

## CEE Special Report 003

# The Interdependence and Determinants of Childhood Outcomes: The Relevance for Policy

Report to the Department of Children, Schools and Families

**Bilal Nasim**

This research was commissioned before the new UK Government took office on 11 May 2010. As a result the content may not reflect current Government policy and may make reference to the Department for Children, Schools and Families (DCSF) which has now been replaced by the Department for Education (DfE). The views expressed in this report are those of the authors' and do not necessarily reflect those of the Department for Education.

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## Executive Summary

The Centre for the Economics of Education was asked to bring together a wide range of academic evidence (primarily England-based) to investigate the extent to which academic and non-academic childhood outcomes are complementary to each other, or are in some way traded-off against each other. The report also investigates the drivers of both academic and non-academic outcomes and the extent to which child outcomes persist throughout a child's life and across generations. There is also a brief discussion of the implications of this evidence to education policy.

The report finds that the relationships between academic and non-academic outcomes are complex in nature. For example, pupils who are bullied or who take unauthorised absence at age 14 have significantly lower educational achievement at GCSE. Pupils who experienced bullying at age 14 were also much more likely to experience bullying at age 16. Conversely pupils who participate in positive extra-curricular activities, such as clubs, were also found to have better academic achievement later in their schooling. These childhood outcomes are themselves determined by a wide variety of influences (such as the quality of parenting they receive) and environmental factors (for example whether they are exposed to passive smoke).

It has been well established that children from disadvantaged backgrounds have relatively poor academic outcomes and tend to have weaker social skills than children from more advantaged households. However the evidence also suggests that these children also go on to experience more negative outcomes in adulthood, such as lower probability of employment and lower wages. Furthermore key social and academic outcomes of parents – cognitive skills, attitudes to education, smoking and drinking – are related to similar behaviours in their children.

The report concludes that the complex nature of the drivers of child development, the interdependence of child outcomes, and the way that outcomes persist through an

individual's life and across generations needs to be recognised in order to develop truly effective policy.

While very little of the evidence highlighted in this report identifies true causal relationships (i.e. that a factor X actually *directly causes* a change in outcome Y), the report draws on some of the highest quality research and analysis currently available, using detailed longitudinal datasets, including the Department's own Longitudinal Study of Young People in England. This enables us to identify at the very least "robust associations" as well as the data allows. However it does suggest that further research is required to better understand the associations outlined in this report to move to a position where we can identify credible causal relationships. This is important to foster more justified and increasingly effective policymaking.

This research report was written before the new UK Government took office on 11 May 2010. As a result the content may not reflect current Government policy. This research will be of use to officials and ministers in helping to shape the future direction of education policy and Departmental strategy.

# The Interdependence and Determinants of Childhood Outcomes: The Relevance for Policy

**Bilal Nasim**

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## **Acknowledgments**

Bilal Nasim is a Research Assistant at the Centre for Market and Public Organisation, University of Bristol.

## 1 Introduction

This report examines a wide range of mainly England-based evidence on the interdependencies and determinants of, and inter- and intra-generational associations in, childhood (Every Child Matters (ECM)) outcomes, and briefly discusses the relevance of this evidence to policy design. The evidence presented here is by no means exhaustive, but rather indicative of the research being undertaken around these issues. The Government's aim is to provide children with the support they need to *be healthy, stay safe, enjoy and achieve, make a positive contribution and achieve economic well-being*. For this to be successful, the dimensions of childhood outcomes which compose each of these categories have to be addressed to ensure that they are improving and that potential inequalities in them are being reduced. This report looks at the academic evidence relating to all of the ECM categories and provides brief inference relating the relevance for the design and implementation for policy, insofar as that is possible.

It is largely left up to the reader to determine to which category of ECM outcomes particular research results are referring to. All of the ECM categories, to varying degrees, overlap with each other and the evidence that is cited in large parts of this report is not investigating childhood outcomes in ECM terms or within the ECM framework explicitly. Nevertheless, all of the childhood outcomes fall within the broad remit of the ECM outcomes, and more generally, are outcomes which could be considered of inherent value when considering the development of children in England. With this in mind, it is worth highlighting variation in the framing and descriptions of outcomes across the sources of evidence reported in this paper. Some of the evidence explicitly investigates outcomes framed within the context of the ECM programme, while others investigate childhood outcomes which are deemed important. With respect to the latter example in particular, distinctions are made between dimensions of childhood variables such as cognitive, non-cognitive, and characteristics representative of mental health. Cognitive variables are usually comprised of either scores from school tests or from individual examinations of cognitive function (such as IQ). The term non-cognitive, in much of the evidence in this report, is used to describe

characteristics relating to ‘emotional intelligence’<sup>1</sup>. A child’s level of confidence, locus of control and sociability, amongst others, are considered typical non-cognitive attributes. These differ from what are considered mental health outcomes, which generally allude to mental health problems, either clinically diagnosed, or using questionnaires to discern problems with psychological functioning.

Much of the evidence referenced in this report does not contain any causal identification. That is, many of the relationships found between childhood outcomes, between the socio-economic characteristics and childhood outcomes, as well as the inter- and intra-generational relationships are conditional correlations, and not causal impacts, with the extent and type of conditioning varying by evidence source. This distinction between causation and correlation will be highlighted regularly throughout the report, but it is worth bearing in mind from the outset. Ideally policy, in the domains covered within this report, would be based on evidence showing the causal impacts of determinants on outcomes. Given the context of this report it is very difficult to statistically identify such relationships, thus, on the one hand, it is difficult to point to concrete policy recommendations on the basis of this evidence alone. However, the evidence outlined is often suggestive of strong and robust conditional associations meaning that although this doesn’t provide a basis for policy implementation, it is at the very least, indicative of the associations which exist concerning childhood outcomes, and provides detailed characterisation of the dynamics involved. That said, the associative and correlative results should be considered with caution, particularly when inferring policy implications.

## **2 Scene Setting**

The U.K. faces numerous social and economic challenges in the coming years, with the recession and its impact the most immediate. Families will tend to experience higher probability of unemployment and lower real incomes, in conjunction with the government

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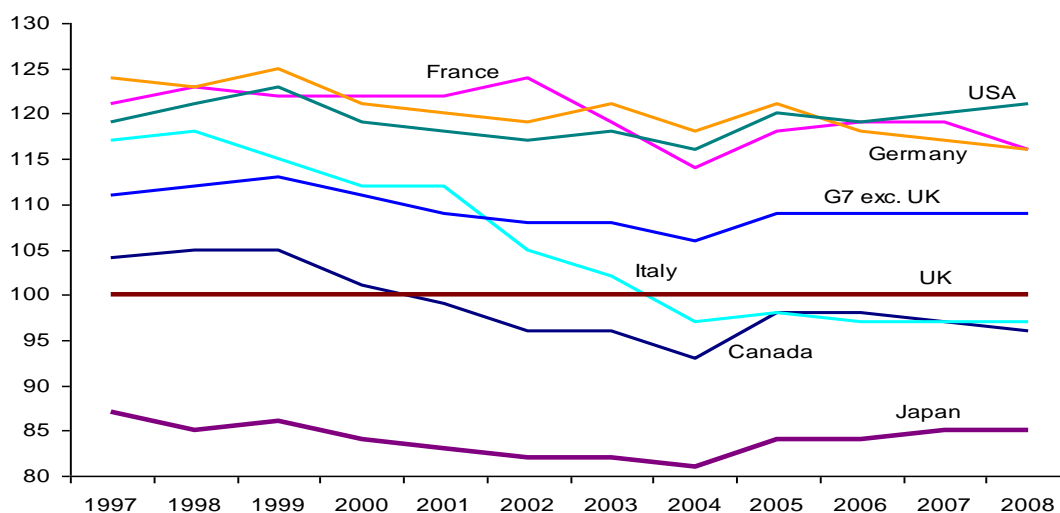
<sup>1</sup> Non-cognitive skills are not easily defined, and the term ‘emotional intelligence’ is often used as a ‘catch-all’ which is not particularly helpful, and potentially misleading.



receiving lower tax receipts and facing potentially higher levels of expenditure. Pressure on public finances will be contiguous with increased overall demand for public services. Other challenges predate the current recession. The U.K. still lags behind other major countries with respect to labour productivity, although progress has been made in recent years.

O'Mahony and de Boer, 2002, find that the labour productivity deficit is primarily accounted for by differential levels of investment both in physical and human capital, implying that a lack of skills in the U.K. labour force may play a role.

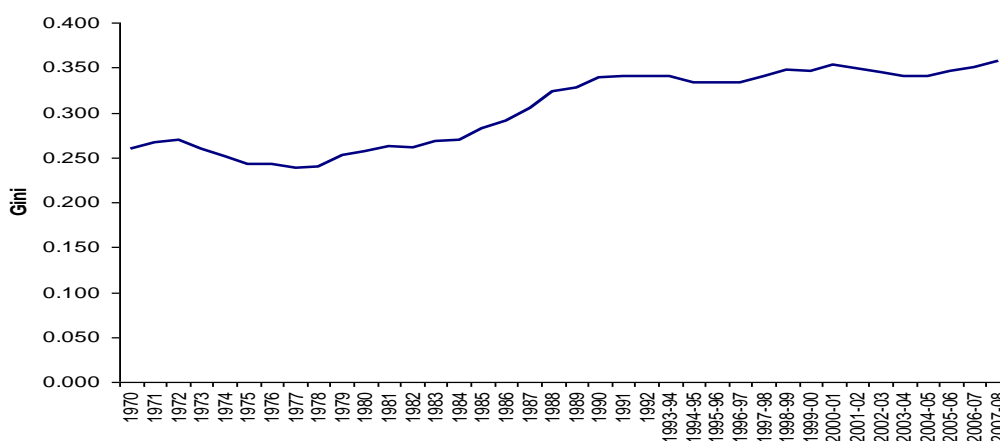
**Chart 1: International comparisons of output per hour worked (UK = 100)**



(ONS: International Comparisons of Productivity)

Income inequality in the U.K. has risen steadily over the past 30 years, particularly during the 1980s. Throughout the 1990s it has remained largely stable but it can be seen that in recent years there has been the return of a slight upward trend.

**Chart 2: Gini Coefficient, U.K. 1970 - 2008**



**(IFS: Poverty and inequality in the UK, 2009)**

Levels of inequality have stabilised since the late 1990s, although there has been a renewed upward trend in the past few years and is above the OECD average. As noted in the IFS report on U.K. poverty and inequality, it is difficult to predict how income inequality will evolve over the coming years, especially with the economy in recession amid turmoil in world financial markets. One might expect these events to reduce top incomes and subsequently income inequality, although the degree to which this will be offset by unemployment, currently rising fastest among low-educated workers, is unknown.

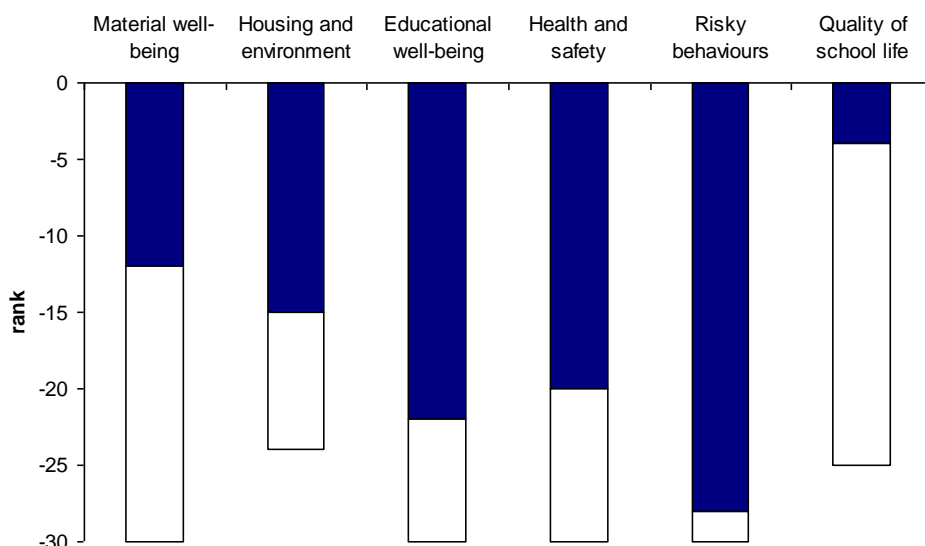
Social mobility also remains an issue. Income mobility fell between cohorts born in 1958 and 1970, with the percentage of sons in the lowest income quartile whose parents were also in the lowest income quartile rising from 31% in the 1958 cohort to 38% in the 1970 cohort. A similar increase in income persistence is observed at the top of the income distribution, where the percentage of sons in the highest income quartile given their parents were also in the highest income quartile, rose from 35% to 42%<sup>2</sup>. However, other dimensions of social mobility appear to be exhibiting different trends. The relationship between family income and GCSE attainment has appeared to weaken since the 1970 cohort<sup>3</sup>.

<sup>2</sup> Blanden, Gregg and Machin (2005), Intergenerational Mobility in Europe and North America, Sutton Trust, LSE

<sup>3</sup> Gregg and Macmillan (2008) Intergenerational Mobility and Education in the Next Generation.

Much of this report is focused on characterising children’s overall well-being and for good reason; the U.K. performs poorly in international comparisons of most dimensions of child well-being.

**Chart 3: Comparative policy-focused child well-being in 30 OECD countries**

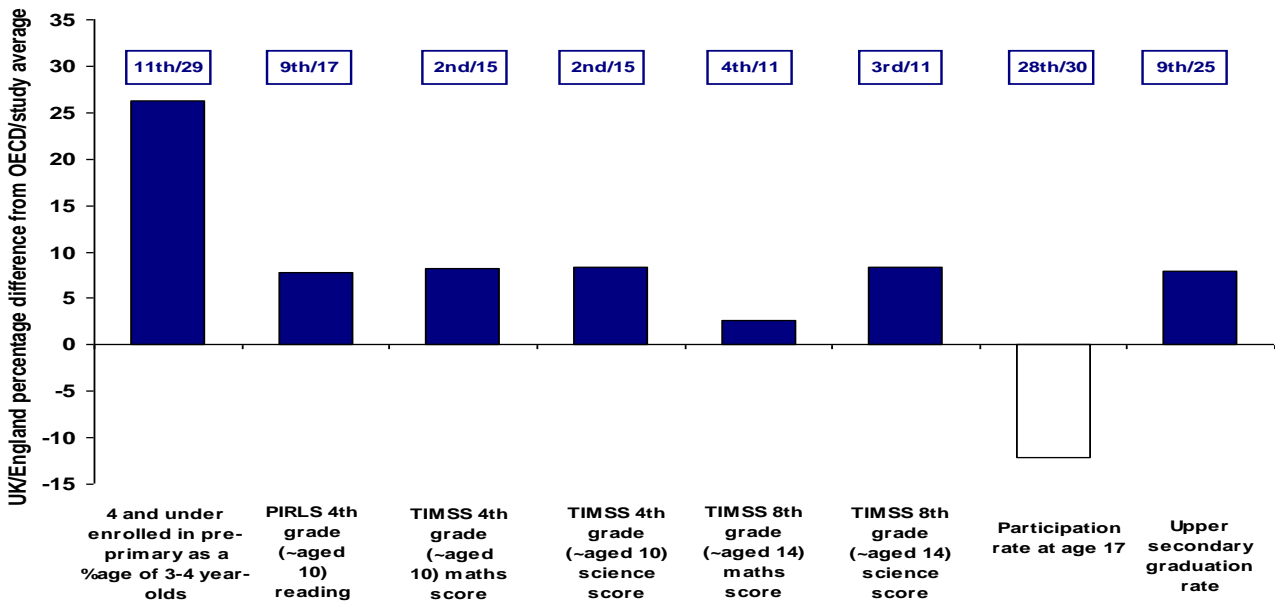


**(OECD: Doing better for children, 2009. Blue Bars indicate UK ranking. White bars indicate number of countries assessed under the particular domain)**

Children in the U.K. are more likely to engage in risky behaviours compared with most of the 30 other OECD countries in the sample. The U.K. performs poorly relative to other countries in the quality of child housing and environment, educational well-being and health and safety. Interestingly however, the U.K. performs relatively well with respect to children’s quality of school life.

