety are two separate conditions in early childhood, with some evidence suggesting that the two do not separate until adolescence (Wichstrom et al., 2012).

In contrast, other research has argued that assessing children at preschool may be too late for implementing preventative interventions to stop children having lifelong consequences of such difficulties. The most extreme evidence comes from experiments in Romania, where children experiencing severe neglect in institutions were removed and placed in high quality foster care placements at various ages. The results suggest that the earlier children are placed in a supportive and warm environment (particularly if this is done before the age of 2), the greater the gains in terms of both IQ and social, emotional and behavioural functioning at age 8 (Fox, Nelson III, & Zeanah Jr, 2013). Certainly interventions such as the Family Nurse Partnership, which starts before the child is born and runs until their second birthday and is based in attachment theory, have displayed substantial results when the child is 19, in terms of reduced criminal behaviour, fewer early pregnancies and less expenditure on healthcare, in comparison with a control group (Eckenrode, Campa, & Luckey, 2010).

However, there are also reasons why screening *should* be considered for childhood mental health difficulties at school entry. The main one of these is the evidence around the lack of children who receive help for their difficulties. Wichstrom found that at age 4 just 10% of children who had difficulties received help for them, rising to 25% at age 6. The author suggests that parents of preschool children experiencing such difficulties may be more reluctant to seek help as they may think their child will 'grow out of it', they may be more concerned with other difficulties the child may have e.g. speech and language problems, or they may be more likely to rely on informal sources of help and advice, such as their own parents, rather than approaching medical professionals (Wichstrom et al., 2012). In addition, our research has shown that difficulties tend to cluster in families living in the most deprived areas. Findings from previous research indicate that the most vulnerable mothers are the least likely to seek help or advice from professionals, and are more likely to think that they would be seen as a 'bad parent' if they asked for help or advice, particularly when it comes to areas such as their child's behaviour (Mabelis & Marryat, 2011). Tudor Hart's inverse Care Law proposes that people who most need treatment are those least likely to receive it (Tudor Hart, 1971). This stigma is a double-edged sword in this field, as there is often felt by parents to be a stigma attached to both mental health issues and to receiving parenting support, which may exacerbate the situation if neither type of support is received. For this reason, having a universal screen for social, emotional and behavioural difficulties may result in increases in support being received by children (and possibly parents) who need it. Goodman suggests that population SDQ-based screening for mental health problems could potentially double or treble the proportions of children receiving help (Goodman et al., 2000). The universal aspect of the screen may also reduce the stigma of accessing such help and thus has the potential to reduce social inequalities in child mental health problems.

The current study identified a range of factors which contributed to worsening or poor developmental outcomes by age 7-8, most of which were related to having lived in adverse circumstances in the first few years of life. There is some evidence that good attachment and effective parenting may limit the impact of living in disadvantaged circumstances (Ashford, Smit, Van Lier, Cuijpers, & Koot, 2008; Bayer et al., 2006; Blair et al., 2011). Barlow reviewed parenting programs which aimed to improve social and emotional outcomes in the 0-3 age group and found some modest success on improving social and emotional symptoms (Barlow & Parsons, 2003), whilst a further review found some positive results for the impact of parenting programs on behavioural problems in 3-10 year olds (Barlow & Stewart-Brown, 2000). More recently, positive results of the Incredible Years program in Wales have been reported with regards to reducing the symptoms of ADHD in preschool children (Hutchings et al., 2007).

It may be that we need to learn more about why some children are more resilient than others before we can determine an effective intervention. Differential Susceptibility theory posits that some children are more sensitive to their environment than others. Whilst one group of children will perform well in almost any environment, others will do very poorly if exposed to sub-optimum conditions, such as poor parenting, exposure to violence etc., or in contrast, may do better than the unaffected group if exposed to optimal conditions (Belsky & Pluess, 2009). It has been proposed that children fall into one of two groups: ‘orchids’ or ‘dandelions’. Orchids need to have certain conditions to flourish, such as the correct amount of sunlight and water, otherwise they will fail, whereas dandelions can be planted anywhere and will almost always do well (Kennedy, 2013). If we can identify which children are more sensitive to environmental influences (i.e. the ‘orchids’) then we may be able to enhance their environment to ensure that they flourish, rather than spending money across the population, which may have no effect on some children.

The current study set out to explore if there were any school effects, in addition to the individual contributing factors, on children’s development in the first few years of school. Overall, the research found little significant differences between schools. Although it may be that this is a Type two error due to the wide confidence intervals around the school results, it could also be that all schools are ‘good enough’ (Rutter, 1982), though it could also be due to the small numbers of students within schools, which made the confidence intervals very wide in some places. The two variables at a school level which did appear to be associated with sub-optimal development were being in a school with a high level of children eligible for Free School Meals and being in a small school. The Free School Meals variable is likely to be a proxy for individual household income, though without this additional information we cannot say for sure that being surrounded by other children from deprived backgrounds does not have an additional effect over and above the child's own economic background. However, the 'small schools' phenomenon is an interesting one, which requires further exploration. It is expected that this is an urban feature, which may also be found in other cities, such as Edinburgh, where equally, the largest schools are the most popular ones, normally in more affluent areas. Whether the parents of children remaining in these schools are systematically different, or pupil or teacher morale is lower, we can but speculate. More research into this would be interesting and may help education authorities in informing their decisions about resourcing such schools and attracting parents to send their children to smaller schools, with the hope of improving them, for example, holding open days at the Local Authority schools, to give parents a chance to look around schools and see what they have to offer, which may break down some of the stigma around particular schools, much of which can be based on out-dated reputations. In contrast, it may be decided that a policy of moving children from very small schools into larger schools may be the way forward – a somewhat controversial idea. Qualitative work exploring the features of the smaller schools may help inform decisions in this area.

The current study also raises questions about the use of cut-offs in the assessment of child social, emotional and behavioural difficulties. In this study, borderline cases have been grouped with children in the normal range, due to the poorer predictive value of this score (Goodman et al., 2000). Whilst this makes sense from a public health perspective, from an education point of view, we may be missing differences between schools. For example, the Glasgow Effect data appeared to suggest that Glasgow had more 'sub-threshold' cases of Conduct Problems compared with the rest of Scotland. Having a substantial group of children within a classroom setting who have difficulties with conduct or with hyperactivity, for example, even though they may not meet the clinical cut-off, may still have a major impact on the teacher's management of the classroom and the experience of other children within it. It may be therefore, that future studies should examine differences in borderline scores as well as abnormal scores, and the factors that lie behind these. The addition of class-level data would also benefit future studies in this respect, so that the levels of difficulties within a classroom and this impact of this could be explored.

The current research has a number of important implications for future practice. The results agree with previous research, that social, emotional and behavioural difficulties are a widespread problem from early in childhood. The findings suggest that academics, policy-makers and health professionals should investigate the utility of a screening test for early mental health difficulties. Any screening test would be futile, however, if no practical and cost-effective intervention is available to improve long-term outcomes for children experiencing such difficulties. Further independent research into appropriate and sustainable interventions needs to be conducted. Furthermore, the results indicated a range of factors which contribute to poorer development by age eight. It may be that school-level and/or community-level services and interventions could help to mitigate the impact of some of these factors.

14 Conclusion

This study set out to determine the prevalence of social, emotional and behavioural difficulties for Glaswegian children at school entry and the pathways that these take towards Primary 3; to investigate whether a 'Glasgow Effect' exists in reference to such difficulties; and to analyse whether school-level factors and individual-level factors predicted which children had sub-optimal development at age 7-8.

Results from the current study indicated that children in Glasgow City had similar levels of difficulties, on the whole, to children in the rest of the UK. The primary difference between Glasgow City and other areas was that children in Glasgow City had slightly elevated levels of hyperactivity and inattention problems by the time they reached Primary 3 (age 7-8). Neither did there appear to be a significant difference between parent-rated SDQ scores at age four between Greater Glasgow and Clyde (GGC) and other areas in Scotland, once factors such as deprivation were controlled for. This may, however, be due to issues with the sample, rather than a lack of an effect per se. What this piece of work did highlight was the substantial demographic discrepancy between GGC and the rest of Scotland, even though this sample took in Glasgow City's comparatively wealthy suburbs.

One of the most significant findings to emerge from this study was that there were differences between schools, in relation to both abnormal SDQ scores at age 7-8 and 'added-value' scores between preschool and P3, and that, in terms of children's development over the three years, this difference was only partially accounted for by the difference in intake. Pupils who were male, white, had been 'Looked After' by preschool, and who were in a smaller school, were more likely to have experienced overall maladaptive development in the first three years of school. The models showing predictions for having an abnormal score at age 7-8 were similar, though not identical. The strongest predictor of having an abnormal score at age 7-8, was having an abnormal score at preschool. Other predictors were being male, having Looked After status by preschool and being in a school with high levels of poverty among its students. In this model, schools were not significantly associated with scores.

This research adds to a growing body of literature around what factors make a difference to children's social, emotional and behavioural development early to middle childhood. The results of this research support the idea that screening for early mental health problems should be investigated in the preschool and early school period. Furthermore, factors identified as contributing to maladaptive development, may be able to be targeted by interventions to improve, for example, attachment or parenting, which may in turn moderate some of the effects of such disadvantage in childhood. The differences in school intakes may make them an ideal arena to pursue interventions at a school-level, without stigmatising individuals, as was the case in the Seattle Social Development project. Taking these results together with previous evidence in the field, it is clear, however, that, in the long-term, helping children to overcome or manage such difficulties, may have a substantial positive effect, in terms of enabling these children to become responsible and effective citizens in the future.

This research has thrown up many questions in need of further investigation. Further research is required to look at whether these difficulties persist through the rest of primary school and beyond, in order to assess whether schools and other factors have a prolonged effect. In addition, the current research study would benefit from having more data, in order to more fully establish whether there are more substantial school effects. Additional data collection, both in terms of the SDQ by multiple raters, which would improve the accuracy of the results and in terms of additional contextual information, such as class size and school climate would add to the models. Finally, qualitative research exploring more detail behind some of the findings, such as the reasons why smaller schools appear to be detrimental to children's results, would also be worthwhile conducting, in order that the mechanisms behind the predictors may be examined.

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16 Appendices

Appendix A Supplementary Tables

Supplementary Table 1 Baseline Characteristics of Children

		Pre-school	P3
Sex	Male	1648 (53.1%)	-
	Female	1456 (46.9%)	-
Looked After status	Looked after	50 (2.7%)	139 (6.5%)
	Non-Looked after	1798 (97.3%)	1992 (93.5%)
Ethnicity	White	1654 (79.8%)	-
	Non-white	418 (20.2%)	-
SIMD - Glasgow Quintiles	1 – Most deprived	479 (27.5%)	483 (27%)
	2	414 (23.8%)	435 (24.4%)
	3	383 (22%)	376 (21.1%)
	4	291 (16.7%)	310 (17.4%)
	5 – Least Deprived	172 (9.9%)	182 (10.2%)
Base		2131	2131

Supplementary Table 2 Pearson Correlations between SDQ scores (continuous) and socio-demographic variables

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.
1. Total Difficulties	1														
2. Conduct	0.72**	1													
3. Hyperactivity	0.79**	0.48**	1												
4. Emotional	0.63**	0.20**	0.24**	1											
5. Peer problems	0.62**	0.26**	0.23**	0.37**	1										
6. Pro-social	-0.36**	-0.34**	-0.30**	-0.13**	-0.24**	1									
7. Sex of child	-0.12**	-0.08**	-0.15**	-0.02	-0.06**	0.14**	1								
8. Ethnicity (White)	0.08**	0.01	0.04*	0.05**	0.13**	-0.02	-0.01	1							
9.Mother education (No qualifications)	-0.23**	-0.18**	-0.17**	-0.16**	-0.13**	0.06**	0.01	-0.07**	1						
10. Household income (Lowest)	-0.25**	-0.20**	-0.17**	-0.16**	-0.17**	0.06**	0.03*	-0.11**	0.46**	1					
11. Mother's employment	0.14**	0.11**	0.10**	0.10**	0.09**	-0.07**	-0.02	0.10**	-0.30**	-0.38**	1				
12. Household NSSEC (Managerial and Professional)	0.23**	0.19**	0.17**	0.15**	0.15**	-0.03*	-0.03	0.02	-0.52**	-0.58**	0.32**	1			
13. Age of mother at birth of child (Under 25)	-0.19**	-0.14**	-0.17**	-0.11**	-0.06**	-0.08**	0.03	-0.01	0.03	0.21**	-0.34**	-0.16**	1		
14. Urban/rural classification (Large urban)	-0.05**	-0.05**	-0.05**	-0.03	-0.02	-0.01	-0.01	-0.11**	0.10**	0.04*	0.01	-0.07*	0.07**	1	
15. SIMD (2006) (Least Deprived)	0.21**	0.17**	0.16**	0.13**	0.14**	-0.03	0.00	0.05**	-0.37**	-0.46 **	0.18**	0.43**	-0.32**	-0.20**	1
16. Health board (GGC)	-0.00	0.01	-0.01	0.01	-0.02	0.01	0.01	-0.17**	0.05*	0.01	-0.00	0.00	0.01	0.34**	-0.09**

Supplementary Table 3 Spearman Correlations between banded SDQ scores (normal vs. abnormal) and socio-demographic variables

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.
1. Total Difficulties	1														
2. Conduct	0.45**	1													
3. Hyperactivity	0.41**	0.29**	1												
4. Emotional	0.35**	0.14**	0.10**	1											
5. Peer problems	0.42**	0.15**	0.10**	0.17**	1										
6. Pro-social	0.18**	0.14**	0.20**	0.06**	0.16**	1									
7. Sex of child	-0.07**	-0.04**	-0.09**	0.01	-0.04**	-0.05**	1								
8. Ethnicity (White)	0.08**	0.02	0.04**	0.02	0.07**	0.06**	-0.01	1							
9.Mother education (No qualifications)	-0.13**	-0.13**	-0.11**	-0.06**	-0.03	-0.05**	0.01	-0.05**	1						
10. Household income (Lowest)	-0.16**	-0.15**	-0.11**	-0.07**	-0.08**	-0.06**	0.03*	-0.12**	0.50**	1					
11. Mother's employment	0.09**	0.09**	0.08**	0.05**	0.05**	0.05**	-0.02	0.10**	-0.28**	-0.40**	1				
12. Household NSSEC (Managerial and Professional)	0.15**	0.15**	0.10**	0.07**	0.06**	0.05**	-0.04*	0.04**	-0.55**	-0.60**	0.29**	1			
13. Age of mother at birth of child (Under 25)	-0.09**	-0.10**	-0.12**	-0.05**	-0.02	-0.03*	0.03	-0.02	0.26**	0.34**	-0.15**	-0.38**	1		
14. Urban/rural classification (Large urban)	-0.02	-0.02	-0.04**	-0.01	-0.00	-0.04*	0.00	-0.14**	0.06**	0.02	0.00	-0.04**	0.05**	1	
15. SIMD (2006) (Least Deprived)	0.13**	0.14**	0.12**	0.04**	0.05**	0.04**	0.00	0.06**	-0.38**	-0.46**	0.16**	0.44**	-0.34**	-0.16**	1
16. Health board (GGC)	-0.08	0.01	-0.03*	0.01	-0.02	0.00	-0.00	-0.16**	0.02	-0.00	0.01	0.00	0.01	0.39**	-0.08**

Supplementary Table 4 Means for SDQ subscales and Total Difficulties for GUS GGC, GUS Other Health Boards and UK Norms

	Greater Glasgow and Clyde – Mean (SD)	Other Health Boards - Mean (SD)	UK norms (5-10 year olds)
Emotional symptoms	1.2 (1.4)	1.2 (1.4)	1.9 (2.0)
Conduct problems	2.0 (1.5)	2.0 (1.4)	1.6 (1.7)
Hyperactivity/Inattention	3.7 (2.3)	3.7 (2.2)	3.6 (2.7)
Peer Problems	1.2 (1.5)	1.2 (1.4)	1.4 (1.7)
Total Difficulties	8.0 (4.7)	8.0 (4.5)	8.6 (5.7)
Pro-social	7.8 (1.7)	7.9 (1.8)	8.6 (1.6)
Bases	919 – 925	3016 – 3044	5855