However, significant progress is being made in a number of areas. Although England performs poorly by international standards in ensuring overall child well-being, it compares favourably on most indicators of educational attainment, apart from the participation rate at age 17.

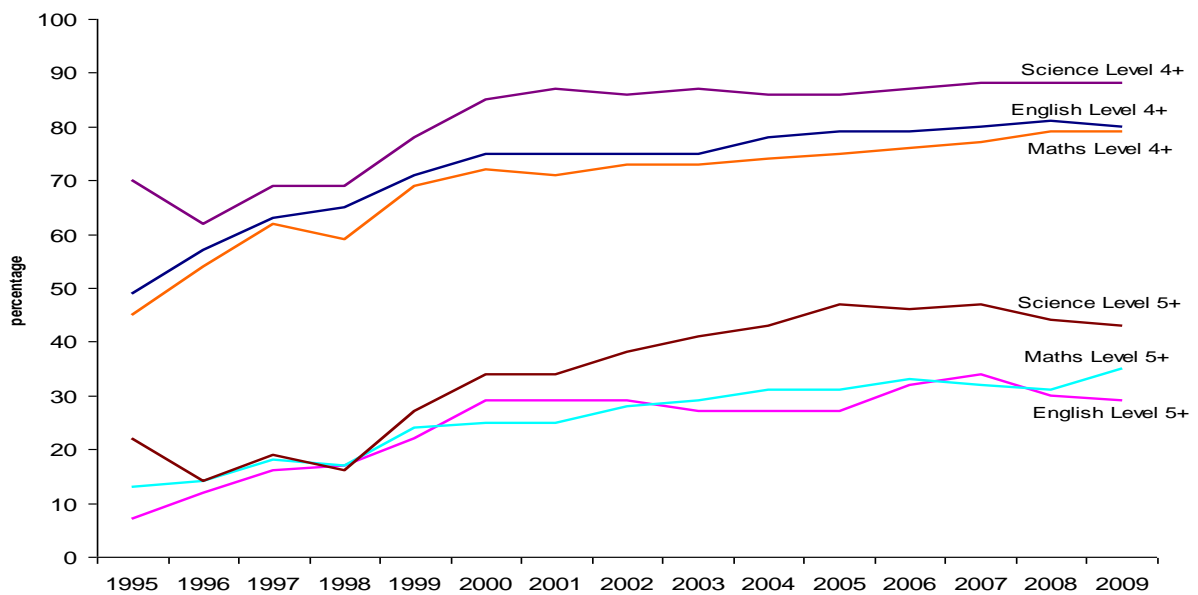
**Chart 4: England/UK performance on selected indicators relative to the OECD/International study average.**



(DCSF Analysis of PIRLS and TIMSS; OECD Education at a Glance, 2009)

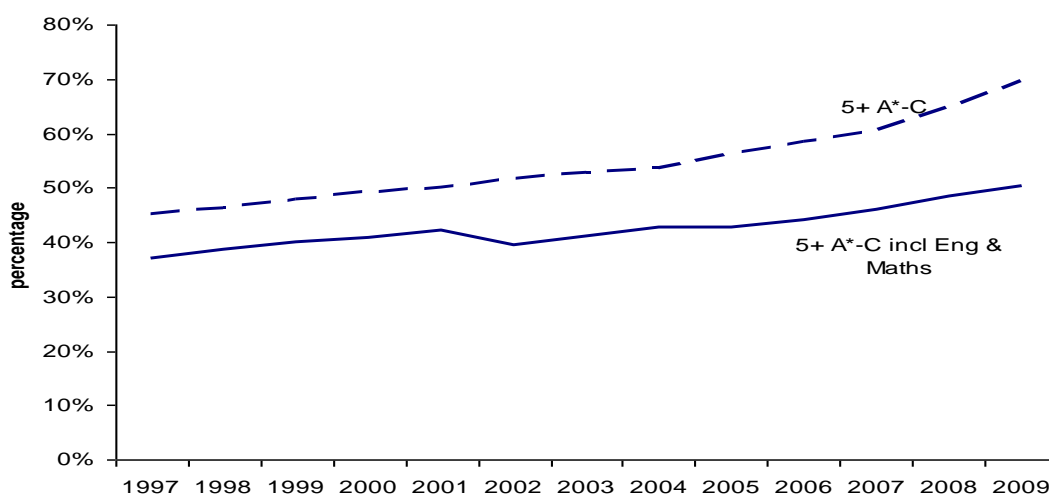
Academic attainment has also been improving over time in England. The proportion of children in England achieving level 4 or above at Key Stage 2 has been steadily increasing. Trends in GCSE attainment are also encouraging

**Chart 5: Key Stage 2: Proportion of young people achieving level 4 or above 1997-2009**



(GCSE and Equivalent Results in England, 2008/09 (Provisional) SFR 27/2009; National Curriculum Assessments at Key Stage 2 in England 2009 (Provisional) SFR 19/2009)

**Chart 6: Trends in GCSE attainment, 1997 - 2009**



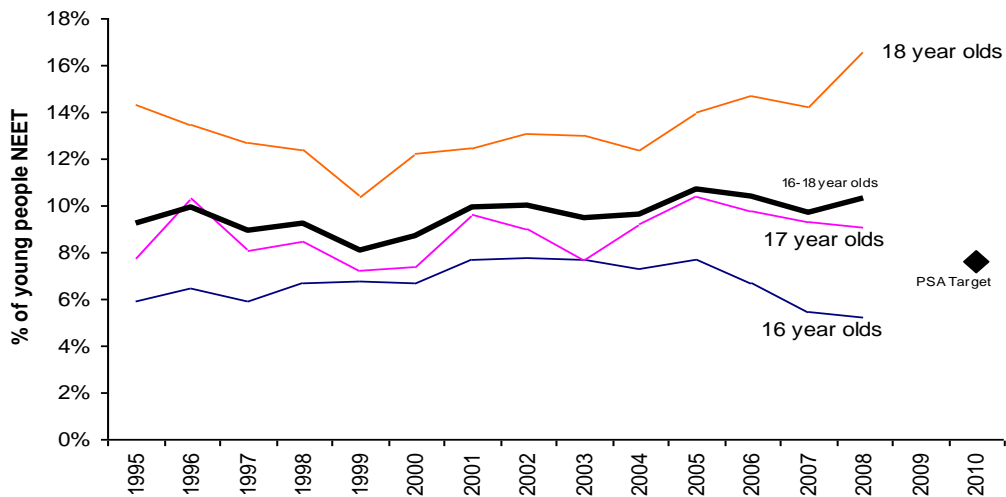
**(GCSE Results calculated on the basis of 15 year olds 1997-2004. From 2005 calculated on an end of Key Stage 4 basis)**

Similarly, fewer children appear to be missing crucial attainment targets. The proportions of schools with less than 55% of pupils at Key Stage 2 attaining Level 4 or above in English and Maths has been decreasing steadily from 2004. Likewise, the number of schools with less than 30% of pupils attaining at least 5 A\* - C grades, including English and Maths, has been decreasing since 2003<sup>4</sup>.

One side-effect of the recession has been the increased participation in further education with the proportion of 15 year olds participating in education and training is at the highest rate ever. However when decomposed by age, it can be seen that although the proportion of 16 and 17 years olds not in education, employment or training (NEET) has seen significant declines, it has in fact risen sharply for 18 year olds, such that the average proportion of young people (16 – 18 years old) has risen slightly between 2008 and 2009.

<sup>4</sup> Under 1500 schools in 2008, down from over 2500 in 2004, had less than 55% of their pupils attaining Level 4 or above at Key Stage 2. Just over 400 schools in 2008, down from almost 1100 schools in 2004, had less than 30% of pupils achieving at least 5 A – Cs, including English and Maths.

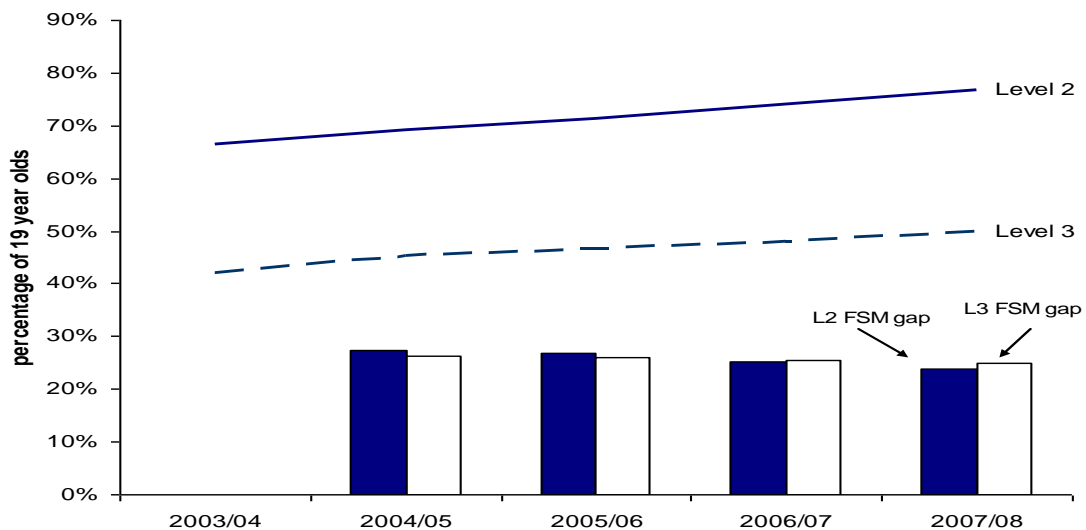
**Chart 7: Percentage of young people NEET, 1995 - 2008**



**(Participation in Education, Training and Employment by 16-18 Year Olds in England SFR 12/2009)**

The *Children's Plan* outlined the goal of getting 90% of 19 year olds to Level 2 by 2020 and 70% to Level 3.

**Chart 8: Attainment at Level 2 and Level 3, including FSM gaps.**



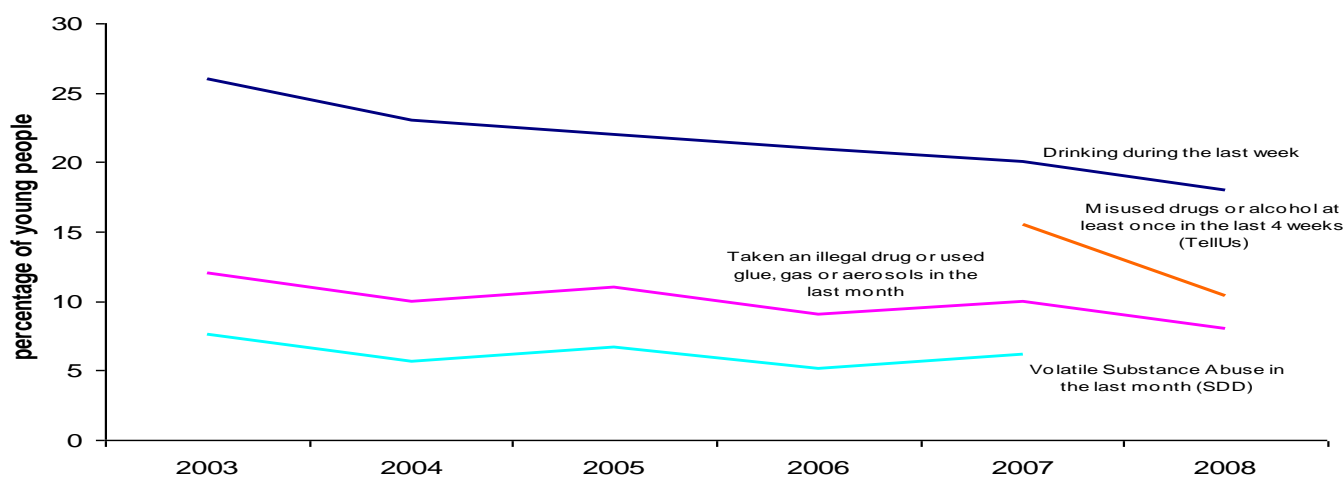
**DCSF Level 2 and 3 Attainment by Young People in England Measured Using Matched Administrative Data: Attainment by Age 19 in 2008 (Provisional)**

It can be seen that attainment of Level 2 and Level 3 has been steadily increasing since 2003/4. The bars on the graph also show that the FSM attainment gaps have been slightly narrowing over the same period in both Level 2 and Level 3.

Recent data also suggests that looked-after children (LAC) are experiencing more stable environments, with fewer moves and longer durations of placement. Similarly, more care-leavers are experiencing positive outcomes, with a higher proportion of 19 year old care leavers (having left care at 16) in suitable accommodation and either employment, education or training than in previous years<sup>5</sup>

Some health outcomes have also seen improvements. Breastfeeding appears to be on a general upward trend at birth and at 6 weeks. However obesity in young children continues to rise, although this rise appears to have been slowing over recent years<sup>6</sup>. Infant mortality continues to fall and the rate of hospital admissions has fallen from its 2006-07 peak<sup>7</sup>. Substance misuse and abuse amongst young people, although still high, is on a downward trend.

**Chart 9: Young people frequently use illicit drugs, alcohol or volatile substances**



(TellUs survey of pupils; Smoking, Drinking and Drug Use Survey (SDD); British Crime Survey)

<sup>5</sup> Statutory SSDA903 data collection from local authorities to DCSF; SSDA903 return, published in: "Statistics of Education Children Looked After by Local Authorities".

<sup>6</sup> Health Survey for England.

<sup>7</sup> ONS Health Statistics Quarterly; Dept of Health Hospital Episode Statistics

The number of 1<sup>st</sup> time entrants (ages 10 – 17) to the criminal system has bucked its previous upward trend and has been decreasing over recent years as well as the rate of reoffending compared with 2005<sup>8</sup>.

However, England still faces significant challenges in ensuring favourable ECM outcomes. Although, as aforementioned, FSM attainment gaps have been narrowing slightly, they still exist, with approximately a 20% and 25% percentage point gap in Key Stage 2 and 4 respectively between children eligible for FSM and those children not. The Special Educational Needs (SEN) attainment gap at Key Stage 2 has narrowed, however, the gap at Key Stage 4 has widened in recent years which is a cause for concern<sup>9</sup>. It also seems likely that the 2011 Child Poverty target will be missed<sup>10</sup>.

Thus, although progress has been made across the spectrum of ECM outcomes, much work still needs to be done to provide all children in England with the personal skills and environments such that they can develop to a fulfilling standard.

### **3 Section A: The Interdependence And Determinants Of Childhood (ECM) Outcomes**

#### **The interdependence of childhood outcomes**

It is increasingly becoming clear that the 'outcomes' of children are not mutually exclusive goods. Research in recent years has been suggestive of robust associations between a wide range of cognitive and non-cognitive childhood outcomes, and has enabled better understanding of these links.

Vignoles and Meschi<sup>11</sup> (2010) highlight the interdependencies of adolescent outcomes using PLASC and LSYPE data. The authors model<sup>12</sup> the determinants of three different ECM

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<sup>8</sup> DCSF official statistics on the number of first-time entrants to the criminal justice system – 10 November 2009.

<sup>9</sup> National Pupil Database and School Census

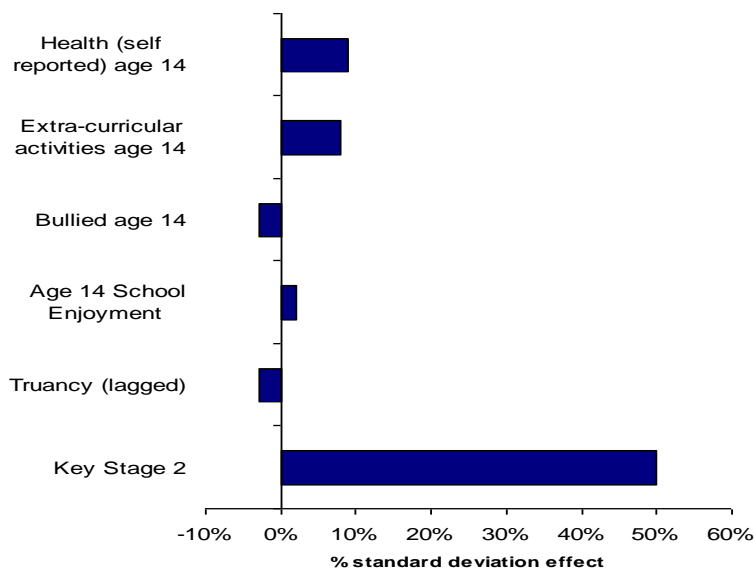
<sup>10</sup> Households below average income

<sup>11</sup> Vignoles and Meschi, 2010, "The determinants of non-cognitive and cognitive schooling outcomes".



outcomes separately (educational achievement, enjoyment of school and bullying at age 16) and include other relevant ECM outcomes in the regression analysis including pupil self-rated health, extra-curricular participation and a proxy for truancy. The first model characterises the determinants of educational achievement at age 16, measured by Key Stage 4 achievement. After conditioning on as many factors as the data would allow, in addition to Key Stage 2 (prior attainment measure) the authors also find significant (but modest) positive associations between self-rated health and participation in extra-curricular activities, and age 16 academic achievement<sup>13</sup>. In contrast, being bullied at age 14 and the number of unauthorised absences (used as proxy for truancy) between ages 14 and 16, were both found to be significantly negatively associated with achievement at age 16.

**Chart 10: Determinants of achievement at age 16**



These associations cannot of course, be considered causal. The potential (and probable) existence of confounding factors associated with both the independent ECM outcomes and the dependent ECM outcome (age 16 achievement in the example above) and/or possible reverse causality both ensure that the associations established in the initial regression analysis should not be interpreted as causal. To explore this matter further, Vignoles and Meschi adopt an instrumental variable (IV) approach to obtain causal estimates. For the first

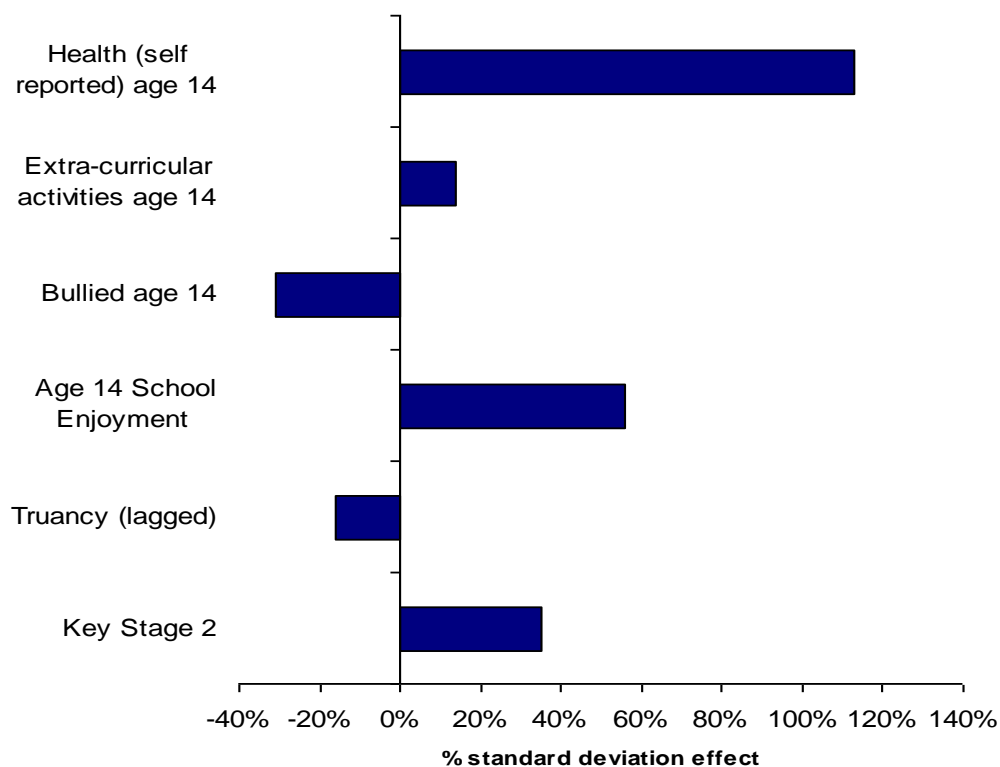
<sup>12</sup> The models are value added models for each of the outcomes; i.e. the authors investigate the determinants of each outcome at age 16, conditioning on prior measurements of the outcome (age 14).

<sup>13</sup> Cognitive outcomes are proxied by academic achievement measured using the results in Key Stage tests contained in the NPD. The enjoyment of school variable is obtained from LSYPE interviews in 2006 and it sums the answers that the young person has given to 12 attitudinal questions relating to how they feel about school. The measure of health is self reported by the pupils who are asked to rate their overall health over the past 12 month. The variable assumes values from 1 (not good at all) to 4 (very good).

of the three models, 'truancy' (the number of unauthorised absences in 2005) is instrumented with the change in the total number of absences at the Local Authority level between 2004 and 2005. Under the assumption that changes in the LA number of absences is not associated with pupil achievement other than via pupil level numbers of unauthorised absences, the instrument can be considered excludable from the age 16 achievement equation. When individual absence is instrumented the coefficient increases substantially (to -0.22 of a SD response in age 16 attainment to a SD increase in (instrumented) number unauthorised absences) suggesting the existence of a causal and non-trivial relationship between truancy and age 16 achievement.

The second model characterises the determinants of school enjoyment. Conditional regression analysis indicates that prior attainment (age 11, Key Stage 2), prior level of school enjoyment (age 14) and especially self-rated health, are significantly positively associated with school enjoyment at age 16. Conversely, being bullied at age 14 and truancy are both significantly negatively related to school enjoyment at age 16.

**Chart 11: Determinants of school enjoyment at age 16.**



In this model, both the number of unauthorised absences and prior (Key Stage 2) attainment are instrumented for. The authors use the pupil's month of birth to instrument Key Stage 2 attainment given they are correlated and, they argue, a pupil's month of birth is unlikely to be independently associated with enjoyment of school<sup>14</sup>. When pupil Key Stage 2 score is instrumented using month of birth the coefficient on Key Stage 2 achievement becomes insignificant, suggesting that there is no genuine causal relationship between academic achievement and subsequent enjoyment of school. Once the number of absences is instrumented using the change in the total number of absences at the Local Authority level, the coefficient becomes insignificant, suggesting that while there appears to be a causal relationship between school absences and pupil achievement (first model) the same does not seem to be true between school absences and school enjoyment.

In addition to school enjoyment, pupil's general life satisfaction has also been found to be positively and significantly associated with the overall quality of school experience. Gilman and Huebner<sup>15</sup> show that youth (aged 11 – 18) reporting higher life satisfaction<sup>16</sup> achieve higher Grade Point Averages, report greater frequency of extracurricular participation and report more positive school experiences than those with lower self-rated life satisfaction. In addition, pupils with high levels of life satisfaction reported more positive relationships with others (including peers and parents), less intrapersonal distress (such as anxiety and depression), higher levels of hope and a greater sense of personal control than youth reporting low life satisfaction. Such findings suggest that high levels of life satisfaction and various indices of positive behavioural and psychological adjustment are interrelated.

The cross-sectional nature of the data precludes determination of the direction of the relationship between pupil life satisfaction and the dependent measures. Thus nothing causal can be inferred from the observed associations. Method variance concerns and the potential response bias as a result of the self-reported nature of the data also highlight the need to interpret these results with caution.

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<sup>14</sup> One could question the validity of using birth month to instrument for academic attainment on the grounds that where a child is placed in the rank of age within the year may plausibly have a bearing on other outcomes (such as enjoyment of school for example), independently of the effect on educational attainment. In addition, given that only one instrument is available for each endogenous variable, no over-identification test is possible.

<sup>15</sup> Gilman and Huebner, 2006, "Characteristics of adolescents who report very high life satisfaction"

<sup>16</sup> Life Satisfaction measures using the Students' Life Satisfaction Scale (SLS), a 7 item self report measure designed to assess global life satisfaction in youth.

Experiencing bullying in childhood has also been found to be related to other childhood outcomes and measures of childhood well-being. Children who report being victimised at age 8 have, on average, 3 percentage points higher external locus of control and depression at age 10 than children who were not victimised, while being bullied at age 14 is associated both with academic achievement at 16 and particularly strongly related to enjoyment of school at age 16<sup>17</sup>. Interestingly, although self-reported health at 14 is a strong predictor of whether an adolescent will experience bullying at 16 (a pupil is 6%-7% more likely to be bullied if reporting health problems)<sup>18</sup>, academic achievement at age 11 and enjoyment of school at age 14 are not associated with being bullied at 16<sup>19</sup>.

A recent report<sup>20</sup> for the Institute of Fiscal Studies (IFS) looks at the interdependencies between some of the ECM outcomes and indicators of 'risky' behaviours. The authors show that finding school worthwhile is significantly negatively associated with age 16 behaviours such as drinking frequently, whether the pupil has tried cannabis, anti-social behaviour and truancy.

A particularly interesting result is the significant association between whether a child stops liking school and participation in risky behaviours. In addition to being significantly negatively associated with Key Stage 4 achievement, a pupil that stops liking school between the ages of 14 and 16 is approximately 2 percentage points more likely to drink and smoke frequently, 5 percentage points more likely to have tried cannabis and 8 percentage points more likely to play truant.

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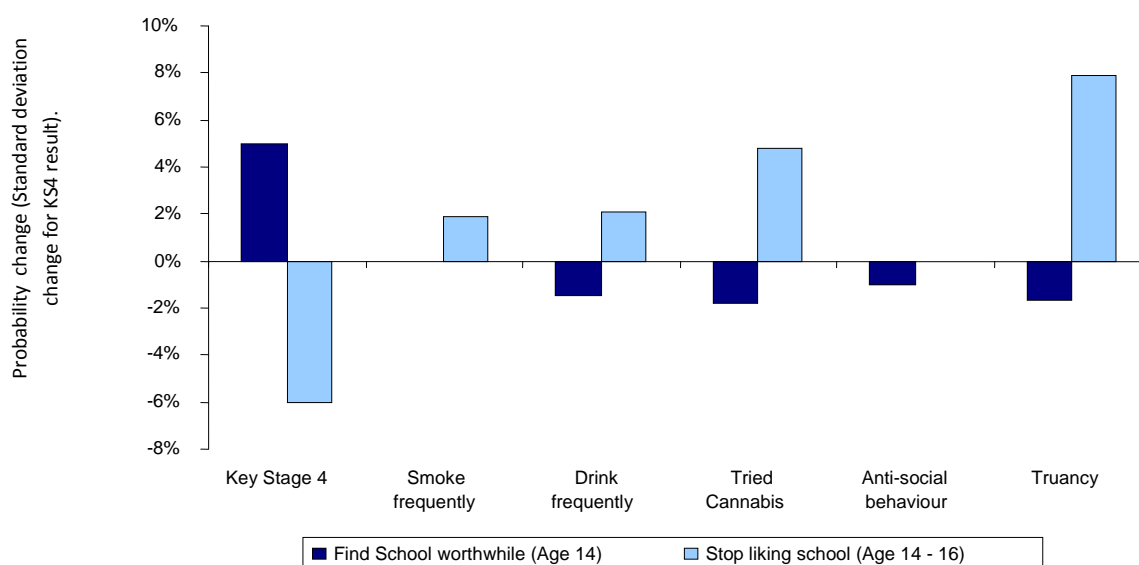
<sup>17</sup> Gutman and Feinstein, 2008, "Children's Well-Being in Primary School: Pupil and School Effects"

<sup>18</sup> It is not possible to establish causality or directions of causality.

<sup>19</sup> Given the robust associations found between being bullied at 14 and later academic achievement and school, this result hints at a causal connection between being bullied at 14 and later achievement and school enjoyment.

<sup>20</sup> IFS (2009) Drivers and Barriers to Educational Success: Evidence from LSYPE

**Chart 12: Impact of school enjoyment on outcomes<sup>21</sup>**



The above evidence suggests that childhood outcomes, broadly defined, are at the very least strongly correlative. As mentioned, nothing can be definitively stated about the extent to which these observed associations can be considered causal, however at the very least, these robust associations between ECM outcomes highlight the potential issues with considering childhood outcomes in isolation.

### **The determinants of childhood outcomes**

The associations between childhood ECM outcomes are robust and complex. However, these outcomes are achieved by the interaction of many different factors, which vary in importance depending on the outcome. In this section we consider the evidence on the dominant determinants of childhood outcomes.