Supplementary Table 5 Linear regression model of correlations with higher difficulties scores on Total Difficulties and each sub-scale

	Total Difficulties	Emotional	Hyperactivity	Conduct	Peer Relations
Health Board	NS	NS	NS	*	NS
Glasgow	-0.37	-0.07	-0.04	-0.14	-0.05
Other	-	-	-	-	
Multiple Deprivation (SIMD)	**	NS	*	**	**
5 - Least deprived	-1.00		-0.29	-0.31	-0.33
4	-1.15		-0.42	0.31	-0.30
3	-0.68		-0.16	-0.15	-0.25
2	-0.50		-0.13	-0.18	-0.17
1 - Most Deprived	-		-	-	-
Ethnicity	*	NS	NS	NS	**
White	-1.26				**-0.81**
Non-White	-				-
Mother's Education	**	**	**		NS
No Qualifications	1.59	0.42	**0.56**	**0.43**	
Other	1.84	0.98	**0.48**	**0.52**	
Lower Standard Grade or Equivalent	1.70	0.48	**0.76**	**0.32**	
Higher Standard Grades or Equivalent	0.93	0.17	**0.54**	**0.25**	
Higher Grades or Equivalent	0.01	-0.01	**0.14**	**-0.04**	
Degree or higher	-	-	-	-	
Equivalised Income	**	**	*		**
Bottom Quintile (<£11, 875)	1.48	0.39	**0.43**	**0.42**	**0.46**
2nd Quintile	0.88	0.27	**0.19**	**0.22**	**0.39**
3rd Quintile	0.44	0.05	**0.17**	**0.07**	**0.18**
4th Quintile	0.19	-0.18	**0.05**	**0.08**	**0.08**
Top Quintile (>=£37,500)	-	-	-	-	-
Household employment status	NS	NS	NS	NS	NS
1+ Parent Work Full-time					
1+ Parent Work Part-time					

No work					
	Total Difficulties	**Emotional**	**Hyperactivity**	**Conduct**	**Peer Relations**
Household Socio-economic classification (NS-SEC)	NS	NS	NS	NS	NS
Managerial and Professional					
Intermediate					
Small employers and own accounts workers					
Lower supervisory and Technical					
Semi-routine and routine					
Never worked					
Child Sex	**	NS	**		**
Male	1.05		**0.63**	**0.22**	**0.16**
Female	-		**-**	**-**	**-**
Age of Mother at Birth of child	**	NS	**		NS
20 years or under	1.88		**1.07**	0.46	
21 to 30 years	0.93		**0.73**	0.18	
31 to 40 years	0.52		**0.50**	0.15	
Over 40 years	-		**-**	-	
Family Status	NS	NS	NS	NS	NS
Couple Family					
Lone Parent					
R^2 (Nagelkerke)	0.12	0.04	0.08	0.07	0.05
Base	3695	3769	3740	3746	

Supplementary Table 6 Predictors of Abnormal Scores on the SDQ Total Difficulties Scale and subscales by child, family and area characteristics

	Total Difficulties	Emotional	Hyperactivity	Conduct	Peer Relations
Health Board	NS	NS	NS	NS	NS
Glasgow	-0.10	-0.13	0.15	-0.24	0.17
Other	-	-	-	-	-
Multiple Deprivation (SIMD)	NS	NS	**	**	NS
5 – Least deprived			-0.51	-0.68	
4			-0.54	-0.60	
3			-0.27	-0.31	
2			-0.18	-0.25	
1 – Most Deprived			-	-	
Ethnicity	*	NS	NS	NS	*
White	-0.70				-0.97
Non-White	-				-
Mother's Education	**	**	**	NS	NS
No Qualifications	0.91	1.15	0.31		
Other	0.85	2.62	0.38		
Lower Standard Grade or Equivalent	0.80	0.26	0.56		
Higher Standard Grades or Equivalent	0.48	0.87	0.47		
Higher Grades or Equivalent	-0.05	-0.21	0.01		
Degree or higher	-	-	-		
Equivalised Income	**	NS	NS	**	**
Bottom Quintile (<£11, 875)	1.64			0.94	1.02
2nd Quintile	1.16			0.44	0.97
3rd Quintile	0.51			0.24	-0.05
4th Quintile	0.68			0.02	-0.07
Top Quintile (>=£37,500)	-			-	-
Household employment status	NS	NS	**	NS	NS
1+ Parent Work Full-time			-0.32		
1+ Parent Work Part-time			-0.46		

No work			-		
	Total Difficulties	**Emotional**	**Hyperactivity**	**Conduct**	**Peer Relations**
Household Socio-economic classification (NS-SEC)	NS	NS	NS	NS	NS
Managerial and Professional					
Intermediate					
Small employers and own accounts workers					
Lower supervisory and Technical					
Semi-routine and routine					
Never worked					
Child Sex	**	NS	*	**	*
Male	0.64		0.54	0.23	0.47
Female	-		-	-	-
Age of Mother at Birth of child	NS	NS	**	NS	NS
20 years or under			**1.37**		
21 to 30 years			**1.10**		
31 to 40 years			**0.76**		
Over 40 years			-		
Family Status	NS	NS	NS	NS	NS
Couple Family					
Lone Parent					
R^2 (Nagelkerke)	0.11	0.05	0.08	0.06	0.05
Base	3716	3739	3924	3776	3768

Supplementary Table 7 Linear regression model of correlations with higher difficulties scores on Total Difficulties and each sub-scale

	Total Difficulties	Emotional	Hyperactivity	Conduct	Peer Relations
Health Board	NS	NS	NS	*	NS
Glasgow	-0.37	-0.07	-0.04	-0.14	-0.05
Other	-	-	-	-	
Multiple Deprivation (SIMD)	**	NS	*	**	**
5 - Least deprived	-1.00		-0.29	-0.31	-0.33
4	-1.15		-0.42	0.31	-0.30
3	-0.68		-0.16	-0.15	-0.25
2	-0.50		-0.13	-0.18	-0.17
1 - Most Deprived	-		-	-	-
Ethnicity	*	NS	NS	NS	**
White	-1.26				**-0.81**
Non-White	-				-
Mother's Education	**	**	**		NS
No Qualifications	1.59	0.42	**0.56**	**0.43**	
Other	1.84	0.98	**0.48**	**0.52**	
Lower Standard Grade or Equivalent	1.70	0.48	**0.76**	**0.32**	
Higher Standard Grades or Equivalent	0.93	0.17	**0.54**	**0.25**	
Higher Grades or Equivalent	0.01	-0.01	**0.14**	**-0.04**	
Degree or higher	-	-	-	-	
Equivalised Income	**	**	*		**
Bottom Quintile (<£11, 875)	1.48	0.39	**0.43**	**0.42**	**0.46**
2nd Quintile	0.88	0.27	**0.19**	**0.22**	**0.39**
3rd Quintile	0.44	0.05	**0.17**	**0.07**	**0.18**
4th Quintile	0.19	-0.18	**0.05**	**0.08**	**0.08**
Top Quintile (>=£37,500)	-	-	-	-	-
Household employment status	NS	NS	NS	NS	NS
1+ Parent Work Full-time (16+ hours)					
1+ Parent Work Part-time (<16 hours)					

No work					
	Total Difficulties	**Emotional**	**Hyperactivity**	**Conduct**	**Peer Relations**
Household Socio-economic classification (NS-SEC)	NS	NS	NS	NS	NS
Managerial and Professional					
Intermediate					
Small employers and own accounts workers					
Lower supervisory and Technical					
Semi-routine and routine					
Never worked					
Child Sex	**	NS	**		**
Male	1.05		**0.63**	**0.22**	**0.16**
Female	-		-	-	-
Age of Mother at Birth of child	**	NS	**		NS
20 years or under	1.88		**1.07**	0.46	
21 to 30 years	0.93		**0.73**	0.18	
31 to 40 years	0.52		**0.50**	0.15	
Over 40 years	-		-	-	
Family Status	NS	NS	NS	NS	NS
Couple Family					
Lone Parent					
R^2 (Nagelkerke)	0.12	0.04	0.08	0.07	0.05
Base	3695	3769	3740	3746	

Supplementary Table 8 Predictors of Abnormal Scores on the SDQ Total Difficulties Scale and subscales by child, family and area characteristics

	Total Difficulties	Emotional	Hyperactivity	Conduct	Peer Relations
Health Board	NS	NS	NS	NS	NS
Glasgow	-0.10	-0.13	0.15	-0.24	0.17
Other	-	-	-	-	-
Multiple Deprivation (SIMD)	NS	NS	**	**	NS
5 – Least deprived			-0.51	-0.68	
4			-0.54	-0.60	
3			-0.27	-0.31	
2			-0.18	-0.25	
1 – Most Deprived			-	-	
Ethnicity	*	NS	NS	NS	*
White	-0.70				-0.97
Non-White	-				-
Mother's Education	**	**	**	NS	NS
No Qualifications	0.91	1.15	0.31		
Other	0.85	2.62	0.38		
Lower Standard Grade or Equivalent	0.80	0.26	0.56		
Higher Standard Grades or Equivalent	0.48	0.87	0.47		
Higher Grades or Equivalent	-0.05	-0.21	0.01		
Degree or higher	-	-	-		
Equivalised Income	**	NS	NS	**	**
Bottom Quintile (<£11, 875)	1.64			0.94	1.02
2nd Quintile	1.16			0.44	0.97
3rd Quintile	0.51			0.24	-0.05
4th Quintile	0.68			0.02	-0.07
Top Quintile (>=£37,500)	-			-	-
Household employment status	NS	NS	**	NS	NS
1+ Parent Work Full-time (16+ hours)			-0.32		
1+ Parent Work Part-time (<16 hours)			-0.46		
No work			-		

	Total Difficulties	**Emotional**	**Hyperactivity**	**Conduct**	**Peer Relations**
Household Socio-economic classification (NS-SEC)	NS	NS	NS	NS	NS
Managerial and Professional					
Intermediate					
Small employers and own accounts workers					
Lower supervisory and Technical					
Semi-routine and routine					
Never worked					
Child Sex	**	NS	*	**	*
Male	0.64		0.54	0.23	0.47
Female	-		-	-	-
Age of Mother at Birth of child	NS	NS	**	NS	NS
20 years or under			**1.37**		
21 to 30 years			**1.10**		
31 to 40 years			**0.76**		
Over 40 years			-		
Family Status	NS	NS	NS	NS	NS
Couple Family					
Lone Parent					
R^2 (Nagelkerke)	0.11	0.05	0.08	0.06	0.05
Base	3716	3739	3924	3776	3768

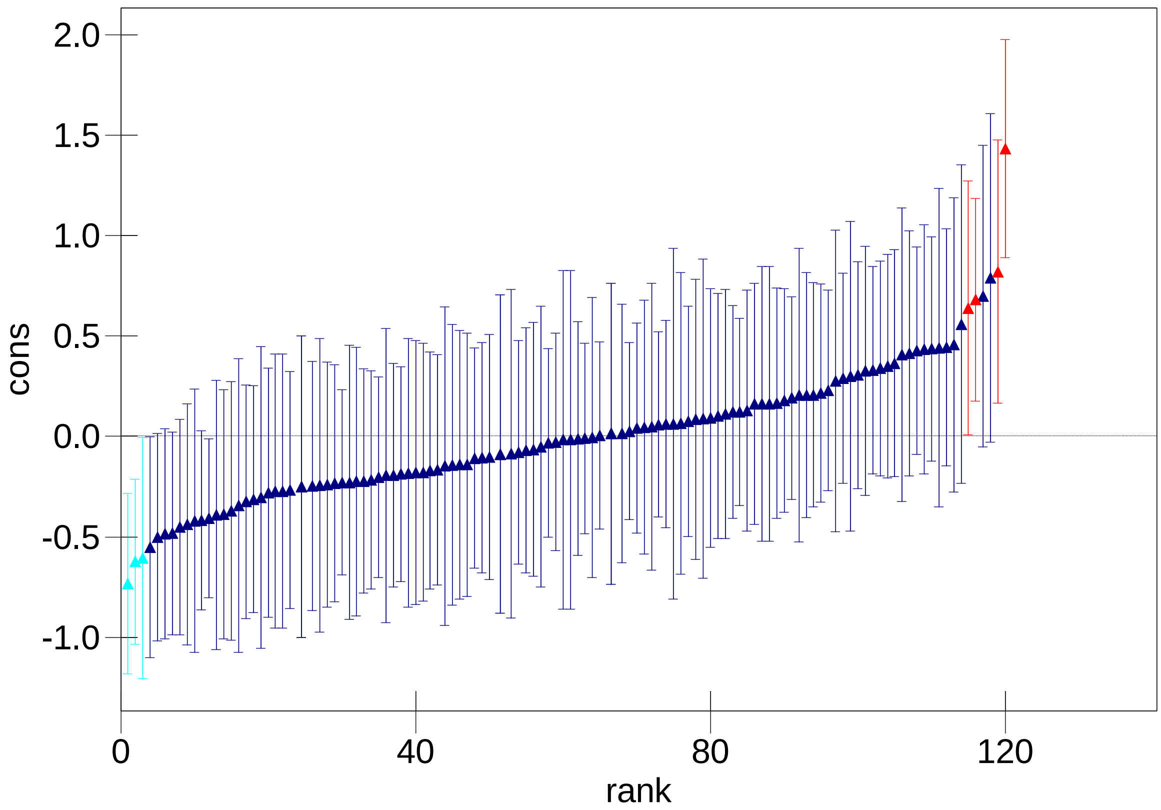
Appendix B Multilevel Models for SDQ Sub-domains

16.1 Conduct Problems

Table 20 MLwin Conduct Problems Change scores Null Single Level change model vs. Two-level change model

Parameter	Null (Single level)	Multi-level
β_0	0.090 (0.037)	0.125 (0.058)
u_{oj}		0.214 (0.051)
e_{ij}	2.987 (0.092)	2.779 (0.087)
Base	2128	2128
% variance between schools (VPC)	N/A	7%
Loglikelihood	8367.448	8310.157

Figure 44 Caterpillar plot of residuals from the unadjusted multilevel model for Conduct Problems Change Score



Base - 2128

Table 21 Unadjusted Linear Multilevel Models for Conduct Problems Change Scores with Level 1 (child) explanatory factors

	Unadjusted Coefficients - Fixed Effect β (S.E)	*Loglikelihood Ratio Statistic*	Unadjusted Coefficients - Random slope β (S.E)	*Loglikelihood Ratio Statistic*	*P value of random slope*
Sex of child		8310			
Female	0	3	0	30	0.056
Male	0.129 (0.074)		0.167 (0.084)*		
Ethnicity					
White UK	**0**	**254**	0	255	0.99
Non-White UK	**0.257 (0.098)****		0.264 (0.090)**		
Ever Looked After by Preschool					
Never Looked After	0	1111	**0**	**1123**	**0.019**
Ever Looked After	0.929 (0.245)**		**0.935 (0.381)****		
Home Area Deprivation at Preschool (GIMD Quintile)					
5 - Least Deprived	0	1516	Failed to converge		
4	0.202 (0.171)		-		
3	0.092 (0.164)		-		
2	0.124 (0.164)		-		
1 – Most Deprived	0.127 (0.164)		-		
Ever Looked after by P3					
Never Looked After	0	6		20	0.013
Ever Looked After	0.398 (0.161)**		0.386 (0.232)		
Area Deprivation at P3 (GIMD Quintile)					
1- Least Deprived	0	1359	Failed to converge		
2	0.031 (0.165)		-		
3	-0.100 (0.163)		-		
4	-0.058 (0.161)		-		
5 – Most Deprived	-0.026 (0.162)		-		

P<0.05=*; p<0.01**

Table 22 Unadjusted Multilevel Linear Conduct Problems change score models by Level 2 variables