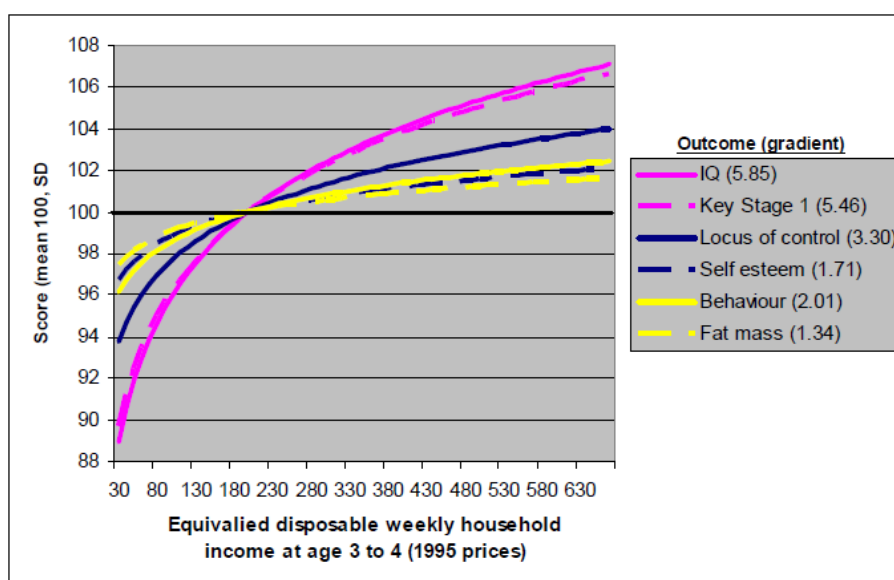
#### **Family**

The Family ‘environment’ provides some of the strongest predictors of a wide range of childhood outcomes. Gregg et al<sup>22</sup>, 2008, estimate the raw family income gradients of 6

<sup>21</sup> Key stage 4: is measured in terms a standard deviation 1 SD in KS4 = approx 120 points. Other measures are percentage point impacts on probability of behaviour occurring.

child outcomes; raw IQ score aged 8, Key Stage 1 achievement (aged 7), Locus of Control aged 8, Self-esteem aged 8, Behavioural problems aged 6 to 7, and Fat mass aged 9. Using the Avon Longitudinal Study of Parents and Children (ALSPAC) the authors find that children raised in poverty are falling behind their better-off counterparts by mid-childhood in terms of the full spectrum of developmental outcomes.

**Chart 13: Income gradients for childhood outcomes**



The gradients are largest for cognitive outcomes. Gradients in socio-emotional outcomes are around a third to a half as large as those in cognitive outcomes while the gradient in fat mass is smallest of all six outcomes. These results show that children in families with low income are not only disadvantaged in terms of intellectual development, but also in terms of broader aspects of childhood development and well-being.

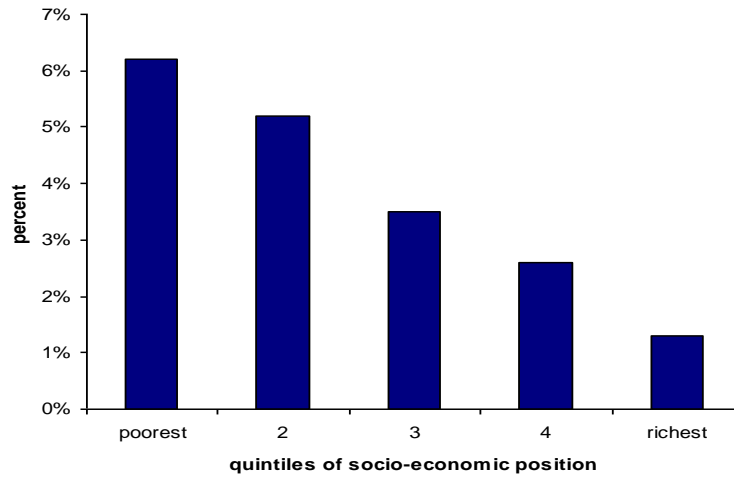
Recent evidence<sup>23</sup> has also helped to highlight the family socio-economic gradients in other ECM outcomes, and in adolescence rather than childhood. Age 14 behaviour outcomes such as being a frequent smoker, whether ever tried cannabis, anti-social

<sup>22</sup> Paul Gregg, Carol Propper and Elizabeth Washbrook (2008) Understanding the Relationship between Parental Income and Multiple Child Outcomes: a decomposition analysis CMPO Working Paper No. 08/193

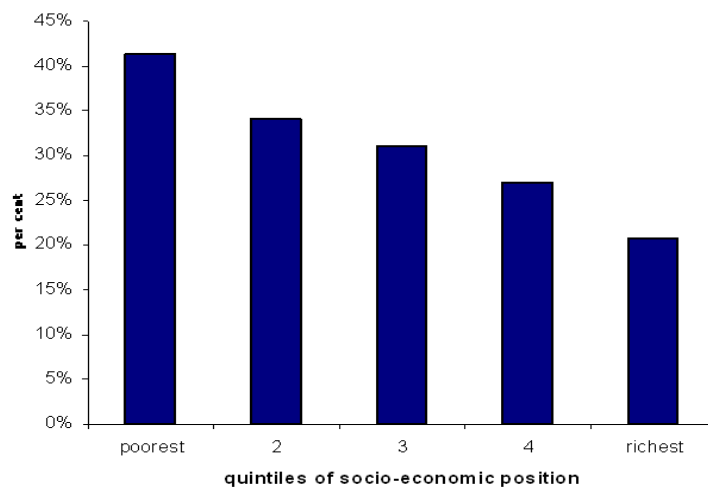
<sup>23</sup> IFS (2009) Drivers and Barriers to Educational Success: Evidence from LSYPE

behaviour and playing truant all have negative socio-economic gradients. These associations again provide further characterisation the relationship between family circumstances and childhood outcomes.

**Chart 14: Frequent smoker age 14**

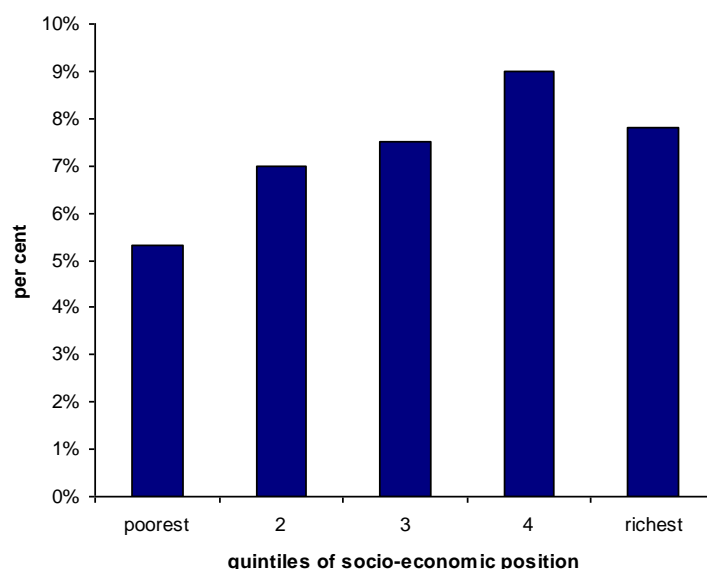


**Chart 15: Anti-social behaviour age 14**

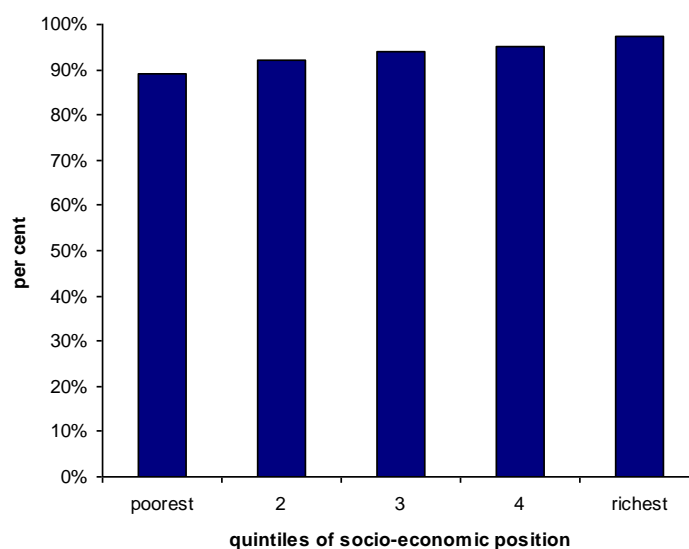


A number of adolescent outcomes are positively associated with the socio-economic status of the family. Interestingly, one of these is whether the individual is a frequent drinker at age 14.

**Chart 16: Frequent drinker age 14.**



**Chart 17: Participation in positive activities.**



This indicates a stronger role for family income in the child's decision to drink than to participate in other risky behaviours. Higher socio-economic families are also more likely to have children participating in positive activities at age 14.

These observed gradients in early and later childhood cannot be considered causal. However, evidence from England.<sup>24</sup> suggests that a one-third reduction in family income

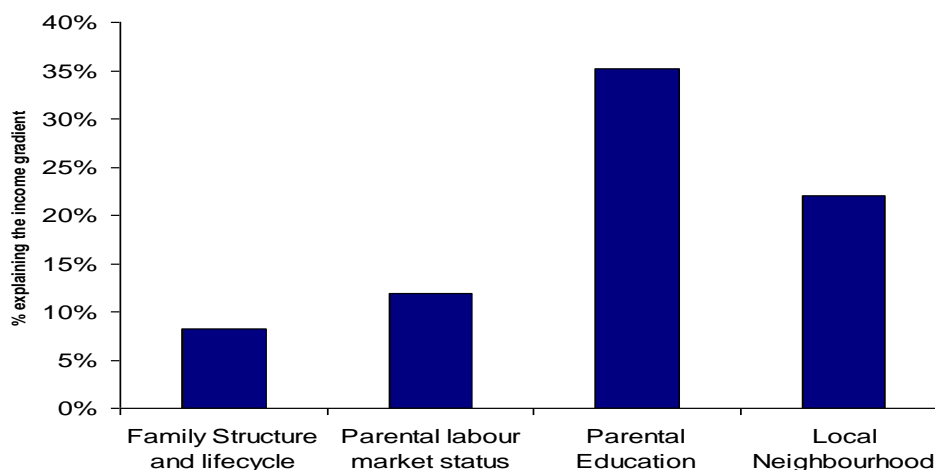
<sup>24</sup> Gregg and Blanden, 2004 "Family Income and Educational Attainment



increases the propensity to achieve no A-C GCSEs by between 1 and 3 percentage points. Recent Canadian and American research<sup>25</sup> measured the impact of a \$1000 (Canadian and American dollars respectively) on early childhood academic achievement and found approximately 7% and 6% increases respectively in academic achievement<sup>26</sup>. Thus research suggests that the **direct** impact of income on children’s outcomes is non-trivial, though modest<sup>27</sup>.

What then, accounts for the substantial socio-economic gradients found in a wide range of childhood outcomes? Decomposition analysis of the income gradients suggests that parental education explains much of the association between family socio-economic background and childhood outcomes. Gregg et al, 2008, show that parental education helps to explain between 25% and 74% of the income gradients observed for each of the 6 outcomes measured<sup>28</sup>. This represents a far greater variance than any other socio-economic characteristic can account for. The distribution across characteristics of explained variance in income gradients differs by the childhood outcome being measured.

**Chart 18: Percentage of income gradient in Key Stage 1 attainment explained by socio-economic characteristics**



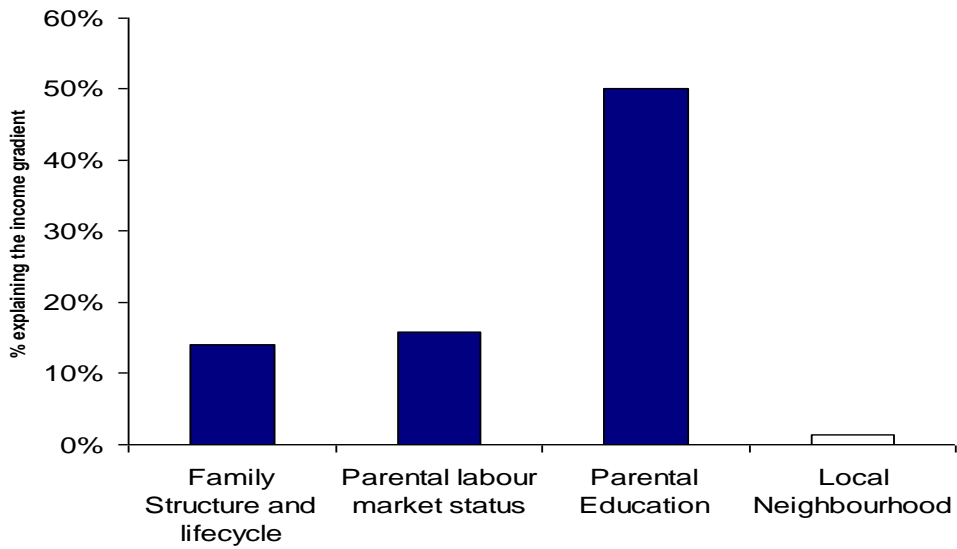
<sup>25</sup> Stabile and Milligan, 2008 “Do child benefits affect the well-being of children? Evidence from Canadian child benefit expansions”; Dahl and Lochner, 2008 “The impact of Family Income on child achievement”

<sup>26</sup> Both papers use IV to estimate the causal impact of income on childhood outcomes. Stabile and Milligan use exogenous changes in the Canadian benefit system for identification, while Dahl and Lochner utilise non-linear changes in the Earned Income Tax Credit (EITC) over 20 years.

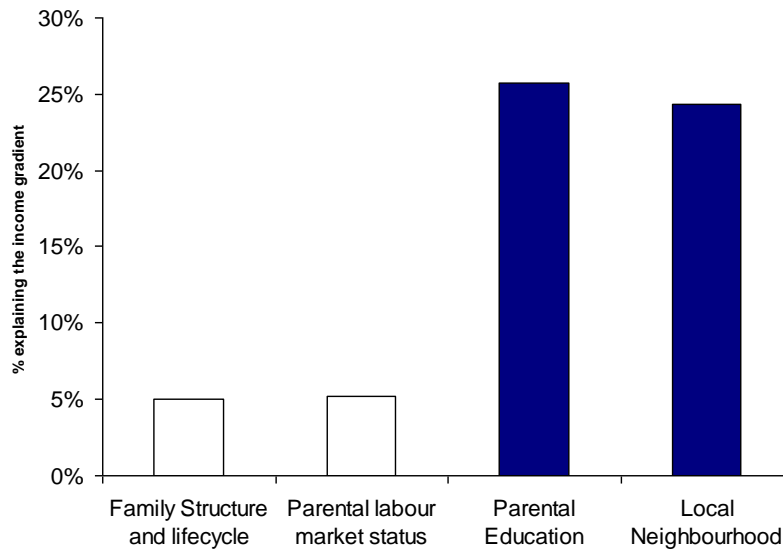
<sup>27</sup> Stabile and Milligan also found impacts on non-cognitive outcomes; A \$1000 increase in child benefits was found to have 3% and 5% of a standard deviation reduction in childhood hyperactivity and physical aggression respectively.

<sup>28</sup> Parental education was found to explain 74% of the fat mass gradient, 25% of the behaviour gradient, approximately 50% of the IQ and Locus of Control gradients, and approximately 36% of the Key Stage 1 and Self-esteem gradients.

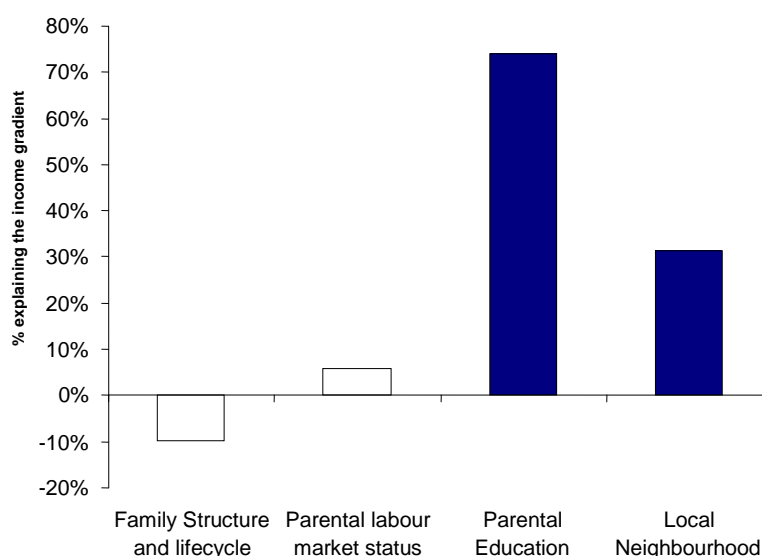
**Chart 19: Percentage of income gradient in Locus of Control explained by socio-economic characteristics**



**Chart 20: Percentage of income gradient in behaviour explained by socio-economic characteristics**



**Chart 21: Percentage of income gradient in fat mass explained by socio-economic characteristics**



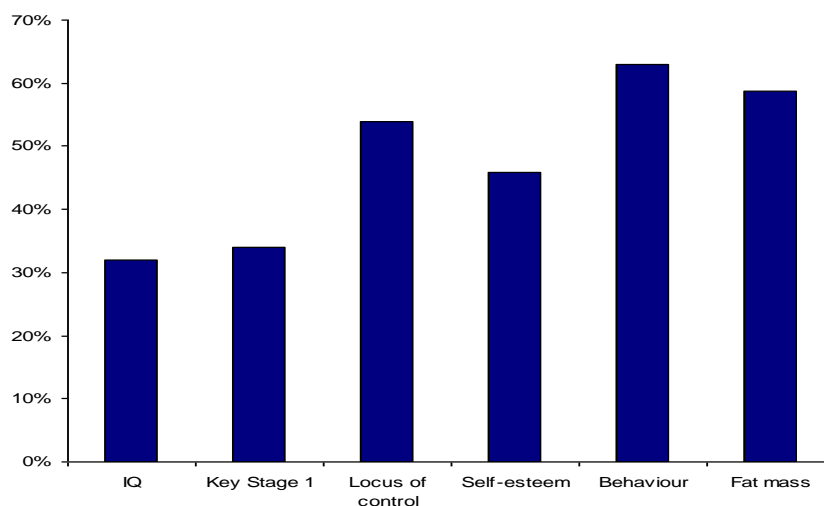
The graphs above are a representation of the results from decomposing the income gradients in Key Stage 1, locus of control, behaviour and fat mass<sup>29</sup>. It can be seen that although parental education is the dominant contributor to the gradient, the relative influence of each of the other socio-economic characteristics (Family structure and lifecycle, parental labour market status, and local neighbourhood) varies across the childhood outcomes. For instance, family structure and parental labour market status appear to significantly explain the income gradients in Key Stage 1 and locus of control, while being statistically insignificant in accounting for gradients in fat mass and behaviour. Likewise the (relative and absolute) importance of the local neighbourhood in explaining the income gradients varies by the childhood outcome. These results suggest that not only do a wide range of family socio-economic characteristics have bearing on childhood outcomes, but as one might expect, the ‘importance’ of these characteristics varies depending on the childhood outcome in question.

Analysis focussing on parental behaviours and the home environment highlight some specific pathways mediating the observed relationships between family income and childhood outcomes. The variation in parental behaviours and indicators of the home

<sup>29</sup> The blue and hollow bars represent statistically significant and insignificant results, respectively.

environment account for one third of the cognitive income gradients and over one half of the shallower mental and physical health gradients.

**Chart 22: Percentage of income gradient explained by differences in environment and behaviours**



The psychological functioning of a child’s mother appears to explain a large proportion of the gradients observed<sup>30</sup>. The total variance in childhood self-esteem and behaviour explained by observed environmental mediators is almost entirely subsumed within mothers psychological functioning<sup>31</sup>. Further decomposition of the role of the psychological functioning of the mother isolate the dominant pathways responsible for the income gradients for the various outcomes. Mothers’ locus of control is significantly associated with 5 of the 6 developmental outcomes (all except child self-esteem), and given the range of childhood outcomes, this is a remarkable finding. The greater level of anxiety and depression, and the harsher discipline of low income mothers are associated particularly with poorer child self-esteem and greater behavioural issues, whilst also, to a lesser degree, associated with cognitive outcomes.

<sup>30</sup> Psychological functioning was identified using a large range of measures covering mental health and interpersonal relationships; Crown-Crisp Experimental Index (CCEI), Frequency and severity of life event shocks, subjective financial distress, quality of parental relationship, harshness of maternal discipline, maternal social networks, and maternal locus of control.

<sup>31</sup> Mothers psychological functioning explains approximately 88% (40% of 45% of the income gradient explained by environmental mediators) and 96% (61% of 63% of the income gradient explained by environmental mediators) of the income gradients in self-esteem and behaviour respectively.

As one might expect, parental health behaviours are important for child health outcomes. The higher parental smoking, lower breastfeeding and different diets provided to children at age 3 by lower income mothers predict over half of the overall observed gradient in fat mass. Interestingly, breastfeeding and eating patterns provided to children have non-trivial associations with child cognitive outcomes

A poorer quality home learning environment within low income households, in terms of both materials and parental activities, contributes significantly to the cognitive and non-cognitive deficits experienced by low income children. The presence of books and toys within the household has significant and large associations with child IQ, Key Stage 1, locus of control and self-esteem and accounts for between 5% and 12% of the income gradients in those outcomes, while parental help with academia is significantly associated with cognitive outcomes.

Evidence from the same decomposition analysis also indicates the existence of adverse cognitive, non-cognitive and health outcomes associated with **high** income households. Longer hours of mother's employment experienced in higher income households are significantly negatively related to all of the child developmental outcomes except for fat mass, and most strongly with child behaviour and self-esteem. This suggests mother-child physical interaction in the pre-school period is important for child non-cognitive (and to a lesser extent cognitive) development<sup>32</sup>.

Similarly, returning to the role of the home environment, car ownership (which may be associated with lower routine activities such as walking to school and shops) is associated with greater fat mass in children, and thus offsets the overall family income gradients in child fat mass. "The results suggest that if the income differential in car ownership was eliminated, the income gradient in fat mass would rise by over 20%." (Gregg et al, 2008). A similar offsetting dynamic in the fat mass gradient exists when looking at the physical

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<sup>32</sup> However research by Joshi and Verropoulou, 2007, find 'mixed and minor' impacts of maternal employment on child cognitive and behavioural development, suggesting that this point is by no means uncontroversial.

conditions characterising the home, where low income children burn more calories due to colder temperatures at home<sup>33</sup>.

These analyses suggest a dominant role for parental characteristics (education) and behaviours (psychological functioning). Gutman et al, 2009, explore this further by investigating the correlates and determinants of parenting quality. The quality of parenting is measured using the Thorpe Interaction Measure which involves a mother and child sharing a picture book at ages one and five. This measure allows assessment of both the quality of interaction (in terms of warmth and involvement) between the mother and child as well as the mothers teaching behaviours (educational communication). In addition to child characteristics and contextual sources of stress and support, a detailed and varied set of maternal characteristics<sup>34</sup> are analysed to check whether they represent significant factors in predicting the quality of interaction between mother and child.

**Chart 23: Predictors of parenting quality at age 1 and 5<sup>35</sup>**

	Quality of interaction at age 1	Educational communication at age 1	Quality of interaction at age 5**	Educational communication at age 5**
Breastfeeding	✓	✓	X	X
Social Networks	✓	X	X	X
Maternal Education	✓	✓	X	X
Maternal Mental Health	X	✓	✓	✓
Marital Status	✓	X	X	X
Number of siblings	X	X	X	✓

Breastfeeding is a good predictor of parenting quality, however for parental warmth and quality of interaction, a mother’s attitude towards breastfeeding appears to be important,

<sup>33</sup> This represents one of the important advantages of this decomposition technique over methods which combine indicators into a single index.

<sup>34</sup> Maternal characteristics conditioned upon are months of and attitudes toward breastfeeding, locus of control, attitude to child and childcare, interpersonal sensitivity, post-natal depression, age, highest education and number of siblings.

<sup>35</sup> Ticks and crosses represent statistically significant and insignificant associations, respectively.

whereas for educational communication the actual duration of breastfeeding was significantly predictive<sup>36</sup>. As can be seen from the table breastfeeding does not predict parenting behaviours at five years, indicating a temporal dynamic with parenting practices. “...our findings indicate that the positive influence of breastfeeding extends beyond the superior nutritional context of breast milk supporting previous evidence that breastfeeding occurs in the context of more positive parenting practices.” (Gutman et al, 2009). Mothers who have more extensive social networks are found to provide higher quality of interaction with their children at one year, though this is not the case at five years. Crucially, the strongest benefits of breastfeeding are experienced by low income mothers, and the effects on the quality of parent-child interactions at ages 1 and 5 of not breastfeeding are most damaging for children from poorer backgrounds.

Consistent with previously mentioned research, maternal education was significantly predictive of both parenting measures at one year. More educated mothers tend to have higher quality interactions and better educational communication with their infants than less educated mothers. Maternal mental health, proxied by interpersonal sensitivity and post-natal depression, is significantly associated with educational communication at age one and both parenting quality measures at age 5.

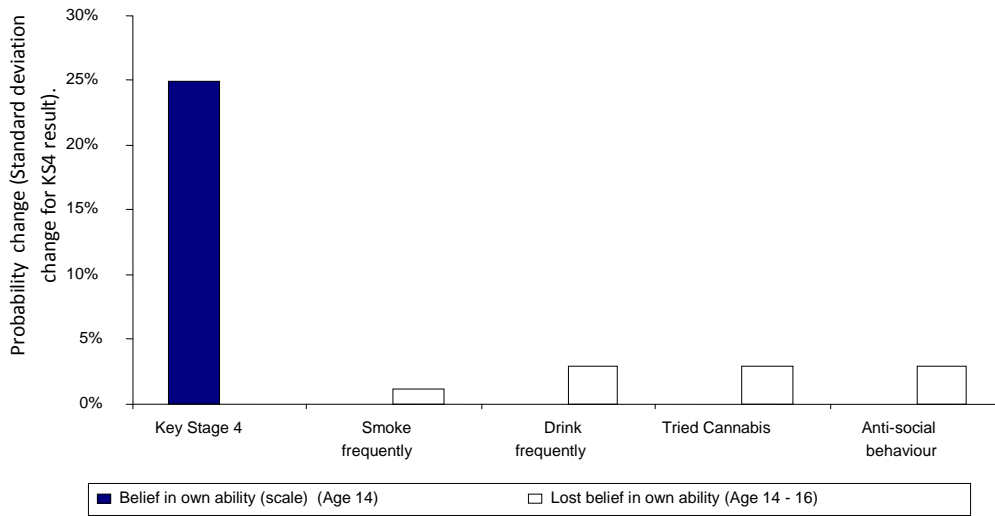
### Individual

Individual characteristics and attitudes of the child have been also found to be strong predictors of both cognitive and non-cognitive outcomes. A child’s self-belief and aspiration has been found to be significantly associated with educational attainment and participation in risky behaviours.

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<sup>36</sup> Analysis conditions on family income and marital status.

**Chart 24: Impact of child self-belief on outcomes<sup>37</sup>**



A one standard deviation increase in a young person’s belief in their own ability at age 14 is associated with almost a quarter of a standard deviation increase in Key Stage 4 attainment<sup>38</sup>. The graph also shows individuals who lose belief in their own ability are 1.2 percentage points more likely to smoke frequently, 2.9 percentage points more likely to drink frequently, 2.9 percentage points more likely to have tried cannabis and 3 percentage points more likely to have been involved in anti-social behaviour. Very similar dynamics hold when assessing the associations between a young person’s aspiration and cognitive and non-cognitive outcomes.

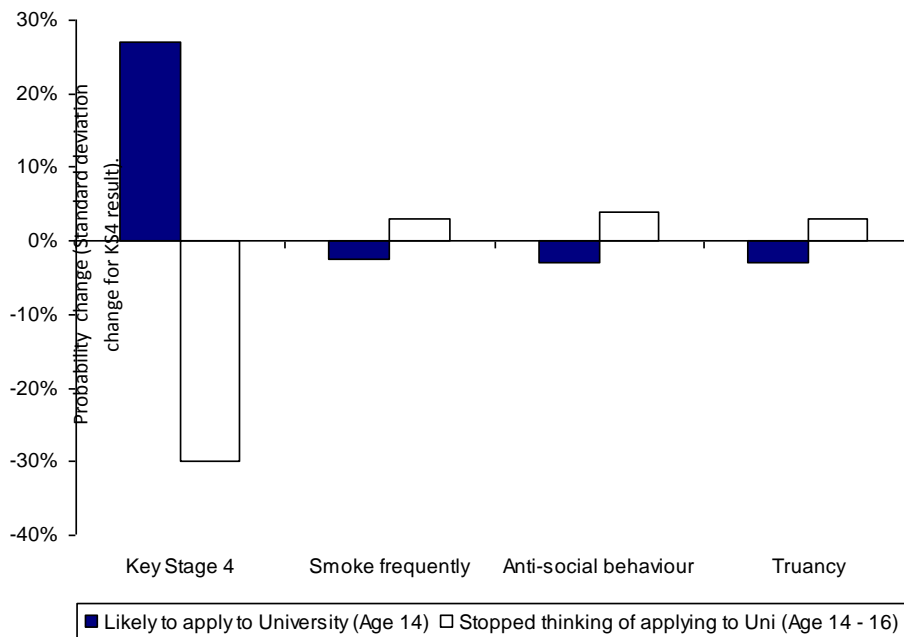
Young people who think it likely that they will apply to university (and likely they will get in) do significantly better at Key Stage 4 and are significantly less likely to participate in anti-social behaviour and truancy (while also 2.2 percentage points more likely to participate in positive activities at age 14). Again, individuals who lose educational aspiration (stop thinking of applying to university) between ages 14 and 16, perform significantly poorer at Key Stage 4 and are more likely to have behavioural issues.

<sup>37</sup> Key stage 4: is measured in terms a standard deviation 1 SD in KS4 = approx 120 points. Other measures are percentage point impacts on probability of behaviour occurring

<sup>38</sup> This effect is equivalent to 38 GCSE points which is not trivial, and the effect is still there when controlling on Key Stage 3 attainment.