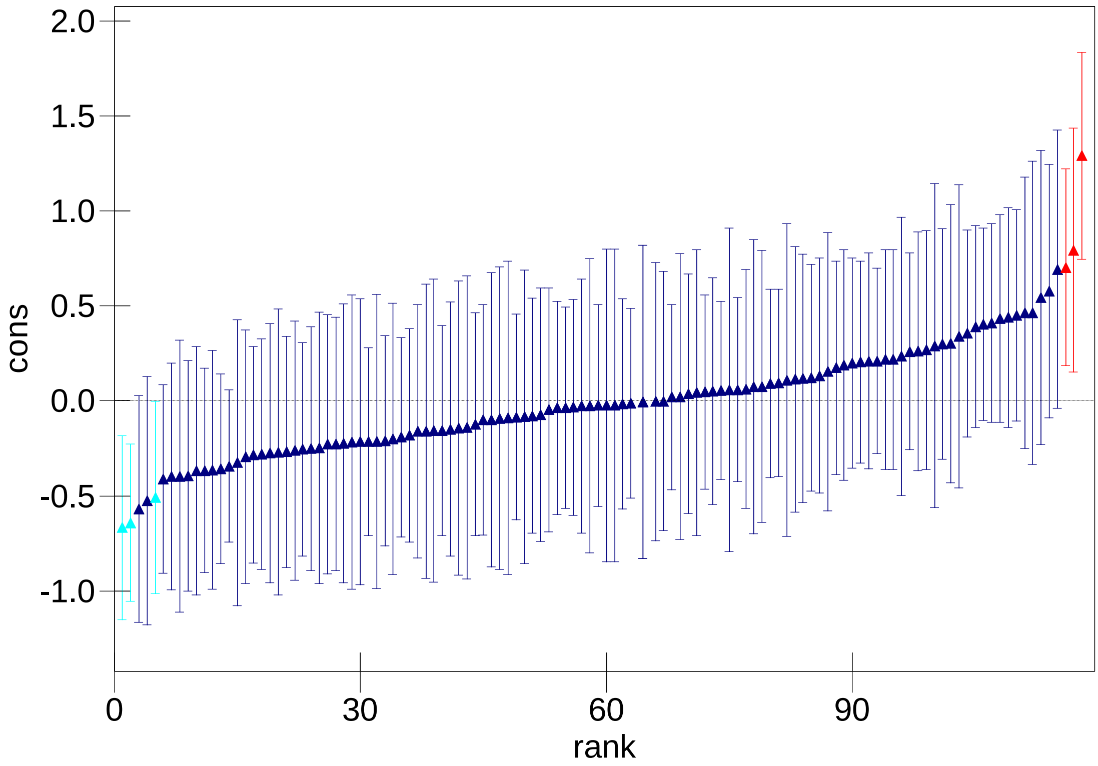
	Unadjusted Coefficients – fixed effects ß (S.E)	Loglikelihood ratio statistic
Constant		8310
% Free school meals		
(cont.)	0.011 (0.004)**	313
No. of Exclusions per 1000 pupils		
(cont.)	0.001 (0.002)	425
School size		
(cont.)	-0.002 (0.001)*	319
HMIe Report Score		
(cont.)	-0.001 (0.088)	1424
Attendance		
Above average	0	2960
Average	0.106 (0.271)	
Below average	0.187 (0.244)	
Well below average	-0.154 (0.375)	
Denomination		
Non-denominational	0	0
Catholic	-0.004 (0.119)	

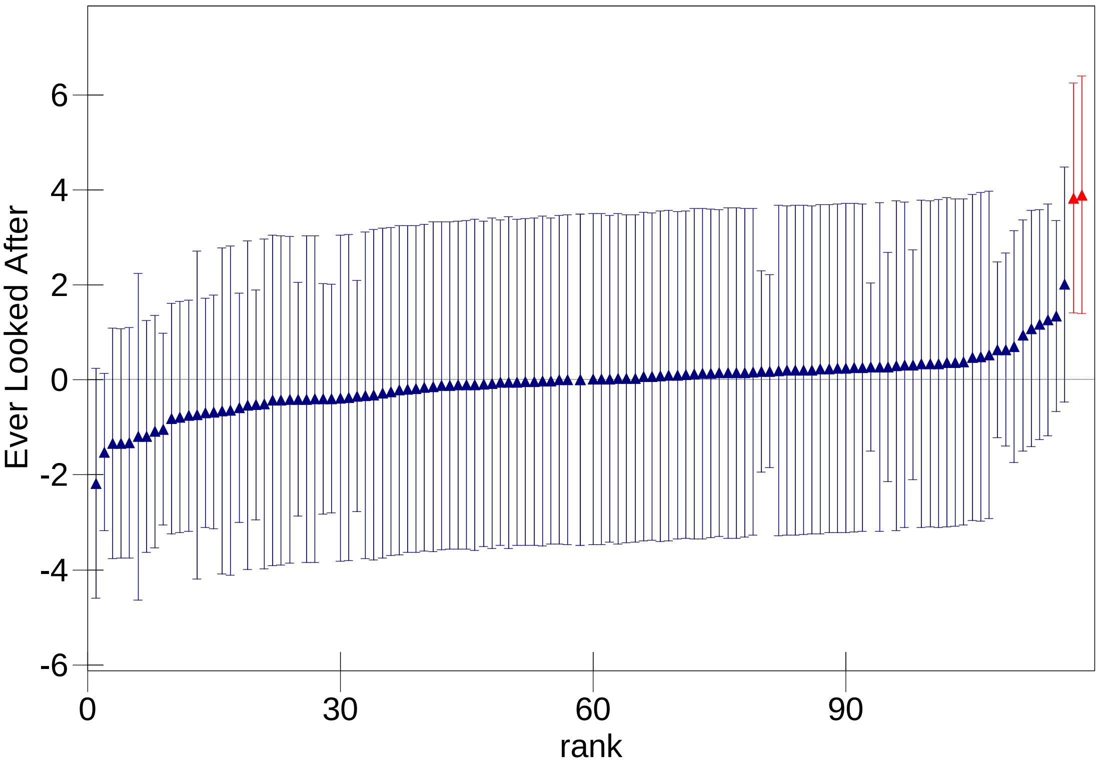
p<0.05=; p<0.01=***

Table 23 Adjusted Multilevel Linear Models for Conduct Problems change scores

	A - Null 2 level	B - Ethnicity (F.E);	C - Ethnicity (F.E); PS Looked After Status (R.S)	D - Ethnicity (F.E); PS Looked After Status (R.S); % FSMs (F.E) & School size (F.E)	E - Ethnicity (F.E); PS Looked After Status (R.S)
Constant	0.125 (0.058)*	-0.0.82 (0.090)	-0.093 (0.100)*	-0.102 (0.100)	-0.093 (0.100)*
Ethnicity					
White UK		0	0	0	0
Non-White UK		0.257 (0.098)**	0.269 (0.101)**	0.250 (0.103)**	0.269 (0.101)**
Ever Looked after by Preschool					
Never Looked After			0	0	0
Ever Looked After			0.958 (0.391)*	0.697 (0.338)*	0.958 (0.391)*
% Free school meals					
(cont.)				0.003 (0.005)	
School Size					
(cont.)				-0.001 (0.001)	0.000
P value of Random part					0.437
cons/cons			0.000	0.07	0.015
Looked After/cons			0.437	0.300	6944
Looked After / Looked After			0.015	0.07	118
Loglikelihood ratio	8310	8022	6944	6722	1790
No. of Schools	120	120	118	115	
No. of cases	2128	2069	1790	1732	

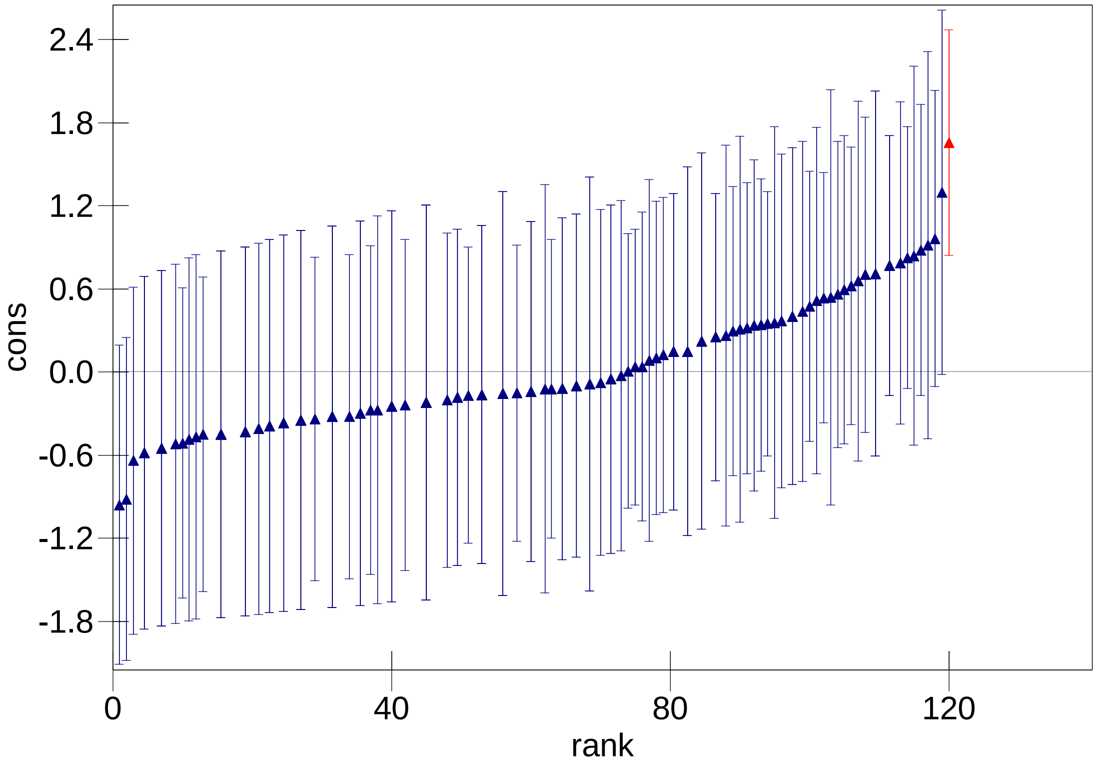
Figure 45 Residuals from final Multilevel linear Conduct Problems change score model (D), adjusted for Ethnicity and Looked After status at preschool(top: residuals for constant; bottom: residuals for Looked After status at preschool random slope)





Base – 1790

Figure 46 Unadjusted P3 Binary Conduct Problems Score residuals



Base 2030

Table 24 Unadjusted Single-level Binomial Conduct Problems Models with P-value and Wald Test statistic (MQL – 1)

	Unadjusted Coefficients - Fixed Effect β (S.E)	***Odds Ratio***	**Unadjusted Coefficients - Random slope β (S.E)**	***Odds Ratio***	***P value of random slope***
Constant	-2.495 (0.110)				
Sex of child					
Female	**0**		0		0.279
Male	**0.993 (0.185)****	**2.70**	1.010 (0.193)**	2.75	
Ethnicity					
White UK	0		0		0.042
Non-White UK	0.468 (0.245)	1.60	0.413 (0.238)	1.51	
Ever Looked After by Preschool					
Never Looked After	**0**		0		0.979
Ever Looked After	**1.385 (0.360)****	3.99	1.375 (0.366)**	3.96	
Home Area Deprivation at Preschool (GIMD)					
5 – Least Deprived	**0**		0		
4	**0.995(0.494)**	**2.70**	1.099 (0.501)	3.00	0.517
3	**0.776 (0.491)**	**2.17**	0.806 (0.500)	2.34	0.000
2	**0.831 (0.487)**	**2.30**	0.885 (0.494)	2.42	0.518
1- Most Deprived	**1.090 (0.479)***	**2.97**	1.192 (0.481)*	3.29	0.712
SDQ Conduct Problems at Preschool					
Normal	**0**		0		
Abnormal	**1.556 (0.237)****	4.74	1.569 (0.249)**	4.80	0.546
Ever Looked after by P3					
Never Looked After	0		0		0.825
Ever Looked After	1.062 (0.264)**	2.89	1.062 (0.264)**	2.89	
Area Deprivation at P3					
5 – Least Deprived	0		0		0
4	0.618 (0.441)	1.86	0.634 (0.405)	1.89	0.137
3	0.626 (0.434)	1.87	0.519 (0.355)	1.68	0.000

2	0.491 (0.434)	1.63	0.605 (0.361)	1.83	0.000
1- Most Deprived	0.799 (0.425)	2.22	0.773 (0.419)	2.17	0.997

p<0.05=; p<0.01=***

Table 25 Unadjusted Multilevel Binomial Conduct Problems change score models by Level 2 variables (MQL-1)

	Unadjusted Coefficients - fixed effects β (S.E)	**Odds Ratio**
Constant		
% Free school meals (centred around GM)		
(cont.)	**0.032 (0.007)****	**1.03**
No. of Exclusions per 1000 pupils		
(cont.)	**0.004 (0.002)***	**1.00**
School size		
(cont.)	**-0.004 (0.001)****	**1.00**
HMIe Report Score		
(cont.)	0.001 (0.168)	1.00
Attendance		
Above average	0	
Average	0.992 (0.583)	2.70
Below average	1.136 (0.543)*	3.11
Well below average	0.920 (0.738)	2.51
Denomination		
Non-denominational	0	
Catholic	0.000 (0.000)	1.00

p<0.05=; p<0.01=***

Table 26 Binomial Conduct problems adjusted models (MQL-1)

	A - Null 2 level	B - Sex (F.E)	C - Sex (F.E); LA status @ PS (F.E) & GIMD @ PS	D - Sex (F.E); LA status @ PS (F.E); GIMD @ PS (F.E) & Baseline Conduct score (F.E)	E - Sex (F.E); LA status @ PS (F.E); GIMD @ PS (F.E); Baseline Conduct score (F.E); FSM - GM (F.E); School size (F.E.) & Exclusions (F.E)	F - Sex (F.E.); LA status @ PS (F.E); Baseline Conduct score (F.E); FSM - GM (F.E) & school size (F.E)
Fixed Part (Logit)						
Constant	-2.495 (0.110)	-3.126 (0.165)	-3.965 (0.469)	-4.004 (0.478)	-3.746 (0.495)	**-3.342 (0.191)**
Sex of child						
Female		0	0	0	0	**0**
Male		0.993 (0.185)**	0.875 (0.208)**	0.775 (0.210)**	0.780 (0.217)**	**0.735 (0.206)****
Home Area Deprivation at Preschool (GIMD)						
5 – Least Deprived			0	0	0	-
4			0.929 (0.497)	0.943 (0.504)	0.759 (0.523)	-
3			0.755 (0.492)	0.749 (0.497)	0.408 (0.522)	-
2			0.759 (0.489)	0.701 (0.495)	0.201 (0.524)	-
1- Most Deprived			1.001 (0.482)*	0.973 (0.486)*	0.326 (0.525)	-
Ever Looked after by PS						
Never Looked After			0	0	0	**0**
Ever Looked After			1.446 (0.401)**	1.515 (0.403)**	1.384 (0.422)**	**1.330 (0.385)****
SDQ Conduct Problems at Preschool						
Normal				0	0	**0**
Abnormal				1.352 (0.283)**	1.450 (0.294)**	**1.617 (0.270)****
% Free school meals (centred around GM)						
(cont.)					0.023 (0.010)*	**0.020 (0.009)****
No. of Exclusions per 1000 pupils						

(cont.)					-0.001 (0.002)	
School size						
(cont.)					-0.003 (0.001)**	**-0.003 (0.001)****
No. of Schools	120	120	119	119	116	**116**
No. of cases	2130	2130	1738	1737	1637	**1786**

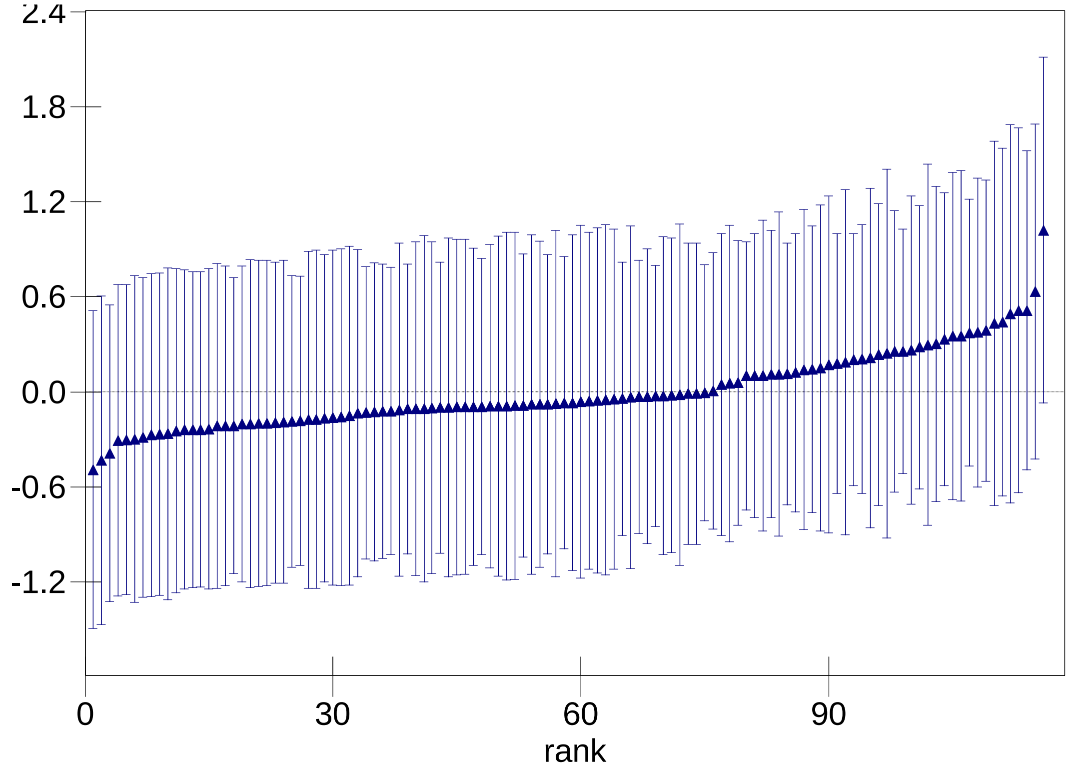
p<0.05=; p<0.01=***

Table 27 Final Multilevel binomial Conduct Problems at P3 model estimates by algorithm

	MQL – 1	**PQL - 2**	**MCMC**
Constant	-3.342 (0.191)	-3.487 (0.202)	**-3.504 (0.202)**
Sex of child			
Female	0	0	**0**
Male	0.735 (0.206)**	0.751 (0.215)**	**0.762 (0.200)****
Ever Looked after by PS			
Never Looked After	0	0	**0**
Ever Looked After	1.330 (0.385)**	1.382 (0.393)**	**1.354 (0.396)****
SDQ Conduct Problems at Preschool			
Normal	0	0	**0**
Abnormal	1.617 (0.270)**	1.682 (0.277)**	**1.675 (0.284)****
% Free school meals (centred around GM)			
(cont.)	0.020 (0.009)*	0.020 (0.010)*	**0.020 (0.009)***
School size			
(cont.)	-0.003 (0.001)**	-0.003 (0.001)**	**-0.003 (0.001)****

p<0.05=; p<0.01=***

Figure 47 Conduct Problems Residuals by School, adjusted for sex, Looked After Status at Preschool, Conduct Problems at Preschool, percentage of children eligible for Free School Meals by school, and school role size



Base 1786

16.2 Hyperactivity/Inattention Scores

Table 28 MLwin Hyperactivity/Inattention Problems Change scores Null Single Level change model vs. Two-level change model

Parameter	Null (Single level)	Multi-level
β_0	0.504 (0.066)	0.571 (0.097)
u_{oj}		0.538 (0.139)
e_{ij}	9.261 (0.284)	8.706 (0.274)
Base	2128	2128
% variance between schools (VPC)	N/A	2%
Loglikelihood	10775.590	10726.710

Table 29 Multilevel Linear Model for Hyperactivity/Inattention Change Scores with individual level explanatory factors

	Unadjusted Coefficients - Fixed Effect β (S.E)	***Loglikelihood Ratio Statistic***	**Unadjusted Coefficients - Random slope β (S.E)**	***Loglikelihood Ratio Statistic***	***P value of random slope***
Constant			0.571 (0.097)	[10726.710]	
Sex of child					
Female	**0**				
Male	**0.564 (0.130)****	**19**	0.610 (0.150)**	32	0.067
Ethnicity					
White UK	**0**				
Non-White UK	**0.653 (0.172)****	314	0.650 (0.179)	315	0.744
Ever Looked After by Preschool					
Never Looked After	0		**0**		
Ever Looked After	**0.967 (0.437)***	**1401**	0.789 (0.476)	1404	0.335
Home Area Deprivation at Preschool (GIMD Quintile)					
5 - Least Deprived	0	1961	0	1979	
4	0.109 (0.302)		0.261 (0.262)		0.951
3	0.322 (0.290)		0.549 (0.207)**		0.000
2	0.320 (0.289)		0.546 (0.254)*		0.683
1 – Most Deprived	0.405 (0.290)		0.614 (0.250)*		0.780
Ever Looked after by P3					
Never Looked After	0		0		
Ever Looked After	0.792 (0.282)**	8	0.878 (0.317)**	10	0.436
Area Deprivation at P3 (GIMD Quintile)					
5- Least Deprived	0	1717	0	1720	
4	0.085 (0.295)		0.063 (0.311)		0.376
3	0.075 (0.291)		0.069 (0.297)		0.174
2	0.095 (0.287)		0.111 (0.297)		0.275
` – Most Deprived	0.223 (0.290)		0.278 (0.298)		0.420

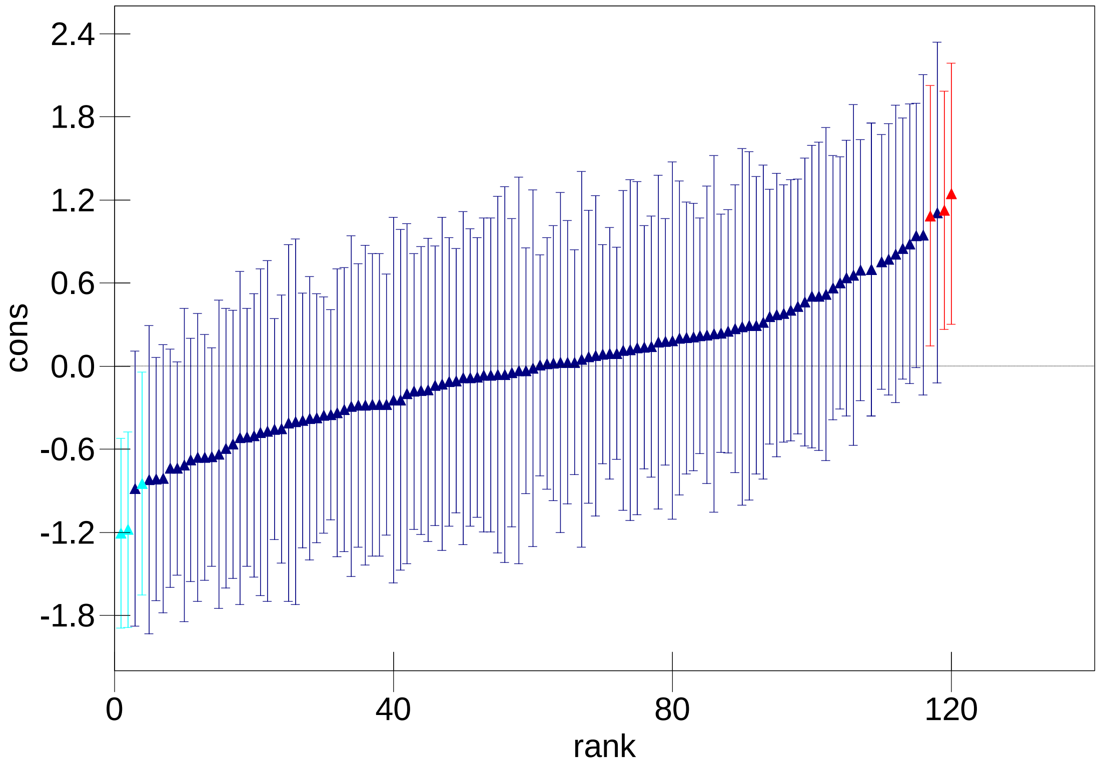
P<0.05=*; p<0.01**

Table 30 Unadjusted Multilevel Linear Hyperactivity Problems change score models by Level 2 variables

	Unadjusted Coefficients - fixed effects β (S.E)	Loglikelihood ratio statistic
Constant		
% Free school meals (Gm)		
(cont.)	0.009 (0.007)	367
No. of Exclusions per 1000 pupils		
(cont.)	-0.001 (0.003)	529
School size (gm)		
(cont.)	**-0.003 (0.001)****	**375**
HMIe Report Score		
(cont.)	0.014 (0.144)	1803
Attendance		
Above average	0	3702
Average	0.343 (0.443)	
Below average	0.167 (0.399)	
Well below average	0.597 (0.610)	
Denomination		
Non-denominational	0	1
Catholic	0.141 (0.197)	

p<0.05=; p<0.01=***

Figure 48 Unadjusted Residuals for Continuous Hyperactivity/inattention Change Scores



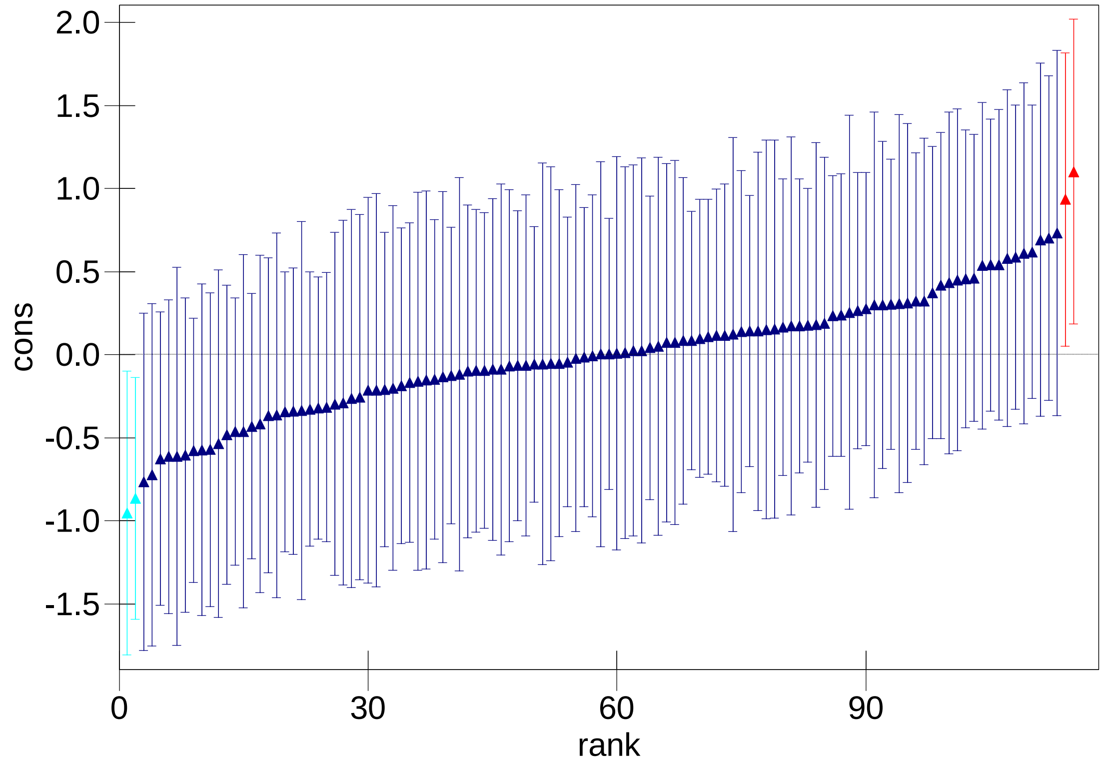
Base = 2128

Table 31 Hyperactivity/inattention multilevel linear change score adjusted models

	A - Null 2 level	**B - Sex (F.E) & ethnicity (F.E)**	**C - Sex (F.E); ethnicity (F.E) & LA status @ PS (F.E)**	**D - Sex (F.E); ethnicity (F.E); LA status @ PS (F.E)& School size - GM (F.E)**
Fixed Part (Logit)				
Constant	0.571 (0.097)**	-0.252 (0.182)	-0.172 (0.192)	-0.245 (0.192)
Sex of child				
Female		0	0	**0**
Male		0.567 (0.131)**	0.519 (0.142)**	**0.505 (0.145)****
Ethnicity				
Non-White UK		0	0	**0**
White UK		0.666 (0.171)**	0.687 (0.181)**	**0.718 (0.183)****
Ever Looked after by PS				
Never Looked After			0	**0**
Ever Looked After			1.014 (0.443)*	**0.911 (0.449)***
School roll size (centred around GM)				
(cont.)				**-0.003 (0.001)****
P value of Random Part				
cons/cons	0.000	0.000	0.000	0.000
Loglikelihood ratio test	-	350	2284	289
No. of Schools	120	120	117	117
No. of cases	2128	2069	1684	1732

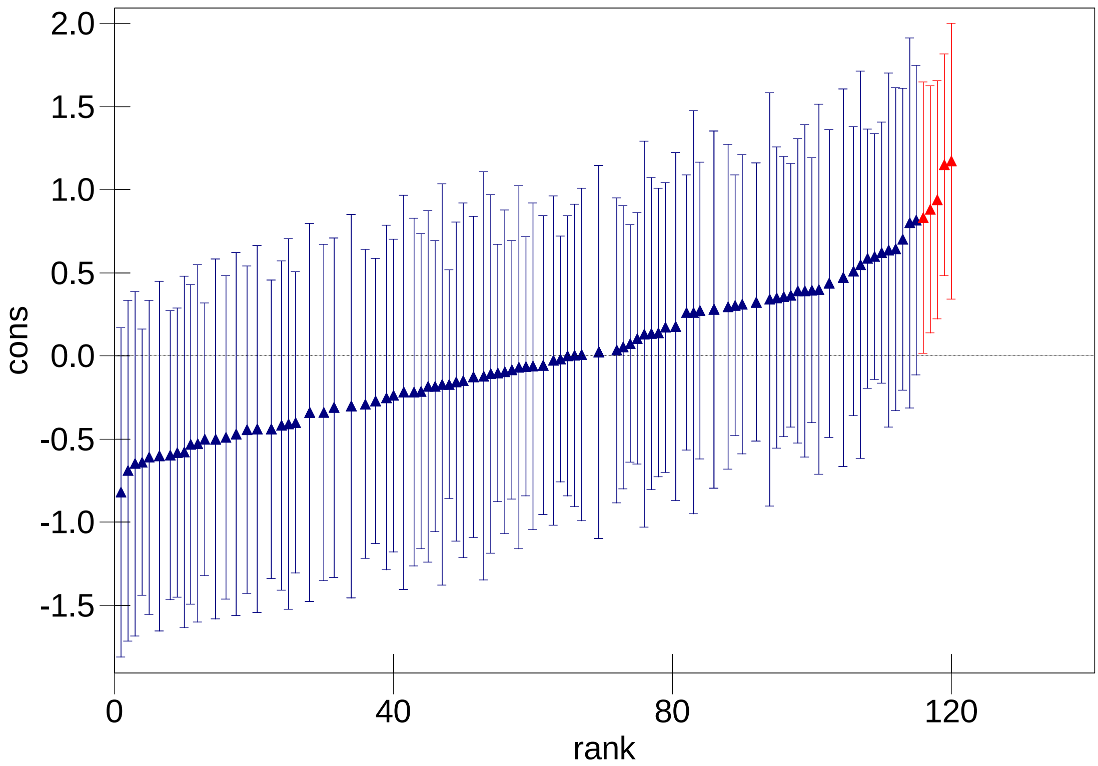
P<0.05=; p<0.01=***

Figure 49 Residuals for Multilevel Linear Hyperactivity Change score model, adjusted for sex of child, ethnicity, Looked After status at preschool, and school size



Base - 1732

Figure 50 Unadjusted Residuals for Binomial P3 Hyperactivity Scores (PQL-2)



Base - 2130

Table 32 Unadjusted Single-level Binomial P3 Hyperactivity Problems Models with P-value and Odds Ratio (MQL – 1)