**Chart 25: Impact of higher education aspirations on outcomes<sup>39</sup>**



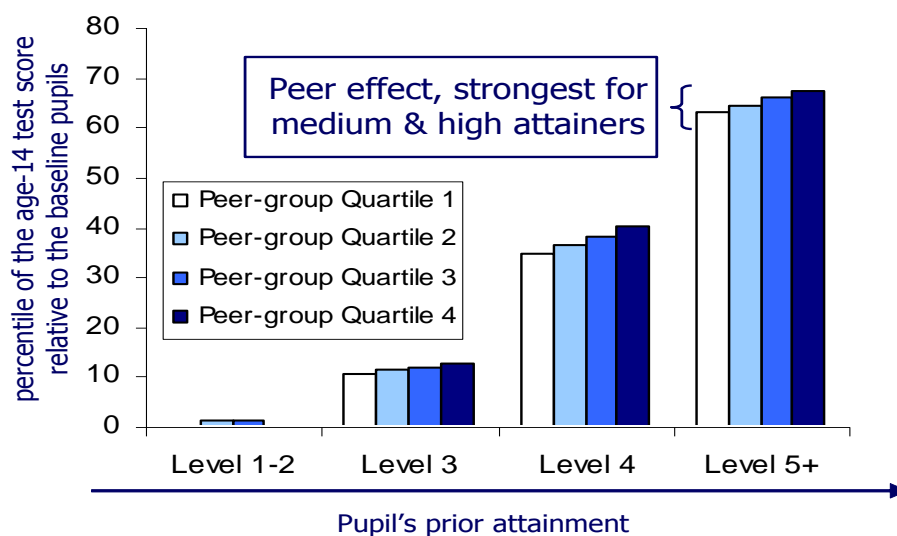
## Social

Peer-effects on academic outcomes, although found to be statistically significant, are small. Peer groups account for less than 1% of the variance observed in pupils' progress between the ages of 11 and 14, and are dwarfed by the impact of pupils' prior attainment and differences between schools. Low ability pupils do not appear to benefit as much from mixing with high ability peers as intermediate and high ability pupils do<sup>40</sup>, the explanation for this most likely being that teaching can proceed faster in higher ability groups, or can start from a higher baseline when the groups prior attainments are higher.

<sup>39</sup> Key stage 4: is measured in terms a standard deviation 1 SD in KS4 = approx 120 points. Other measures are percentage point impacts on probability of behaviour occurring

<sup>40</sup> Gibbons, S., and Telhaj, S. (2006) "Peer Effects and Pupil Attainment: Evidence from Secondary School Transition" CEE Discussion Paper 63. The authors exploit changes to peer group composition that occur when a pupil makes the transition from Primary to Secondary schooling in England at age 11/12.

**Chart 26: Impact of peer group quality on attainment.**



Similarly, the composition of one's peer group in childhood is related to only a few childhood non-academic outcomes. Believing your friends will stay on in full-time education is associated with significantly higher test scores at Key Stage 4, a lower chance of being NEET at age 17 and a lower chance of being a frequent smoker.

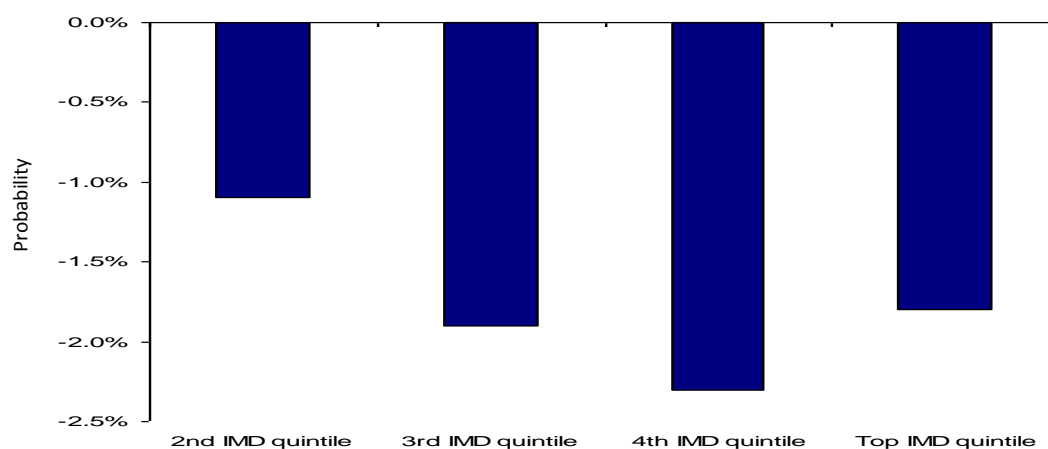
Neighbourhood-level income, as a measure of deprivation, does appear to be correlated with educational attainment. However, regression analysis<sup>41</sup> provides statistically insignificant impacts of deprivation<sup>42</sup> on both Key Stage 4 achievement and value-added outcomes between Key Stage 3 and 4. Strikingly, the analysis also found no associations between neighbourhood deprivation and participation in both anti-social and risky behaviours<sup>43</sup>. Significant associations were, however, found between neighbourhood deprivation and the probability of being NEET.

<sup>41</sup> IFS (2009) Drivers and Barriers to Educational Success: Evidence from LSYPE

<sup>42</sup> Proxied using the Index of Multiple Deprivation.

<sup>43</sup> Although Neighbourhood deprivation was found to be significant in explaining the socio-economic gradients observed in both anti-social and risky behaviours.

**Chart 27: Impact of multiple deprivation on chances of being NEET (relative to 20% most deprived neighbourhoods)**



This mixed impact of neighbourhood deprivation on childhood/adolescent outcomes suggests that neighbourhood deprivation may have a more substantial relationship with local labour market dynamics than with direct adolescent behaviours.

#### **4 Policy Discussion: Section A**

##### **Interdependencies in childhood outcomes**

Much of the evidence<sup>44</sup> featured early on in Section A highlights the interdependencies between ECM outcomes. Put another way, there appear to be complementarities between childhood outcomes. Evidence suggests that pupils who enjoy school also tend to have higher levels of academic achievement. The reverse also appears to be true: children who have higher academic achievement at age 14 go on to have higher levels of enjoyment at age 16<sup>45</sup>. Pupil health is found to be positively associated with academic achievement and school enjoyment and extra-curricular activities are found to be positively related to academic achievement. Youth reporting high levels of life satisfaction report more positive

<sup>44</sup> Primarily taken from Vignoles and Meschi, 2010.

<sup>45</sup> This result was found not to be robust to the IV specification, but it is worth remembering that the instrument used for academic attainment was month of birth, which as aforementioned, is potentially invalid.

relationships with peers and parents, fewer symptoms of distress such as anxiety and depression, higher levels of hope and a greater sense of personal control than those youth reporting low levels of life satisfaction. High life satisfaction is also found to be positively associated with extra-curricular participation and greater academic achievement.

As aforementioned, most of these observed associations between childhood outcomes are purely correlative, and thus cannot be considered causal. So, until robust causal identification can be implemented, no concrete conclusions can be made regarding any subsequent implications for policy on this evidence alone. However, evidence of this kind certainly suggests scope for policy makers to potentially impact on childhood cognitive and non-cognitive outcomes. An initial implication is that there may be scope to exploit these interdependencies to broaden the effect of policy. For example, improving academic achievement at the individual level may benefit children in terms of their enjoyment at school, and of course schools might place added emphasis on ensuring children's enjoyment of school with the potential effect of improving academic performance. Similarly, policies targeting improvements in pupil health or participation in extra-curricular activities may provide returns in either a child's academic achievement or her level of school enjoyment. With this in mind, elements of the child health strategy *"Healthy Lives, Brighter Futures"* in addition to the significant investments in promoting healthy weight, improving school food and introducing compulsory cooking classes from 2011, could potentially confer significant improvements in a wide range of childhood outcomes. The evidence would also support the provision of extended services and facilities within schools, in the attempt to meet the wider needs of children improving their broader school experience.

A second policy implication results from finding that some factors may help reduce the chances of future poor childhood outcomes and deter involvement in anti-social behaviours. 8 year olds who enjoy school tend to engage in fewer anti-social activities at age 10, while children with higher KS1 English scores are less likely to experience increased anti-social behaviours between the ages of 8 and 10. Later in childhood, children with health problems at age 14 or who have SEN are significantly more likely to report experiences of bullying at age 16 while there are also significant relationships between bullying, and academic achievement and school enjoyment. There is also a particularly strong link between unauthorised absences and subsequent academic achievement and school enjoyment.

These interrelationships suggest that some indicators could be potentially used to proactively target pupils at risk of future cognitive and non-cognitive difficulties at different stages in childhood. Understanding the relationships between various cognitive and non-cognitive childhood outcomes at different stages of childhood may be important in enabling us to identify signals of future negative developmental outcomes. Policy interventions which respond to particularly low levels of school enjoyment at age 8 may improve the child's future social adjustment for example, while attempting to understand and combat truancy at age 14 may provide the child with broad future benefits.

However, as stated in Gutman and Feinstein, 2006, such identification needs to be implemented with extreme caution, and stigmatisation is an important consideration. Additionally, elements of the *"Stay Safe: Action Plan"*, helping to protect vulnerable children from bullying in conjunction with schools being required from 2009 to record all incidents of bullying, appear to be positive steps in identifying and protecting vulnerable children. The extension of personalised learning in schools, offering one-to-one tuition in English and Maths through the ECM programmes is potentially a step in the right direction.

More generally, the evidence on the interdependencies of childhood outcomes, taken as a whole, suggests that both researchers and policy makers should be beginning to evaluate significantly broader measures of child well-being. Restricting the notion of child development to cognitive and academic outcomes risks excluding other fundamental dimensions of childhood well-being.

### **The determinants of childhood outcomes**

The evidence amassed on the determinants of childhood outcomes perhaps provides a domain with even greater potential leverage for policy makers. At the individual level, some of the 'outcomes' (such as enjoyment of school for example) could equally be interpreted as determining characteristics in their own right. The very strong correlations observed between many of the attitudes of young people and a variety of educational and behavioural outcomes suggest that the attitudes and beliefs of a child are a key determining factor for his or her outcomes, above and beyond representing merely another dimension

of childhood outcomes. Of particular importance appear to be a young person's ability beliefs, whether they like school and find school worthwhile and their future educational aspirations. The associations between these attitudinal characteristics and behavioural and educational childhood outcomes remain significant and large even when taking many other aspects of young people's homes, schools and neighbourhood into account. Again, correlation does not imply causation however given the robustness of the correlations found suggest there may be some mileage in attempting to improve educational and behavioural outcomes by influencing the attitudes, beliefs and aspirations of children. With this in mind, the "*Aiming Higher for Young People*" and Youth Opportunity Fund initiatives appear to be promising potential directions for policy.

One of the key findings in recent research attempting to characterise the determinants of childhood outcomes is the substantial role of parental education. "Differences in the outcomes of children of less- and more-educated parents are the single biggest driver of the observed deficits of poor children in general" (Gregg *et al*, 2008). When considering the policy implications of this observation, it is worth reflecting further on the nature of this relationship. As Gregg *et al* state in their conclusions, the strength of the relationship between parental education and child outcomes is likely to reflect three distinct processes; (i) Genetic traits affecting an individual's ability to acquire education will be transmitted to children biologically; (ii) Innate traits that are associated with educational success may be positively correlated with other innate skills, such as parenting ability; (iii) More educated parents have greater knowledge and ability as parents.

The likelihood is that the observed relationship between parental education and child outcomes is a combination of these three processes (and potentially more). However understanding the relative importance of these three processes is vital to the formation of policy which exploits the potential importance of parental education in influencing child outcomes. For instance, if either process (i) or (ii) is dominant in producing the correlations between parental education and childhood outcomes observed, the acquisition of qualifications by parents would have no causal impact on children's outcomes. In the case of process (i), the impact on child outcomes arises from a genetic transmission of characteristics which will remain unaffected by a parent acquiring further education. While in the case of process (ii), the mechanism is environmental rather than genetic, whereby

more educated parents also provide better developmental environments for the child. However the third process provides scope for a causal effect, in that acquiring educational capital increases parental knowledge and ability whilst also shaping their values and goals for their children. In this instance, policy targeted at increasing the educational standard of low-income parents could plausibly impact on subsequent outcomes of their children. As aforementioned in Section A of the evidence, more recent research has suggested that maternal education is associated with better parenting even when controlling for other socio-demographic and maternal characteristics, but once again it cannot be ascertained whether the effect is due to education itself or to the latent processes and characteristics which lead one to obtain a better education. Further research is clearly required to disentangle the relationship between parental education and childhood outcomes.

Parental psychological functioning, especially maternal locus of control, is also found to be a key mediating factor between family income and a full spectrum of child outcomes, particularly behavioural outcomes. This is corroborated by evidence on the association between maternal mental health and parental skills, which is significant when examining the parenting of both babies and school-age children. Maternal sensitivity is found to be of great importance for young children, thus “parenting programmes that focus on the skills such as awareness of the needs and feelings of others, including the child, may be particularly useful” (Gutman, 2009). Similarly, the finding that new mothers with post-natal depression have less educational communication with their babies provides support for the idea that maternal psychological functioning directly impacts on parenting ability. These considerations are particularly important for low income mothers, thus targeting resources at these mothers may be particularly beneficial. A related finding is that parental health-related behaviours of low-income parents are as important as parental psychological functioning for cognitive outcomes, and are potentially much more important for child mental and physical health. The findings suggest the need for the continuation and potential escalation of support for breastfeeding, extending communication of the effects of breastfeeding and again targeting disadvantaged mothers.

More broadly, a number of initiatives are currently in place which may be well placed to address some of the issues raised by the evidence on the determinants of childhood outcomes. The Child Health Strategy *“Healthy lives, brighter futures”*, in conjunction with

Family Nurse Partnerships and Sure Start Children’s Centres have the potential to provide crucial support to those pregnant and early-years mothers most in need of it. More generally, initiatives such as Parent Know How” and Family Intervention Projects also have the capacity to potentially improve both parenting quality directly, and indirectly via the aforementioned roles of parental education, parental mental health and parental health behaviours.

The potential adverse effect of certain elements of high income lifestyles is an interesting point for policy makers. “Long hours of maternal employment in the pre-school period, which are more common amongst higher income mothers, are associated with slightly lower cognitive, non-cognitive and behavioural outcomes in children” (Gregg et al, 2008). The authors find that the negative effect of maternal employment can be explained entirely by greater disruption experienced by the children of working mothers and by the adverse effects of long hours of non-maternal childcare at ages 3 and 4. Learning focused activities and behaviours, car ownership and the temperature of the home in the pre-school period are all associated with greater fat mass in children at age 9<sup>46</sup>. With respect to policy, it is difficult to infer how interventions can provide remedies to these dynamics other than at a general level, providing comprehensive information on the potential risks associated to children living in high income households, such that parents can make informed decisions.

Although much of the income gradients in childhood outcomes are accounted for by socio-economic and demographic characteristics, it would be misleading to conclude that income plays no direct role in parents’ ability to foster positive developmental outcomes for their children. The magnitude of the effect of family income on childhood cognitive outcomes is much larger than almost all of the socio-economic characteristics taken separately, that can be controlled for, with only low parental education being a more important single predictor of low income children’s cognitive deficits. The income effect is proportionally larger for socio-emotional childhood outcomes and more important than all of the other socio-economic characteristics taken in isolation. Again, these associations cannot be considered causal, but rather they highlight the relative importance of income. However, the causal

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<sup>46</sup> This shows that the adverse effects of other risk factors faced by low income children are somewhat disguised by the protective effects of their home environments on calorie expenditure.



evidence on the effects of income suggests that there remains a crucial role for benefits and transfers to disadvantaged families in attempting to improve child outcomes.

Another key finding is that the adverse environmental circumstances of low income children matter for successful development. “Maternal smoking is strongly linked to both behavioural problems and the risk of obesity in children” (Gregg et al, 2008). Although this observed association cannot be considered causal, there is evidence that exposure to nicotine increases the risk of psychiatric problems in children (Linnet et al, 2003; Ernst et al, 2001). No associations are found between smoking and cognitive or non-cognitive outcomes, suggesting that smoking is not simply a marker for unobserved heterogeneity. Another finding is that food consumption preferences at age 3 are significantly predictive of fat mass at age 9 and cognitive outcomes at age 7 and 8, suggesting that much of the groundwork in cultivating food preferences in children is laid early in life<sup>47</sup>

A significant role is also found for the wider local environment in predicting low income children’s deficits in both cognitive (Key Stage 1 and age 8 IQ scores) and health outcomes. Gregg et al, 2008, refer to Levanthal and Brooks-Gunn, 2000, in providing three potential mechanisms via which the local environment can affect childhood outcomes; (i) The availability and quality of institutional resources such as childcare facilities, schools and recreational facilities may play a role; (ii) Parents in low income neighbourhoods exhibit poorer mental and physical health and have access to weaker social support networks; (iii) The extent of monitoring and rule-enforcement by non-parental local residents (“Collective Efficacy”). Gregg et al, 2008, add some empirical results to the discussion of these potential mechanisms. They find no evidence that the composition and quality of schools in low income neighbourhoods is a factor in explaining the deficits of poor children in any aspect of development. However the authors do find some support for the second potential mechanism, where differences in psychological functioning associated with deprived local environments appear to significantly explain variances in behavioural outcomes and fat mass between high and low income children, although the effect is less pronounced for cognitive and non-cognitive outcomes. There is also some indirect evidence for the third mechanism stated; “10% of the income gradients in both behavioural problems and fat

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<sup>47</sup> This finding is consistent with previous research by Sorhaindo and Feinstien, 2006.

mass can be accounted for by the poorer health-related behaviours of parents in deprived neighbourhoods. This suggests there may be a role for local social norms in shaping the smoking, breastfeeding and eating habits of low income mothers” (Gregg et al, 2008).

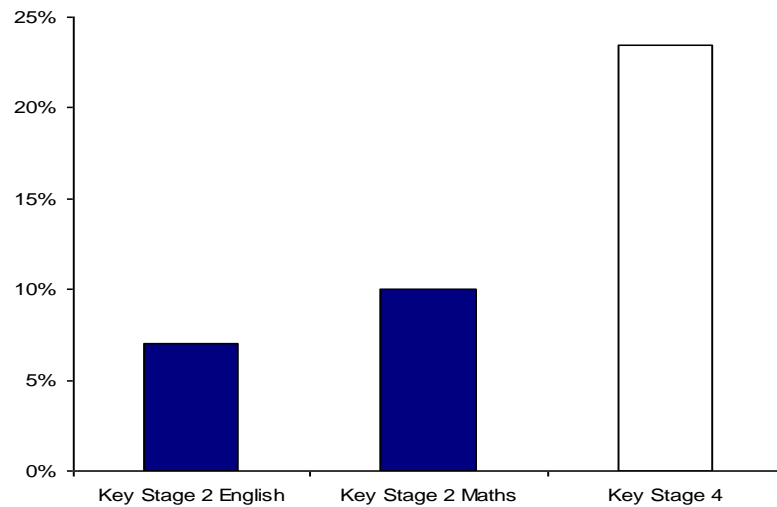
Once again, further research is certainly required regarding the effect of both more direct characteristics of the home environment and the broader local environment. With respect to policy, the implications for the impact of the home environment on child development appear to be predominantly within the domain of increasing parental knowledge and understanding of the potential effects of their behaviours, allowing informed choices to be made. However, initiatives such as Book Start should positively influence parental understanding of the importance learning-based activities as well providing the books. The evidence on the impact of broader environment characteristics potentially allows for a more targeted approach to policy. Avenues for policy could involve attempting to specifically address the negative psychological effects of residing in deprived neighbourhoods. This would of course require further understanding of the mechanisms defining the relationship between neighbourhood-level deprivation and individual-level psychological functioning. Similarly, there may be value in attempting to exploit the potential positive impact of elements of collective efficacy and social norms in tempering adverse parental behaviours and increasing communication. Intuitively, community-based initiatives like this may improve areas and neighbourhoods in a number of dimensions.

## **5 Section B: The Role Of School And Pre-School**

### **The role of schools**

Variation in pupil level academic achievement is predominantly accounted for by within-school variance in individual characteristics, and relatively little can be explained by between-school school-level characteristics.

**Chart 28: Percentage of between school variance in test scores.**



Immediately it can be seen that a substantially smaller proportion of the variance in Key Stage 2 attainment can be explained, when compared with variance in Key Stage 4 attainment<sup>48</sup>. Between-school variance in changes in non-cognitive outcomes is significantly less than that observed in cognitive outcomes. The variation between schools for children’s mental health, antisocial behaviour and pro-social behaviour ranges from 1% to 3%<sup>49</sup>. These findings suggest that the school attended explains a greater percentage of children’s achievement than other dimensions of their well-being.

The relatively small between-school variance in childhood outcomes, however, does not mean that individual schools and teachers cannot potentially affect both childhood academic and non-academic outcomes. Recent evidence<sup>50</sup> suggests that the quality of a teacher can have a substantial bearing on the educational attainment of the pupils. Being taught by a high-quality teacher rather than a low-quality teacher adds almost half of a grade per GCSE subject<sup>51</sup>.

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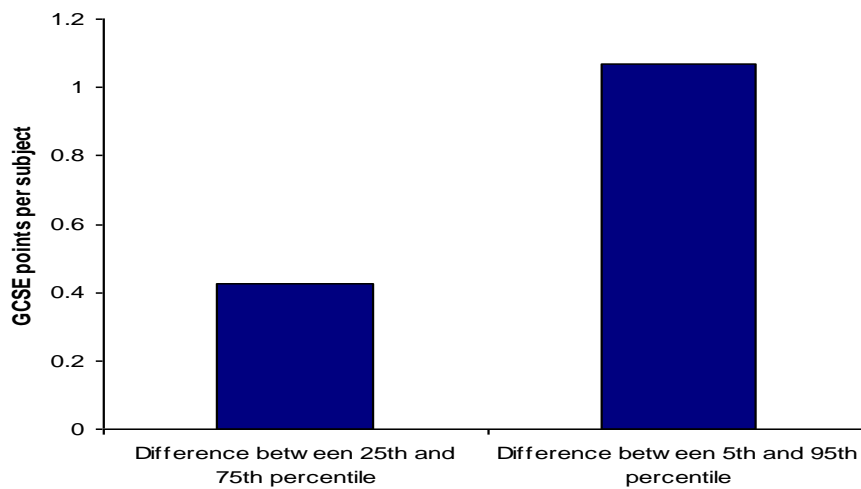
<sup>48</sup> Different methodologies are used to estimate between school variance for KS2 (Feinstein et al, 2008) and KS4 (Vignoles et al, 2010) scores, represented by the blue and white bars respectively. Vignoles et al, 2009, do find that the LSYPE data used overestimate the extent of the variation across schools in the full specification. When the full population from the National Pupil Database is used and pupil characteristics are conditioned upon, between school variance falls to less than half of that shown in above.

<sup>49</sup> The percentage explained by schools for non-cognitive outcomes relates to changes in, rather than levels of non-cognitive outcomes between age 14 and 16.

<sup>50</sup> Burgess et al (2009) Do teachers matter? Measuring the variation in teacher effectiveness in England

<sup>51</sup> Burgess et al us point-in-time fixed effects and prior attainment to control for pupil heterogeneity.

**Chart 29: Impact of teacher quality on GCSE attainment.**



An alternative way of interpreting this estimated teacher effect is considering a pupil taking 8 GCSEs and taught by 8 ‘good’ teachers. The pupil will score approximately three and a half grades more than the same pupil in the same school taught by 8 ‘poor’ teachers. Given that the estimated gap between a poor and non-poor student is over 6 grades<sup>52</sup>, this effect is substantial, making up over 50% of the socio-economic gap. Interestingly, no observable teacher characteristics are found to play any statistically significant role in explaining teacher effectiveness other than very low levels of experience showing a negative effect<sup>53</sup>

Good teacher-child relations at age 14 are positively associated with progress between Key Stage 3 and Key Stage 4. A one standard deviation worsening in teacher-child relations at age 14 is associated with a reduction of approximately 9 GCSE points, conditioning on Key Stage 3 attainment. Conversely, pupils who start to like their teachers between age 14 and age 16 score significantly higher at Key Stage 4<sup>54</sup>. Children attending school where parents and the head teacher have regular disputes perform 5% lower on average in Key Stage 2 English scores, while children who attend schools where parental attendance at school meetings is high have a 5% and 4% advantage in maths and English respectively, over children attending schools with low levels of parental attendance to school meetings.

<sup>52</sup> Rivkin et al (2005)

<sup>53</sup> Other teacher characteristics included gender, age, high levels of experience, subject, degree-class and salary band.

<sup>54</sup> This result is true both before and after conditioning for prior attainment.

Research also indicates that the determinants of child well-being and enjoyment of school are not the same as those for academic achievement. *Traditional* school characteristics appear to be only weakly associated with pupil attitudes toward school<sup>55</sup>. Traditional school characteristics overall exert little influence on pupils' perceptions of their own school, but they tend to have a significant impact on their parents' views. "Strikingly, the linear combination of school characteristics that predicts that a child is *unhappy* at school is positively correlated with the linear combination that predicts a *high* school quality rating amongst parents, reinforcing the idea that parents' and children's views about their school are not well aligned" (Gibbons and Silva, 2009). This highlights the discordance between the perspective of children and parents when it comes to valuing school.

However, non-traditional (and rarely investigated) school characteristics do appear to have significant associations with indicators of well-being. A high level of parental involvement in school is significantly negatively associated with child depression and anti-social behaviour. Similarly, a standard deviation increase in the quality of teacher-child relations at age 14 is associated with approximately 3% reductions in the likelihood of being a frequent smoker or drinker at age 16, a 10% reduction in the likelihood of having ever tried cannabis at age 16 and a 9% reduction in the probability of having played truant.

Research over the last few years has also found robust (though relatively small) causal impacts of per pupil school expenditure on academic outcomes. Instrumental variable analysis suggests that a £100 increase in per pupil expenditure increases Maths and Science attainment at Key Stage 3 on average by 4% of a level, and a £100 per annum increase over 5 years of additional expenditure per pupil would be associated with an improvement of about 0.3 of a capped GCSE points score<sup>56</sup>. These effects, although significant, are relatively small, however it is worth noting the effects in both studies, both in terms of significance and magnitude, were dominated by the impacts on children from poor socio-economic backgrounds<sup>57</sup>

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<sup>55</sup> Only the pupil-teacher ratio appears to be significantly associated with individual school enjoyment. The other *traditional* school characteristics were proportion FSM, average Key Stage 2 attainment, proportion non-white, school size and school type.

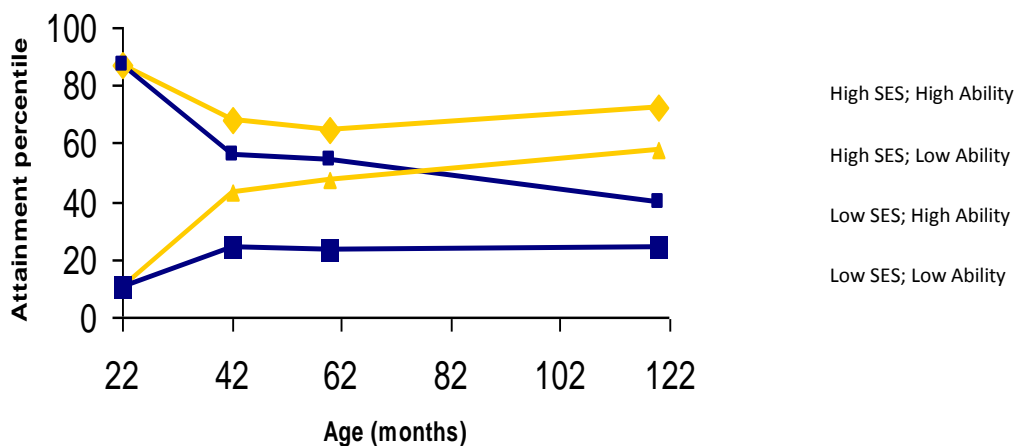
<sup>56</sup> Levacic et al (2005) Estimating the Relationship Between School Resources and Pupil Attainment at Key Stage 3; Levacic et al (2006) Estimating the Relationship between School Resources and Pupil Attainment at GCSE; Holmand et al (2008) Impact of School Resources on Attainment at Key Stage 2

<sup>57</sup> The Key Stage 2 analysis was using Ordinary Least Squares while the Key Stage 3 and 4 analyses were performed using IV.

## The role of pre-school

When one considers the socio-economic inequalities which are observed in early years childhood ability and subsequent trajectories in performance of different socio-economic groups, it may not be particularly surprising that the impact of schools on childhood outcomes is highly contextual. The evidence<sup>58</sup> suggests that within a few years of birth children from poorer socio-economic environments perform systematically and significantly worse in indicators of cognitive functioning, and perhaps crucially, continue to do so, suggesting that a significant part of a child's capacity and disposition to learn over time may be established at a young age.