	Unadjusted Coefficients - Fixed Effect ß (S.E)	***Odds Ratio***	**Unadjusted Coefficients - Random slope ß (S.E)**	***Odds Ratio***	***P value of random slope***
Constant	-1.722 (0.060)**		-1.680 (0.086)**		
Sex of child					
Female	0				
Male	**1.166 (0.136)****	**3.21**	1.179 (0.122)**	3.25	0.120
Ethnicity					
White UK	**0**		0		
Non-White UK	**0.462 (0.177)****	1.59	0.449 (0.176)**	1.57	0.770
Ever Looked After by Preschool					
Never Looked After	0		0		
Ever Looked After	0.878 (0.315)**	2.41	0.889 (0.256)**	2.43	0.172
Home Area Deprivation at Preschool (GIMD)					
5 - Least Deprived	**0**		0		
4	**0.802 (0.325)****	2.23	0.795 (0.343)*	2.21	0.226
3	**0.868 (0.315)****	2.38	0.899 (0.318)**	2.46	0.722
2	**0.938 (0.313)****	2.55	1.015 (0.317)**	2.76	0.035
1- Most Deprived	**1.016 (0.311)****	2.76	1.091 (0.312)**	2.98	0.019
SDQ Hyperactivity Problems at Preschool					
Normal	0		**0**		
Abnormal	1.516 (0.171)**	4.55	**1.585 (0.132)****	4.88	0.000
Ever Looked after by P3					
Never Looked After	**0**		0		
Ever Looked After	**1.248 (0.207)****	3.48	1.241 (0.192)**	3.46	0.332
Area Deprivation at P3					
5 - Least Deprived	0				
4	0.788 (0.303)**	2.20	0.794 (0.315)*	2.21	0.694
3	0.682 (0.302)*	1.98	0.663 (0.303)*	1.94	0.986

2	0.818 (0.296)**	2.27	0.828 (0.294)**	2.29	0.015
1- Most Deprived	0.875 (0.295)**	2.40	0.970 (0.288)**	2.64	0.008

P<0.05=; p<0.01=***

Table 33 Unadjusted Multilevel Binomial Hyperactivity/inattention group at P3 models by Level 2 variables (MQL-1)

	Unadjusted Coefficients – fixed effects β (S.E)	**Odds Ratio**
Constant		
% Free school meals (centred around GM)		
(cont.)	**0.019 (0.005)****	1.02
No. of Exclusions per 1000 pupils		
(cont.)	**0.004 (0.002)***	1.004
School size (centred around GM)		
(cont.)	**-0.003 (0.001)****	1.003
HMIe Report Score		
(cont.)	**-0.339 (0.114)****	1.40
Attendance		
Above average	**0**	
Average	**0.697 (0.387)**	**2.01**
Below average	**0.498 (0.358)**	**1.65**
Well below average	**1.210 (0.488)***	**3.35**
Denomination		
Non-denominational	0	
Catholic	0.000 (0.000)	1.00

p<0.05=; p<0.01=***

Table 34 Multilevel Binary P3 Hyperactivity/inattention Adjusted models

	A - Null 2 level	B - Sex (F.E) & Ethnicity (F.E)	C - Sex (F.E); Ethnicity (F.E); & GIMD @ PS (F.E) & LA status @ P3 (F.E)	D - Sex (R.S); Ethnicity (F.E);LA status @ P3 (F.E); GIMD @ PS (F.E) & Baseline Hyperactivity score (R.S)	E - Sex (F.E); Ethnicity (F.E);LA status @ P3 (F.E); GIMD @ PS (F.E) & Baseline Hyperactivity score (R.S); FSM - GM (F.E); Exclusions (F.E); School Size - GM (F.E); HMIe score (F.E) & attendance (F.E)	F - Sex (F.E); Ethnicity (F.E); LA status @ P3 (F.E); Baseline Hyperactivity score (F.E) & School Size - GM (F.E)
Fixed Part (Logit)						
Constant	-1.680 (0.086)**	-2.870 (0.204)**	-3.659 (0.355)**	-3.780 (0.352)**	-3.764 (0.793)**	-3.194 (0.217)**
Sex of child						
Female		0	0	0	0	0
Male		1.190 (0.140)**	1.249 (0.151)**	1.105 (0.154)**	1.209 (0.192)**	1.102 (0.151)**
Ethnicity						
Non-White UK		0	0	0	0	0
White UK		0.522 (0.181)**	0.595 (0.191)**	0.619 (0.196)**	0.759 (0.246)**	0.559 (0.194)**
Home Area Deprivation at Preschool (GIMD)						
5 – Least Deprived			0	0	0	-
4			0.738 (0.337)*	0.665 (0.350)	0.823 (0.436)	-
3			0.746 (0.326)*	0.742 (0.313)*	0.626 (0.424)	-
2			0.826 (0.324)*	0.867 (0.326)**	0.649 (0.426)	-
1- Most Deprived			0.842 (0.323)**	0.881 (0.320)**	0.688 (0.432)	-
Ever Looked after by P3						
Never Looked After			0	0	0	0
Ever Looked After			1.084 (0.225)**	1.073 (0.231)**	0.911 (0.265)**	1.209 (0.224)**
SDQ Hyperactivity Problems at Preschool						

Normal				0	0	0
Abnormal				1.542(0.088)**	1.300 (0.236)**	1.321 (0.189)**
% Free school meals (centred around GM)						
(cont.)					-0.001 (0.010)	-
No. of Exclusions per 1000 pupils						
(cont.)					-0.004 (0.005)	-
School size (centred around GM)						
(cont.)					-0.002 (0.001)*	-0.003 (0.001)**
HMIe Report Score						
(cont.)					-0.081 (0.144)	-
Attendance						
Above average					0	-
Average					0.498 (0.329)	-
Below average					0.243 (0.320)	-
Well below average					0.503 (0.394)	-
P value of Random Part						
cons/cons		0.002	0.018	1.722	0.613	0.035
SDQ/cons				0.000	0.000	-
SDQ/SDQ				0.000	0.590	-
No. of Schools	120	120	117	117	96	117
No. of cases	2130	2071	1685	1684	1337	1997

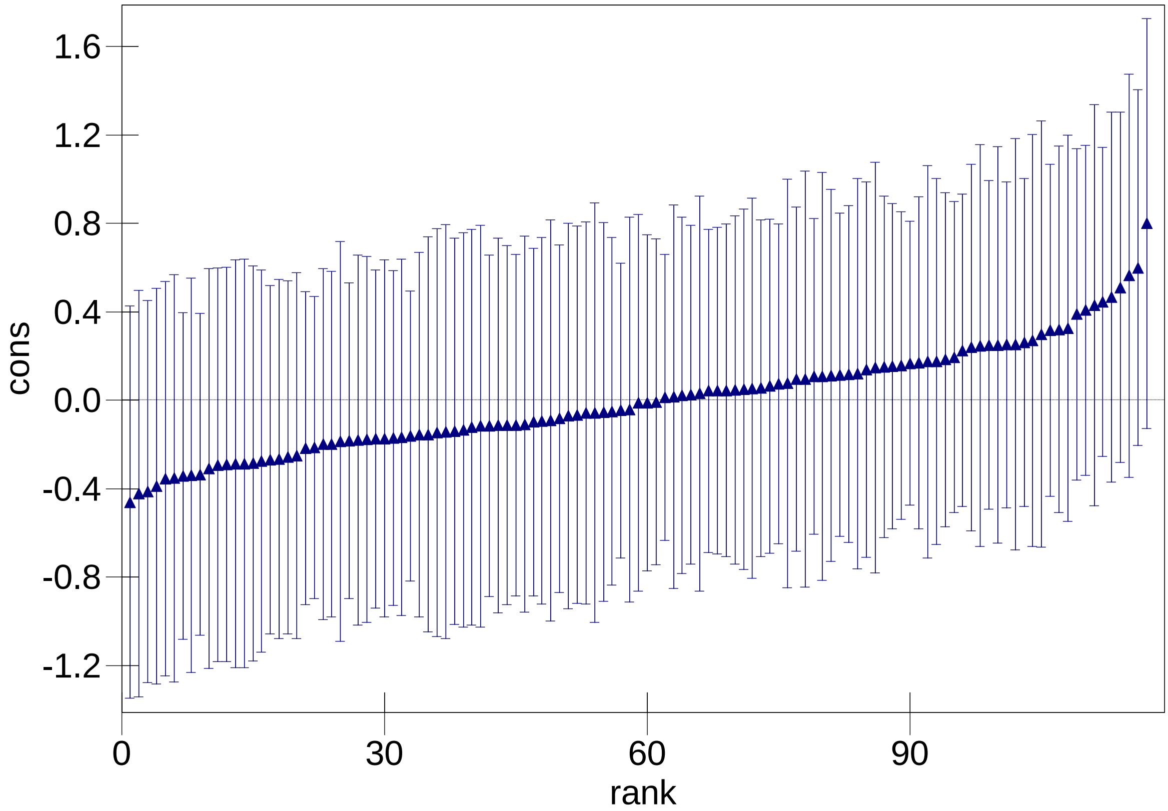
p<0.05=; p<0.01=***

Table 35 Final Multilevel binomial Hyperactivity/inattention at P3 model estimates by algorithm

	Sex (F.E); Ethnicity (F.E); LA status @ P3 (F.E); Baseline Hyperactivity score (F.E) & School Size - GM (F.E)		
	MQL - 1	**PQL - 2**	**MCMC**
Constant	-3.194 (0.217)**	-3.301 (0.224)**	**-3.346 (0.230)****
Sex of child			
Female	0	0	**0**
Male	1.102 (0.151)**	1.125 (0.155)**	**1.141 (0.153)****
Ethnicity			
Non-White UK	0	0	**0**
White UK	0.559 (0.194)**	0.577 (0.198)**	**0.598 (0.194)****
Ever Looked after by P3			
Never Looked After	0	0	**0**
Ever Looked After	1.209 (0.224)**	1.256 (0.228)**	**1.262 (0.231)****
SDQ Hyperactivity/ inattention at Preschool			
Normal	0	0	**0**
Abnormal	1.321 (0.189)**	1.371 (0.191)**	**1.378 (0.199)****
School size			
(cont.)	-0.003 (0.001)**	-0.003 (0.001)**	**-0.003 (0.001)****

p<0.05=; p<0.01=***

Figure 51 Residuals by school for binary Hyperactivity/inattention group at P3, adjusted for sex, ethnicity, baseline score, Looked After status at P3 and school roll size (MCMC)



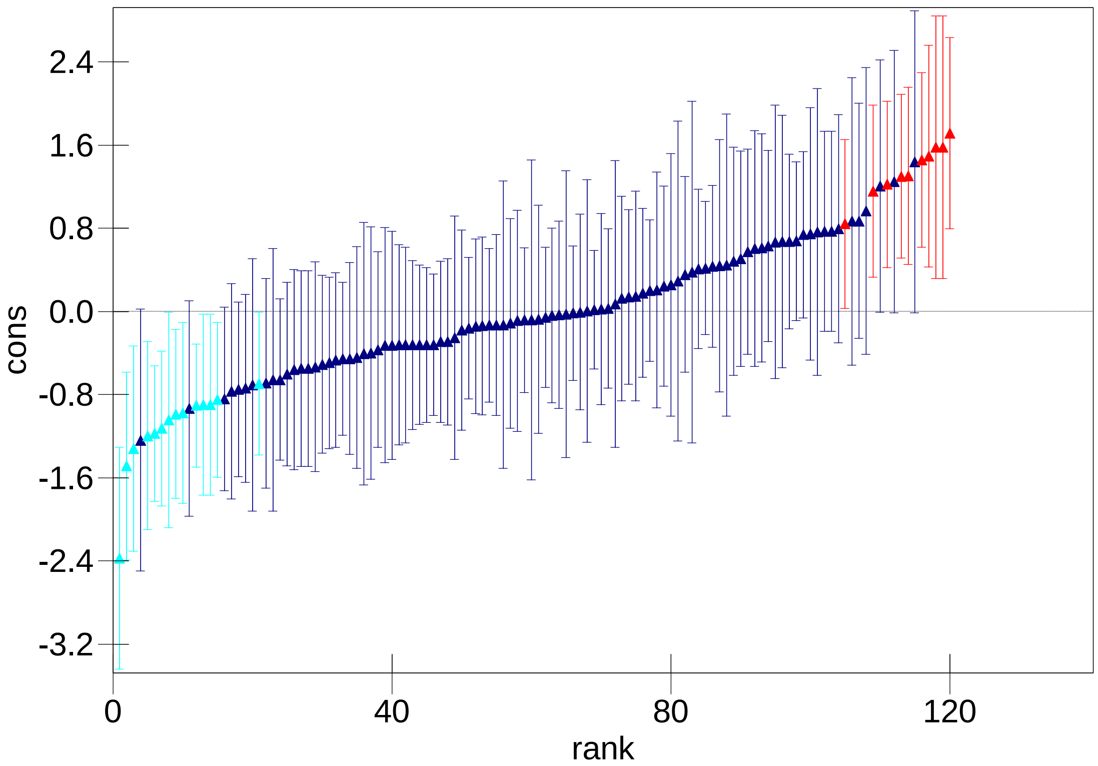
Base = 1997

16.3 Emotional Symptoms

Table 36 MLwin Emotional Symptom Problems Change scores Null Single Level change model vs. Two-level change model

Parameter	**Null (Single level)**	**Multi-level**
β_0	0.225 (0.052)	0.321 (0.100)
u_{oj}		0.820 (0.151)
e_{ij}	5.656 (0.173)	4.972 (0.157)
Base	2127	2127
% variance between schools (VPC)	N/A	14%
Loglikelihood	9721.701	9598.547

Figure 52 Unadjusted Residuals by school on the Emotional Symptoms binary score



Base = 2127

Table 37 Multilevel Linear Regression Model for Emotional Symptoms Change Scores with individual level explanatory factors

	Unadjusted Coefficients - Fixed Effect β (S.E)	***Loglikelihood Ratio Statistic***	**Unadjusted Coefficients - Random slope β (S.E)**	***Loglikelihood Ratio Statistic***	***P value of random slope***
Constant			0.321 (0.100)	[9599]	
Sex of child					
Female	0	0	**0**	1	
Male	-0.068 (0.099)		-0.074 (0.101)		0.857
Ethnicity					
Non-White UK	0	269	**0**	269	
White UK	0.049 (0.134)		0.045 (0.139)		0.659
Ever Looked After by Preschool					
Never Looked After	0	1180	0	8416	0.208
Ever Looked After	0.483 (0.339)		0.438 (0.414)		
Home Area Deprivation at Preschool (GIMD Quintile)					
5 - Least Deprived	0	1682	0	1700	
4	-0.026 (0.238)		0.011 (0.247)		0.715
3	0.027 (0.229)		0.007 (0.260)		0.031
2	0.054 (0.230)		0.053 (0.246)		0.113
1 – Most Deprived	0.083 (0.233)		0.071 (0.241)		0.091
Ever Looked after by P3					
Never Looked After	0	1	0	6	
Ever Looked After	0.226 (0.221)		0.238 (0.281)		0.069
Area Deprivation at P3 (GIMD Quintile)					
5- Least Deprived	0	1486	0	1496	
4	-0.138 (0.231)		-0.144 (0.227)		0.516
3	-0.093 (0.230)		-0.021 (0.211)		0.924
2	-0.107 (0.227)		-0.050 (0.194)		0.223
` – Most Deprived	0.084 (0.232)		0.138 (0.214)		0.928

p<0.05=; p<0.01=***

Table 38 Unadjusted Multilevel Linear Emotional Symptoms change score models by Level 2 variables

	Unadjusted Coefficients - fixed effects β (S.E)	**Loglikelihood ratio statistic**
Constant		
% Free school meals (Gm)		
(cont.)	0.026 (0.007)**	342
No. of Exclusions per 1000 pupils		
(cont.)	0.002 (0.002)	475
School size (gm)		
(cont.)	**-0.004 (0.001)****	**341**
HMIe Report Score		
(cont.)	-0.140 (0.146)	1604
Attendance		
Above average	**0**	**3306**
Average	**0.351 (0.456)**	
Below average	**0.527 (0.412)**	
Well below average	**1.457 (0.636)***	
Denomination		
Non-denominational	0	0
Catholic	0.000 (0.000)	

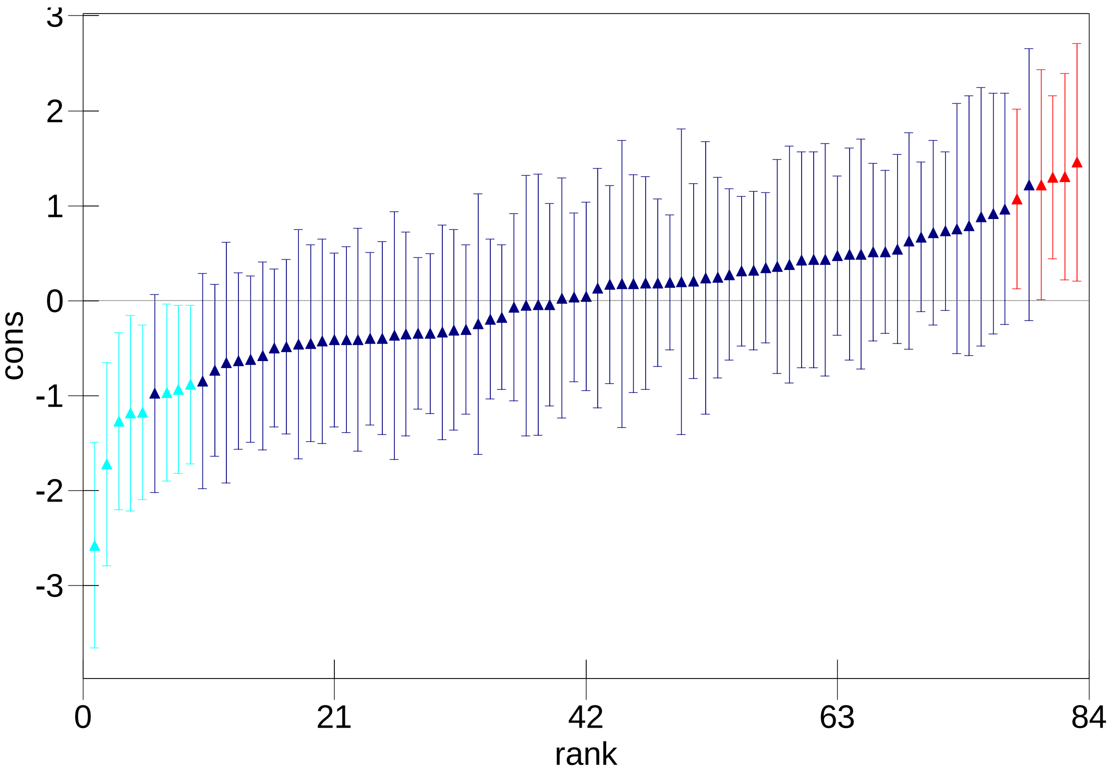
p<0.05=; p<0.01=***

Table 39 Multilevel Linear models predicting Emotional Symptoms change scores, adjusted for Level 1 and 2 variables

	A - Null 2 level	C -School size - GM (F.E) & Attendance (F.E)
Fixed Part (Logit)		
Constant	0.321 (0.100)**	-0.142 (0.370)
School roll size (centred around GM)		
(cont.)		-0.003 (0.001)**
Attendance		
Above average		0
Average		0.338 (0.447)
Below average		0.342 (0.406)
Well below average		1.273 (0.370)**
P value of Random Part		
cons/cons	0.000	0.000
Loglikelihood ratio test	[9599]	3388
No. of Schools	120	83
No. of cases	2127	1371

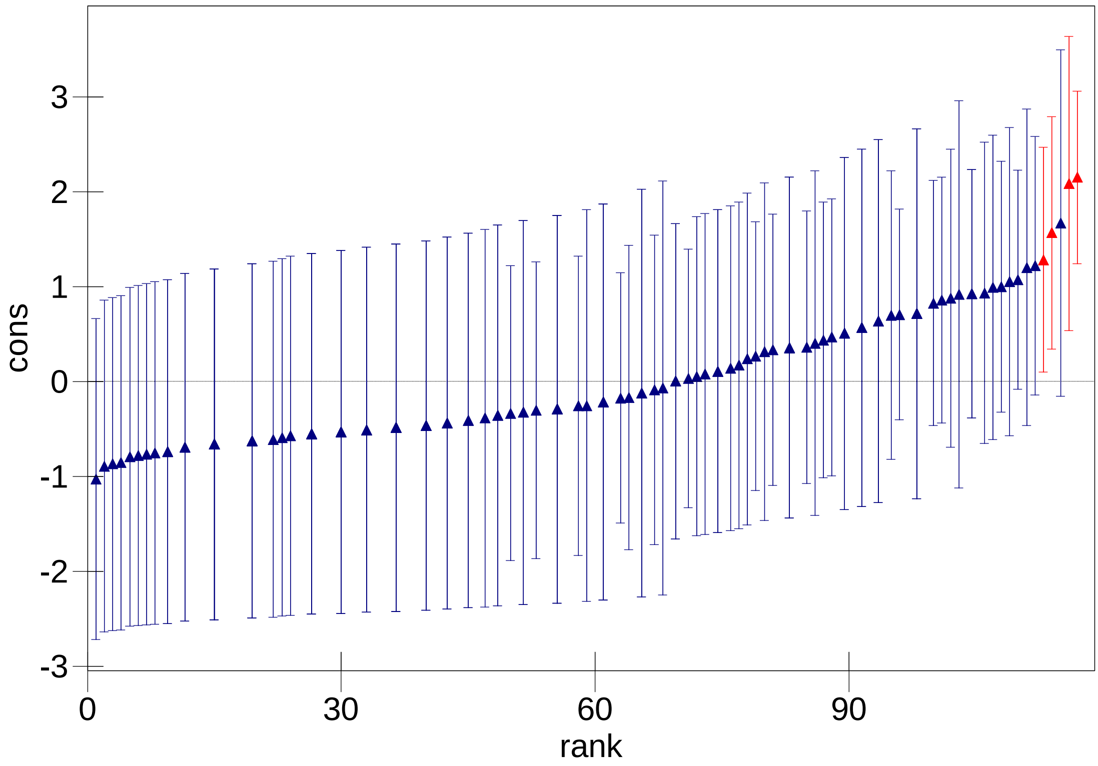
p<0.05=; p<0.01=***

Figure 53 Residuals for the Adjusted Multilevel linear models predicting Emotional Symptoms change scores between Preschool and P3, adjusted for school roll size and attendance levels of pupils in relation to national average



Base: 1371

Figure 54 Residuals from Unadjusted Multilevel Binomial Model for Emotional Symptoms at P3 (2nd Order PQL)



Base: 1997

Table 40 Unadjusted Single-level Binomial P3 Emotional Symptoms Models with P-value and Odds Ratio (MQL – 1)

	Unadjusted Coefficients - Fixed Effect β (S.E)	***Odds Ratio***	**Unadjusted Coefficients - Random slope β (S.E)**	***Odds Ratio***	***P value of random slope***
Constant	-2.969 (0.100)**		-2.869 (0.138)**		0.001
Sex of child					
Female	**0**				
Male	**0.452 (0.202)***	1.57	0.331 (0.124)**	1.39	0.000
Ethnicity					
Non-White UK	0		0		
White UK	0.227 (0.270)	1.25	0.220 (0.243)	1.25	0.317
Ever Looked After by Preschool					
Never Looked After	**0**		Failed to converge		
Ever Looked After	**1.049 (0.442)***	2.85			
Home Area Deprivation at Preschool (GIMD)					
5 - Least Deprived	0		Failed to converge		
4	0.689 (0.558)	2.01			
3	0.740 (0.541)	2.10			
2	0.813 (0.537)	2.25			
1- Most Deprived	0.952 (0.531)	2.59			
SDQ Emotional Symptoms at Preschool					
Normal	0				
Abnormal	0.789 (0.440)	2.20	0.706 (0.413)	2.03	0.752
Ever Looked after by P3					
Never Looked After	0		0		
Ever Looked After	0.731 (0.335)*	2.08	0.786 (0.253)**	2.19	0.055
Area Deprivation at P3					
5 - Least Deprived	0		Failed to converge		
4	0.004 (0.469)	1.004			
3	0.040 (0.457)	1.04			
2	0.150 (0.445)	1.16			
1- Most Deprived	0.491 (0.433)	1.63			

p<0.05=; p<0.01=***

Table 41 Unadjusted Multilevel Binomial models predicting Emotional Symptoms at P3 by Level 2 variables

	Unadjusted Coefficients - fixed effects β (S.E)	**Odds Ratio**
Constant		
% Free school meals (Gm)		
(cont.)	**0.032 (0.009)****	1.03
No. of Exclusions per 1000 pupils		
(cont.)	0.003 (0.003)	1.003
School size (gm)		
(cont.)	**0.005 (0.001)****	1.005
HMIe Report Score		
(cont.)	-0.118 (0.193)	1.13
Attendance		
Above average	**0**	
Average	**0.976 (0.750)**	**2.65**
Below average	**1.335 (0.699)**	**3.80**
Well below average	**1.877 (0.843)***	**6.53**
Denomination		
Non-denominational	0	
Catholic	-0.113 (0.282)	1.12

p<0.05=; p<0.01=***

Table 42 Adjusted Binary P3 Emotional Symptoms models

	A - Empty 2 level	B - Sex (F.E)	C - Sex (F.E) & Looked After Status at PS (F.E)	D - Sex (F.E); Looked After Status at PS (F.E); FSM- GM (F.E); School size - GM (F.E) & Attendance (F.E)
Fixed Part (Logit)				
Constant	-2.869 (0.138)**	-3.138 (0.185)**	**-3.216 (0.201)****	-4.233 (0.778)**
Sex of child				
Female		0	**0**	0
Male		0.452 (0.202)*	**0.535 (0.218)***	0.302 (0.275)
Ever Looked after by Preschool				
Never Looked After			**0**	0
Ever Looked After			**1.160 (0.438)****	0.896 (0.517)
% Free school meals (Gm)				
(cont.)				0.024 (0.015)
School roll size (centred around GM)				
(cont.)				-0.001 (0.002)
Attendance				
Above average				0
Average				0.819 (0.840)
Below average				0.955 (0.797)
Well below average				1.623 (0.891)
P value of Random Part				
cons/cons	0.001	0.001	**0.002**	0.212
No. of Schools	120	120	**119**	83
No. of cases	2130	2130	**1847**	1185

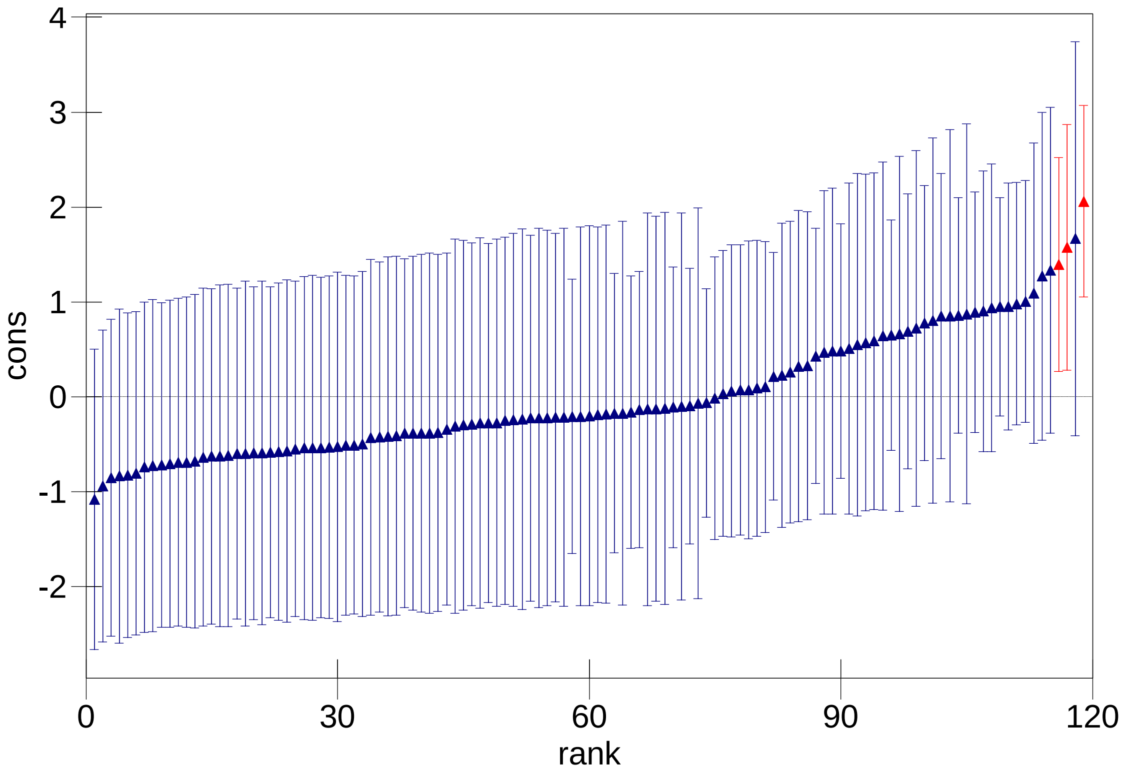
p<0.05=; p<0.01=***

Table 43 Final Multilevel binomial Emotional Symptoms at P3 model estimates by algorithm

	Sex (F.E) & LA status @ PS (F.E)		
	MQL - 1	PQL - 2	MCMC
Constant	-3.216 (0.201)**	-3.663 (0.250)**	**-3.683 (0.252)****
Sex of child			
Female	0	0	**0**
Male	0.535 (0.218)*	0.538 (0.260)*	**0.555 (0.235)***
Ever Looked after by preschool			
Never Looked After	0	0	**0**
Ever Looked After	1.160 (0.438)**	1.208 (0.493)*	**1.165 (0.485)***

p<0.05=; p<0.01=***

Figure 55 Residuals for Binary Emotional Symptoms, adjusted for Sex and Looked After Status at Preschool, ranked by school (MCMC)



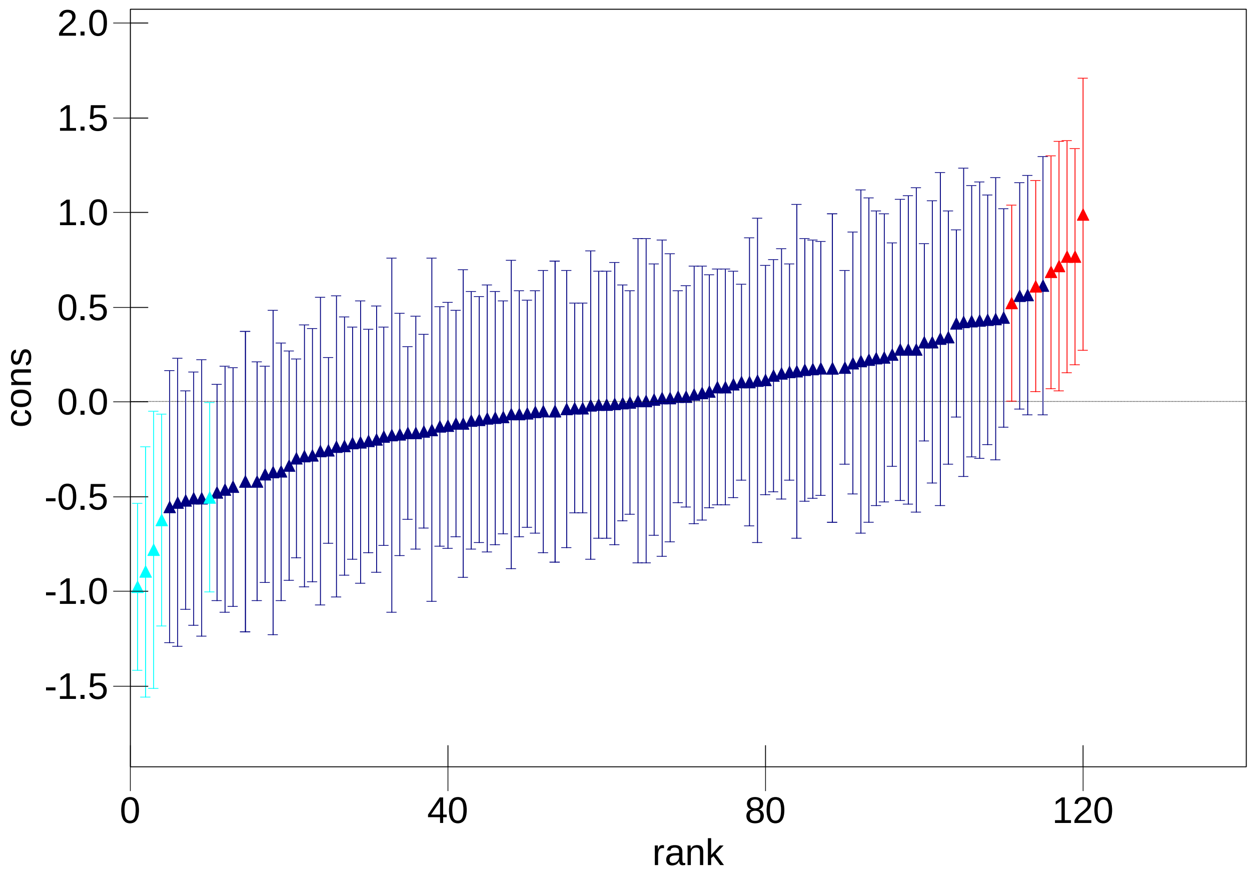
Base: 1847

16.4 Peer Relationship Problems

Table 44 MLwin Peer Relationship Problems Change scores Null Single Level change model vs. Two-level change model

Parameter	Null (Single level)	Multi-level
β_0	-0.296 (0.042)	-0.274 (0.064)
u_{oj}		0.243 (0.060)
e_{ij}	3.779 (0.116)	3.534 (0.111)
Base	2128	2128
% variance between schools (VPC)	N/A	6%
Loglikelihood	8867.924	8814.403

Figure 56 Unadjusted residuals from Multilevel Linear model for Peer Relationship Problems change scores



Base - 2128

Table 45 Multilevel Linear Regression Model for Peer Relationship Problems Change Scores with individual level explanatory factors

	Unadjusted Coefficients - Fixed Effect β (S.E)	***Loglikelihood Ratio Statistic***	**Unadjusted Coefficients - Random slope β (S.E)**	***Loglikelihood Ratio Statistic***	***P value of random slope***
Constant			-0.274 (0.064)	[8814]	
Sex of child					
Female	0	0	0	2	
Male	-0.076 (0.083)		-0.079 (0.089)		0.411
Ethnicity					
Non-White UK	**0**				
White UK	**0.442 (0.109)****	**302**	0.452 (0.099)**	304	0.179
Ever Looked After by Preschool					
Never Looked After	0	1065	0	1066	
Ever Looked After	0.588 (0.285)		0.535 (0.331)		0.322
Home Area Deprivation at Preschool (GIMD Quintile)					
5 - Least Deprived	0	1541	0	1342	
4	-0.141 (0.137)		-0.134 (0.139)		0.255
3	-0.042 (0.142)		-0.052 (0.158)		0.727
2	-0.226 (0.158)		-0.222 (0.206)		0.788
1 - Most Deprived	-0.274 (0.189)		-0.236 (0.199)		0.044
Ever Looked after by P3					
Never Looked After	0	2	0	3	
Ever Looked After	0.262 (0.181)		0.264 (0.175)		0.543
Area Deprivation at P3 (GIMD Quintile)					
5- Least Deprived	0	1351	Failed to converge		
4	0.093 (0.191)				
3	0.225 (0.188)				
2	0.172 (0.186)				
1 - Most Deprived	0.329 (0.187)				

p<0.05=; p<0.01=***

Table 46 Unadjusted Multilevel Linear Peer Relationship Problems change score models by Level 2 variables

	Unadjusted Coefficients - fixed effects ß (S.E)	**Loglikelihood ratio statistic**
Constant		
% Free school meals (Gm)		**296**
(cont.)	**0.010 (0.004)***	
No. of Exclusions per 1000 pupils		445
(cont.)	0.002 (0.002)	
School size (gm)		296
(cont.)	0.001 (0.001)	
HMIe Report Score		1492
(cont.)	-0.025 (0.096)	
Attendance		3035
Above average	0	
Average	0.214 (0.300)	
Below average	0.105 (0.271)	
Well below average	-0.079 (0.414)	
Denomination		1
Non-denominational	0	
Catholic	-0.175 (0.129)	

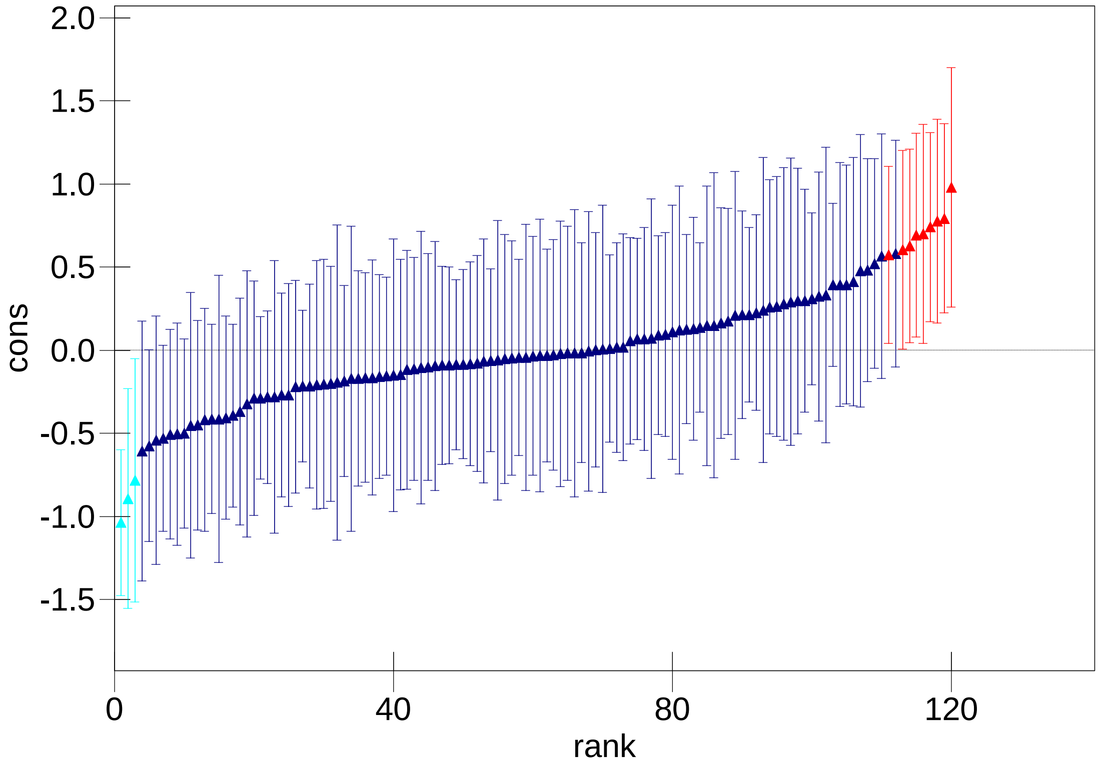
p<0.05=; p<0.01=***

Table 47 Multilevel Linear Model predicting Peer Relationship Problems change scores, adjusted for Level 1 and Level 2 variables

	A - Null 2 level	**B - Ethnicity (F.E)**	**C - Ethnicity (F.E) & % FSMs (F.E)**	**D - Ethnicity (F.E)**
Fixed Part (Logit)				
Constant	-0.274 (0.064)**	-0.627 (0.106)**	**-0.627 (0.110)****	-0.627 (0.106)**
Ethnicity				
Non-White UK		0	**0**	0
White UK		0.442 (0.109)**	**0.446 (0.111)****	0.442 (0.109)**
% Free school meals (Gm)				
(cont.)			**0.09(0.005)**	
P value of Random Part				
cons/cons	0.000	0.060	**0.000**	0.060
Loglikelihood ratio statistic	[8814]	302	**284**	302
No. of Schools	120	120	**117**	120
No. of cases	2128	2069	**1997**	2069

p<0.05=; p<0.01=***

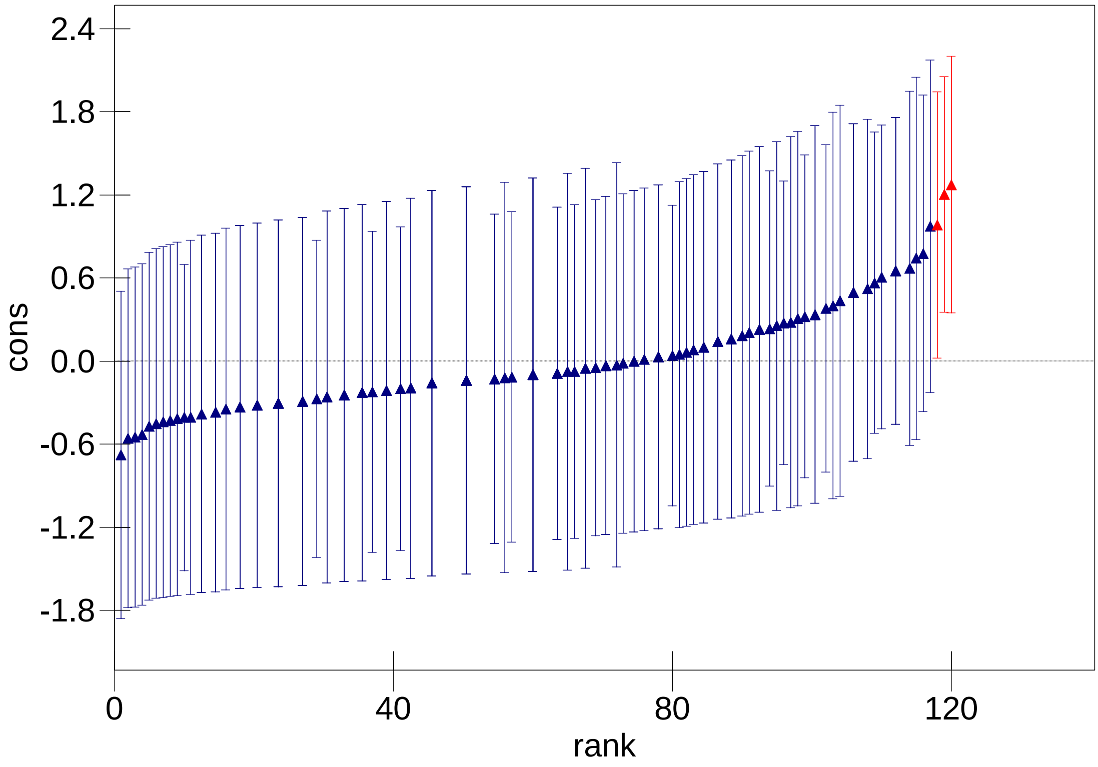
Figure 57 Residuals for Multilevel Linear Peer Relationship change models, adjusted for Ethnicity



Base: 2054

16.5 Binary P3 Peer Relationship Problem scores

Figure 58 Residuals for Unadjusted P3 Binary Peer Relationship Problems Model (PQL-2)



Base - 2130

Table 48 Unadjusted Single-level Binomial P3 Peer Relationships Models with P-value and Odds Ratio (MQL – 1)

	Unadjusted Coefficients - Fixed Effect ß (S.E)	***Odds Ratio***	**Unadjusted Coefficients - Random slope ß (S.E)**	***Odds Ratio***	***P value of random slope***
Constant	-2.990 (0.101)**		-2.963 (0.124)**	`	
Sex of child					
Female	0		0		
Male	0.331 (0.206)	1.39	0.342 (0.214)	1.41	0.656
Ethnicity					
Non-White UK	0		0		
White UK	0.314 (0.286)	1.37	0.404 (0.248)	1.50	0.002
Ever Looked After by Preschool					
Never Looked After	0		0		
Ever Looked After	0.878 (0.494)	2.41	0.888 (0.448)	2.43	0.633
Home Area Deprivation at Preschool (GIMD)					
5 – Least Deprived	0		Failed to converge		
4	1.118 (0.623)	3.06			
3	1.219 (0.607)*	3.38			
2	0.755 (0.623)	2.13			
1- Most Deprived	0.904 (0.613)	2.47			
SDQ Peer Relationship Problems at Preschool					
Normal	**0**		0		
Abnormal	**1.606 (0.278)****	4.98	1.576 (0.242)**	4.84	0.092
Ever Looked after by P3					
Never Looked After	0		0		0.055
Ever Looked After	0.595 (0.351)	1.81	0.515 (0.128)**	1.67	
Area Deprivation at P3					
5 – Least Deprived	0		Failed to converge		
4	0.368 (0.486)	1.44			
3	0.464 (0.473)	1.59			
2	0.080 (0.486)	1.08			
1- Most Deprived	0.309 (0.473)	1.36			

p<0.05=; p<0.01=***

Table 49 Unadjusted Multilevel Binomial models predicting Peer Relationship Problems at P3 by Level 2 variables

	Unadjusted Coefficients - fixed effects β (S.E)	**Odds Ratio**
Constant	-2.990 (0.101)**	
% Free school meals (Gm)		
(cont.)	**0.025 (0.009)****	**1.03**
No. of Exclusions per 1000 pupils		
(cont.)	0.001 (0.003)	1.001
School size (gm)		
(cont.)	**-0.002 (0.001)***	**1.002**
HMIe Report Score		
(cont.)	0.036 (0.186)	1.04
Attendance		
Above average	**0**	
Average	**1.771 (0.804)***	**5.88**
Below average	**1.662 (0.779)***	**5.27**
Well below average	**2.021 (0.896)***	**7.55**
Denomination		
Non-denominational	0	
Catholic	0.000 (0.000)	1.00

p<0.05=; p<0.01=***

Table 50 Adjusted Binomial P3 Peer Relationship Problems models (MQL - 1)

	A - Empty 2 level	**B - Baseline score (F.E)**	**D - Baseline score (F.E); FSM-GM (F.E); School size - GM (F.E) & Attendance (F.E)**	**E - Baseline score (F.E); FSM- GM (F.E) & Attendance (F.E)**	**F - Baseline score (F.E) & FSM- GM (F.E)**
Cons.	-2.963 (0.124)**	-3.132 (0.133)**	-4.491 (0.892)**	-4.475 (0.764)**	-3.206 (0.138)**
SDQ Peer Relationship Problems at Preschool					
Normal		0	0	0	0
Abnormal		1.606 (0.278)**	1.884 (0.313)**	1.901 (0.313)**	1.638 (0.282)**
% Free school meals (Gm)					
(cont.)			0.041 (0.013)**	0.036 (0.012)**	0.026 (0.009)**
School roll size (centred around GM)					
(cont.)			0.002 (0.002)	-	
Attendance					
Above average			0	0	
Average			1.688 (0.808)*	1.662 (0.807)*	
Below average			1.120 (0.795)	1.076 (0.790)	
Well below average			1.632 (0.892)	1.568 (0.888)	
P value of Random Part					
cons/cons	0.020	0.024	0.354	0.345	0.052
No. of Schools	120	120	83	83	2054
No. of cases	2130	2128	1371	1371	117

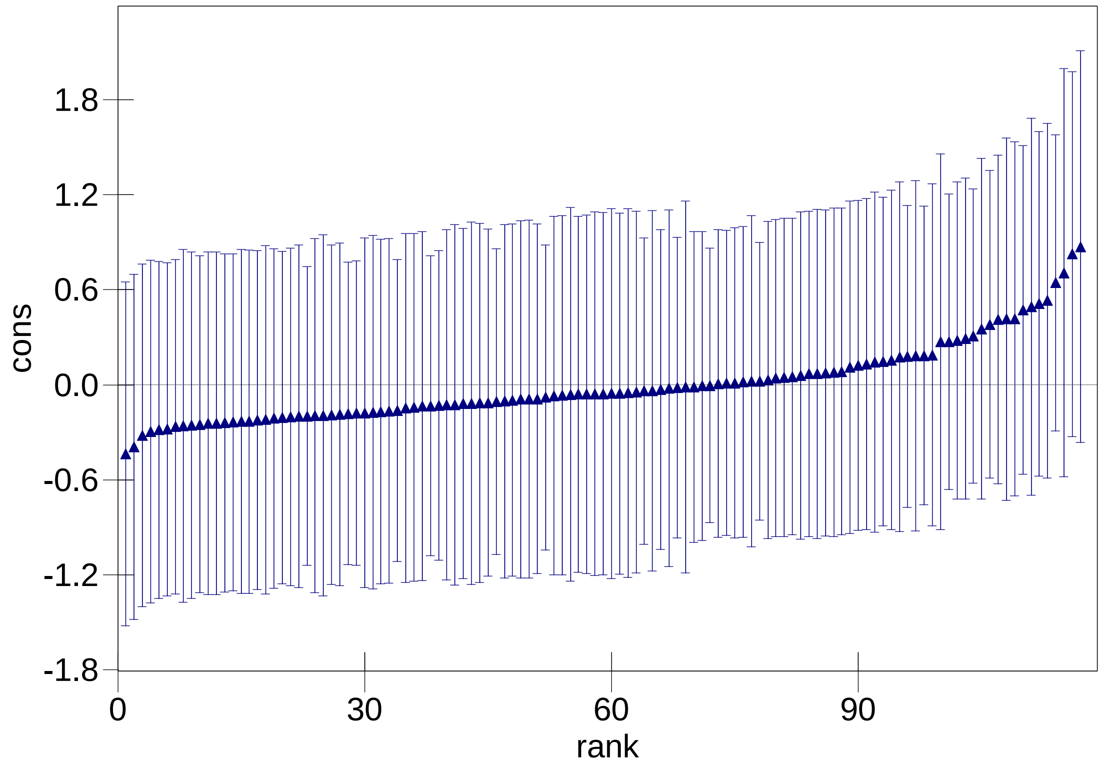
p<0.05=; p<0.01=***

Table 51 Final Multilevel binomial Peer Relationship Problems at P3 model estimates by algorithm

	Baseline score (F.E) & FSM- GM (F.E)		
	MQL - 1	**PQL - 2**	**MCMC**
Constant	-3.206 (0.138)**	-3.412 (0.150)**	**-3.379 (0.175)****
SDQ Peer Relationship Problems at Preschool			
Normal	0	0	**0**
Abnormal	1.638 (0.282)**	1.706 (0.293)**	**1.693 (0.290)****
% Free school meals (Gm)	0.026 (0.009)**	0.027 (0.009)**	**0.027 (0.009)****

p<0.05=; p<0.01=***

Figure 59 Residuals from Binomial P3 Peer Relationship Models, adjusted for baseline score and the percentage of children eligible for Free School Meals (MCMC)



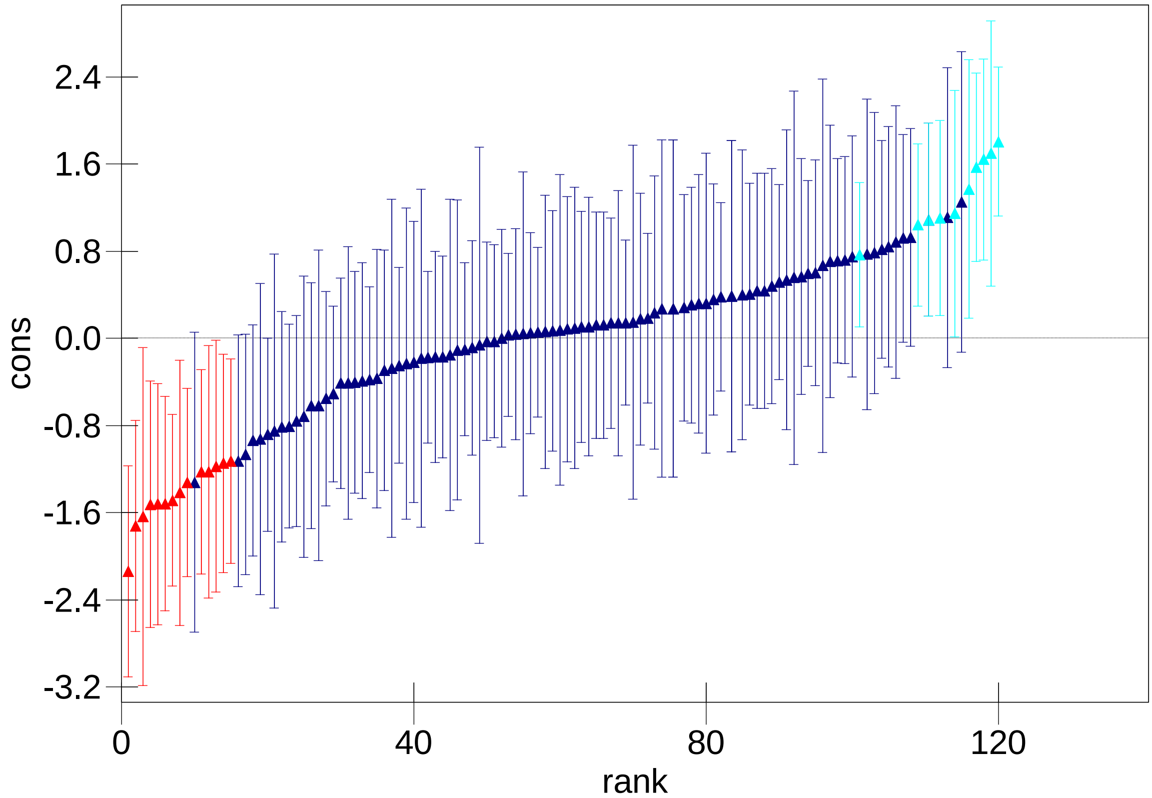
Base: 2054

16.6 Pro-social Skills

Table 52 MLwin Pro-social Behaviours Change scores Null Single Level change model vs. Two-level change model

Parameter	Null (Single level)	Multi-level
β_0	0.539 (0.061)	0.497 (0.112)
u_{oj}		0.981 (0.188)
e_{ij}	7.829 (0.240)	6.856 (0.216)
Base	2128	2128
% variance between schools (VPC)	N/A	6%
Loglikelihood	10418.148	10275.435

Figure 60 Caterpillar Plot showing residuals from the unadjusted Multilevel Linear model for Pro-social Behaviours Change scores ranked by school



Base: 2128

Table 53 Multilevel Linear Regression Model for Pro-social Behaviours Change Scores with individual level explanatory factors

	Unadjusted Coefficients - Fixed Effect ß (S.E)	***Loglikelihood Ratio Statistic***	**Unadjusted Coefficients - Random slope ß (S.E)**	***Loglikelihood Ratio Statistic***	***P value of random slope***
Constant			0.497 (0.112)	*[10275]*	
Sex of child					
Female	0				
Male	-0.066 (0.117)	0	-0.095 (0.135)	20	0.054
Ethnicity					
Non-White UK	0				
White UK	-0.236 (0.156)	300	-0.191 (0.187)	308	0.089
Ever Looked After by Preschool					
Never Looked After	0		0		
Ever Looked After	-0.362 (0.387)	1369	-0.288 (0.466)	1372	0.238
Home Area Deprivation at Preschool (GIMD Quintile)					
5 - Least Deprived	0	1986	Failed to converge		
4	0.337 (0.273)				
3	0.255 (0.262)				
2	0.287 (0.263)				
1 – Most Deprived	0.226 (0.266)				
Ever Looked after by P3					
Never Looked After	0	0	0	6	
Ever Looked After	0.089 (0.258)		0.096 (0.315)		0.134
Area Deprivation at P3 (GIMD Quintile)					
5- Least Deprived	0	1668	Failed to converge		
4	0.147 (0.265)				
3	0.132 (0.263)				
2	0.158 (0.261)				
` – Most Deprived	0.025 (0.266)				

p<0.05=; p<0.01=***

Table 54 Unadjusted Multilevel Linear Pro-social Behaviours change score models by Level 2 variables

	Unadjusted Coefficients - fixed effects β (S.E)	**Loglikelihood ratio statistic**
Constant	0.497 (0.112)	*[10275]*
% Free school meals (Gm)		
(cont.)	-0.001 (0.008)	349
No. of Exclusions per 1000 pupils		
(cont.)	0.003 (0.003)	514
School size (gm)		
(cont.)	0.001 (0.001)	350
HMIe Report Score		
(cont.)	0.047 (0.166)	1713
Attendance		
Above average	0	3552
Average	-0.433 (0.521)	
Below average	0.086 (0.471)	
Well below average	-0.282 (0.725)	
Denomination		
Non-denominational	0	
Catholic		

p<0.05=; p<0.01=***

Table 55 Unadjusted Pro-social Behaviours Binary Models with Odds Ratio and P-value of random slope (MLQ – 1)

	Unadjusted Coefficients - Fixed Effect ß (S.E)	***Odds Ratio***	**Unadjusted Coefficients - Random slope ß (S.E)**	***Odds Ratio***	***P value of random slope***
Constant	-2.401 (0.078)**		-2.350 (0.113)**		
Sex of child					
Female	**0**				
Male	**1.350 (0.188)****	**3.86**	1.358 (0.199)**	3.89	0.492
Ethnicity					
White UK	0		0		
Non-White UK	-0.167 (0.199)	1.18	-0.195 (0.222)	1.21	0.320
Ever Looked After by Preschool					
Never Looked After	0		0		
Ever Looked After	0.286 (0.456)	1.33	0.286 (0.456)	1.33	1.000
Home Area Deprivation at Preschool (GIMD)					
5 – Least Deprived	0		Failed to converge		
4	0.978 (0.417)*	2.66			
3	0.965 (0.408)*	2.63			
2	0.791 (0.411)	2.21			
1- Most Deprived	0.568 (0.416)	1.76			
SDQ Peer Relationship Problems at Preschool					
Normal	**0**		0		
Abnormal	**1.500 (0.186)****	**4.48**	1.515 (0.215)**	4.55	0.120
Ever Looked after by P3					
Never Looked After	0		0		0.136
Ever Looked After	0.459 (0.294)	1.58	0.496 (0.256)	1.64	
Area Deprivation at P3					
5 – Least Deprived	0		Failed to converge		
4	0.774 (0.384)*	2.17			
3	0.808 (0.379)*	2.24			
2	0.549 (0.383)	1.73			
1- Most Deprived	0.324 (0.390)	1.38			

Table 56 Unadjusted Multilevel Binomial Pro-social Behaviours at P3 models by Level 2 variables

	Unadjusted Coefficients - fixed effects β (S.E)	**Odds ratio**
Constant		
% Free school meals (Gm)		
(cont.)	0.008 (0.008)	1.008
No. of Exclusions per 1000 pupils		
(cont.)	0.002 (0.003)	1.002
School size (gm)		
(cont.)	**-0.002 (0.001)***	**1.002**
HMIe Report Score		
(cont.)	-0.193 (0.156)	1.21
Attendance		
Above average	**0**	
Average	**0.862 (0.496)**	**2.37**
Below average	**0.500 (0.465)**	**1.65**
Well below average	**1.351 (0.615)***	**3.86**
Denomination		
Non-denominational	0	
Catholic	0.056 (0.228)	1.06

p<0.05=; p<0.01=***

Table 57 Adjusted Multilevel Binomial models predicting Pro-social Behaviours abnormal scores at P3

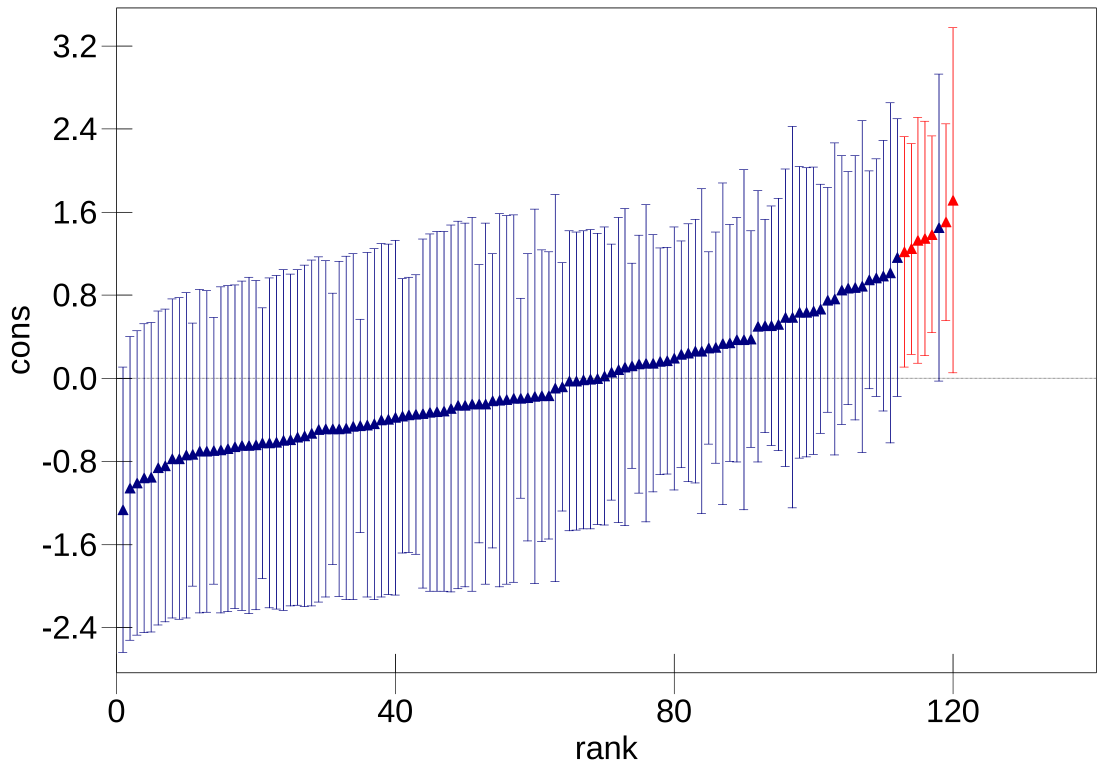
	A - Null 2 level	B - Sex (F.E.)	C - Sex (F.E.) & Baseline score (F.E.)	D - Sex (F.E.); Baseline score (F.E.); School size - gm(F.E.) & Attendance (F.E.)	FINAL - Sex (F.E.) & Baseline score (F.E.)
Fixed Part (Logit)					
Constant	-2.350 (0.113)**	-3.232 (0.184)**	-3.354 (0.187)**	-4.299 (0.486)	**-3.354 (0.187)****
Sex of child					
Female		0	0	0	**0**
Male		1.350 (0.188)**	1.190 (0.192)**	1.243 (0.228)	**1.190 (0.192)****
Binary Pro-social Behaviours Problems at Preschool					
Normal			0	0	**0**
Abnormal			1.271 (0.190)**	1.382 (0.221)	**1.271 (0.190)****
School size (gm)					
(cont.)				-0.000 (0.001)	-
Attendance					
Above average				0	-
Average				1.036 (0.510)*	-
Below average				0.589 (0.484)	-
Well below average				1.201 (0.637)	-
P value of Random Part					
cons/cons	0.000	0.000	0.000	0.015	**0.000**
Wald Test					
No. of Schools	120	120	120	119	**120**
No. of cases	2130	2130	2128	1731	**2128**

Table 58 Final Multilevel binomial model predicting difficulties with Pro-social Behaviours at P3 estimates by algorithm

	Sex (F.E.) & Baseline score (F.E.)		
	MQL - 1	**PQL - 2**	**MCMC**
Constant	-3.354 (0.187)**	-3.727 (0.215)**	**-3.758 (0.225)****
Sex of child			
Female	0	0	**0**
Male	1.190 (0.192)**	1.261 (0.213)**	**1.268 (0.208)****
Binary Pro-social Behaviours Problems at Preschool			
Normal	0	0	**0**
Abnormal	1.271 (0.190)**	1.399 (0.208)**	**1.400 (0.208)****

p<0.05=; p<0.01=***

Figure 61 Residuals from Multilevel binomial model predicting difficulties with Pro-social Behaviours at P3, adjusted for sex and baseline score



Base: 2128

[i] Currency converted to Great British Pounds for benefit of comparability on 24th June 2014 using the current exchange rate of 1 USD equivalent to 0.59 GBP, and 1 Euro to 0.80 GBP.