**Chart 30: Attainment (percentile rank) by SES and early ability (1970 cohort).**



This chart<sup>59</sup> shows that gaps in attainment by family background increase as children age. Having low ability at 22 months does not necessarily matter greatly for a child's future position in the distribution of academic attainment, unless the child belongs to a low socio-economic status (SES) family. In such an instance, the child's position is unlikely to improve greatly. In addition, a low SES child of high initial ability at age 22 months will fall behind high SES children who had low attainment at 22 months. This is not to say that initial ability does not matter, but suggests that the interaction of schooling and SES is an important factor. "Nonetheless, as well as influencing early ability, family background clearly plays a

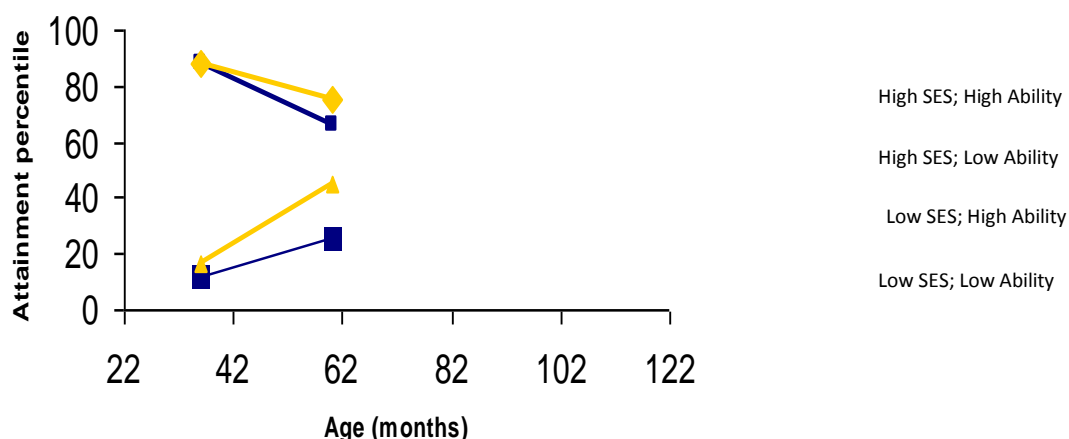
<sup>58</sup> Feinstein (2003). "Inequality in the Early Cognitive Development of British Children in the 1970 Cohort," *Economica*, p73-97

<sup>59</sup> Feinstein (2003). "Inequality in the Early Cognitive Development of British Children in the 1970 Cohort," *Economica*, p73-97

tremendously important role in determining the continued development of ability of UK children” (Feinstein, 2003).

More recent research by Blanden and Machin<sup>60</sup> uses data from the Millennium Cohort Study to reproduce Feinstein’s analysis for children growing up in the 2000s.

**Chart 31: Attainment (percentile rank) by Income and early ability (2000 cohort).**



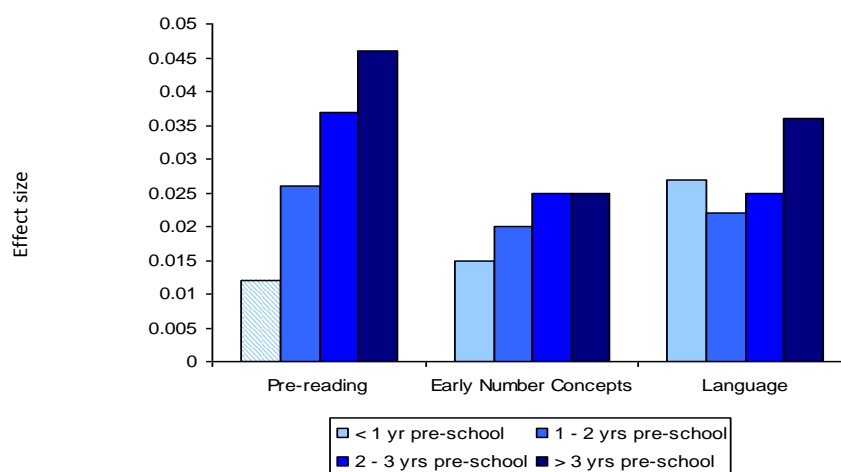
“It is clear that Feinstein’s results are replicated; high achievers at age 3 with low SES are losing ground while low achievers with high SES are improving their percentile scores more quickly than other children” (Blanden and Machin, 2007). As in Feinstein’s analysis, there appears to be a relatively larger performance improvement among initially low attaining, high SES children, compared with the decline in performance of initially high attaining, low SES children.

Given the magnitudes of the gaps observed between early cognitive ability, and the variation in subsequent trajectories for various sub-groups of children, it is perhaps unsurprising that attendance at pre-school appears to have significant effects on cognitive outcomes in childhood.

<sup>60</sup> Blanden and Machin (2007) Recent Changes in Intergenerational Mobility

Compared with children with no pre-school experience, i.e. home children, attending pre-school is significantly associated with better cognitive performance during the pre-school period<sup>61</sup>. The duration in pre-school also appears to have an independent impact, with those children in pre-school for longer experiencing the greatest differential in pre-school cognitive attainment compared with home children<sup>62</sup>. These positive effects of pre-school on cognitive attainment persist into school entry, and beyond.

**Chart 32: Impact of pre-school on cognitive ability (pre-school) compared with home children**



By year two of school, the effects of having attended pre-school and the duration of attendance remain. If anything, it appears the impacts are larger than those observed in year one, though smaller than those observed upon entry to school. Overall the effect size for reading reduces by approximately a quarter over the two years<sup>63</sup>. Positive and significant effects of pre-school attendance and duration are also apparent for non-cognitive outcomes.

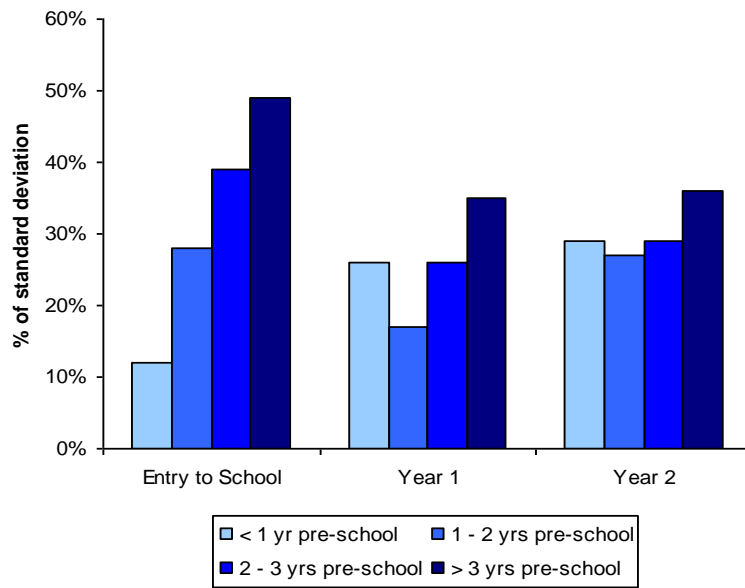
<sup>61</sup> EPPE: Tech Paper 8a "Measuring the Impact of Pre-School on Children's Cognitive Progress over the Pre-School Period"

<sup>62</sup> Significant results were not found for the impact of less than one year of pre-school on pre-reading (hashed bar) or for pre-school on non-verbal reasoning or spatial awareness. Also, it is worth noting that causality is not established in these results, but rather only associations. Thus the analyses may yet suffer from endogeneity biases even with the significant characteristics that are conditioned upon.

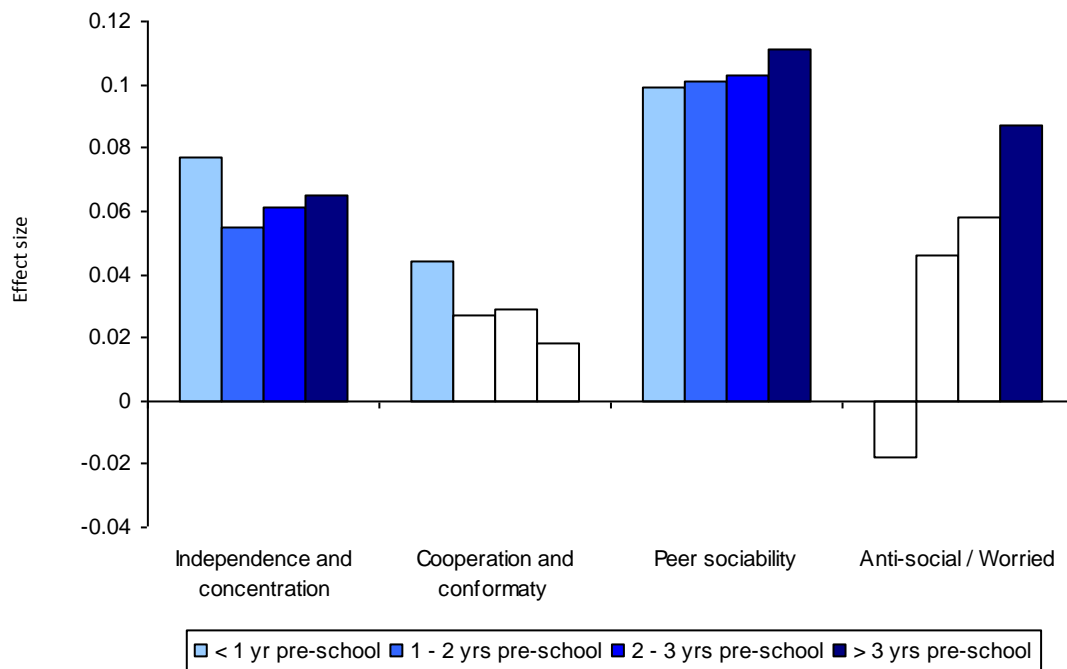
<sup>63</sup> This was not found to be the case for Maths



**Chart 33: Impact of pre-school on primary school reading**



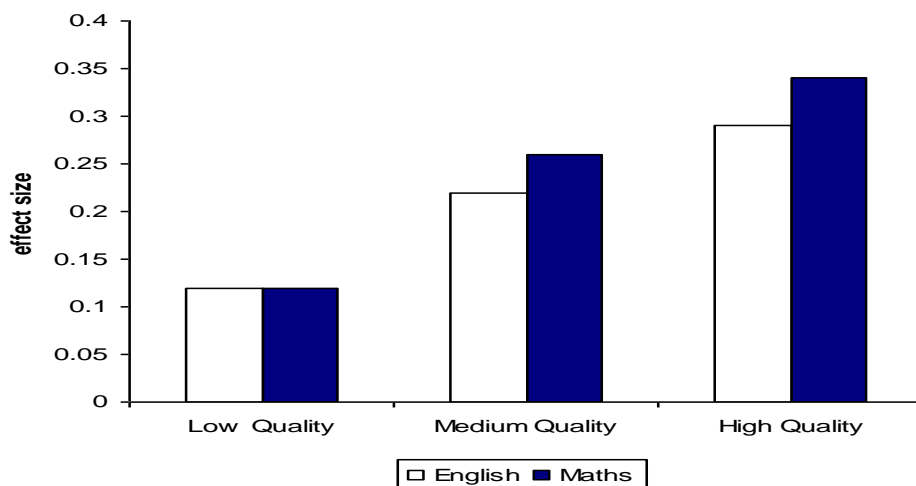
**Chart 34: Impact of pre-school on non-cognitive outcomes (pre-school), compared with home children<sup>64</sup>.**



Attendance in a pre-school significantly impacts on a child’s sociability<sup>65</sup>. Likewise, a child’s independence and level of concentration is positively affected by attendance in pre-school<sup>66</sup>.

These observed impacts of pre-school continue into later childhood. By age 11, children who attended pre-school perform significantly better in Key Stage 2 Maths and English, as well as behavioural outcomes. There also exists a clear pre-school **quality**<sup>67</sup> gradient in Key Stage 2 performance and behavioural outcomes<sup>68</sup>.

**Chart 35: Effect of pre-school on age 11 English and Maths.**



The low quality group scores more highly on English and Maths than the home children, however the differences are not statistically significant. For both the medium and high quality groups their advantage over the home children is statistically significant. The high quality group also performs statistically significantly better than the low quality group in English and Maths, and better than the medium quality group in Maths only. Similar dynamics hold when considering behavioural outcomes. Children who attended medium

<sup>65</sup> Though duration of pre-school does not seem to be important.

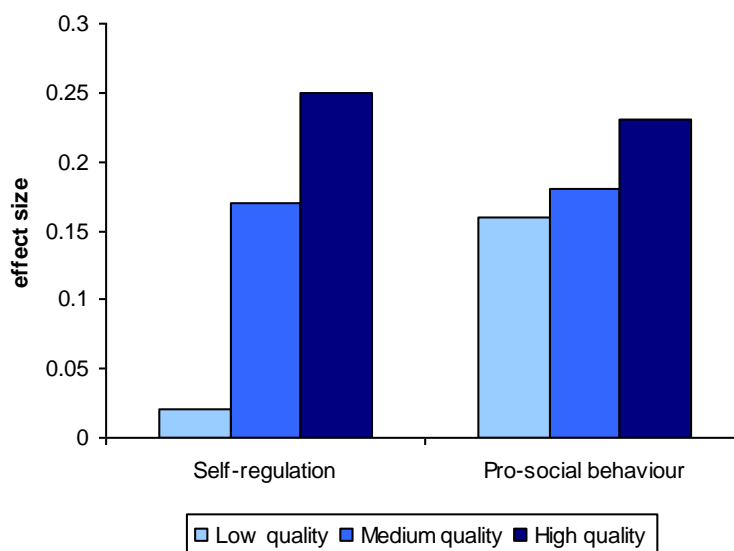
<sup>66</sup> The anti-social/worried result appears counter-intuitive, in that children appear to be more anti-social/worried the longer they have spent in pre-school. One possible explanation to this is the fact a proportion of the children who spent 3 years in pre-school, were care-children, with existing issues with anti-social behaviour, and these children may be driving this result.

<sup>67</sup> Pre-school quality was identified with using Early Childhood Environment Rating Scale (ECERS). ECERS-R focuses on the environment and social interactions within the pre-school while ECERS-E focuses more on the educational aspects of the provision of pre-school.

<sup>68</sup> EPPE (3-11): Final Report from the Primary Phase: Pre-school, School and Family Influences on Children’s Development During Key Stage 2 (Age 7-11)

and high quality pre-schools show higher levels of self-regulation in year 6 than those who had attended poor quality pre-schools, and similarly, children who had attended high quality pre-schools display the most pro-social behaviour, although the quality gradient is less marked for this outcome.

**Chart 36: Impact of pre-school on self-regulation and pro-social behaviour age 11.**



The combination of a good home learning environment (HLE) and a high quality pre-school has been shown to have the greatest positive impact on children. Children who had high early years HLE and went to a medium or high quality pre-school have the strongest benefit in attainment in English. “These findings underline the importance of the quality of the pre-school centre for promoting English attainment and also the importance of early years HLE” (EPPE 3-11, Final Report)

## 6 Policy Discussion: Section B

### School-level variance in childhood outcomes

School-level characteristics are found to explain a substantially larger proportion of the variance in cognitive child outcomes than non-cognitive outcomes and measures of well-

being and this is found to be true at both primary and secondary school ages. Research studies have found that around 20% and 10% of the variation in Key Stage 4 and Key Stage 2 pupil achievement respectively is attributable to differences across schools. In contrast, only around 3% or less of the variation in non-cognitive childhood outcomes can be attributed to school-level characteristics. These results suggest that although schools do make a difference for children's well-being, it is primarily children's individual experiences within schools which are important. Indeed, the evidence does suggest that even within the same school, children experience very different environments due to their own individual interactions with peers and teachers. This observation that the school a pupil chooses to attend currently has little or no impact on their well-being and non-cognitive outcomes should be interpreted only as evidence of the current homogeneity of schools with respect to this domain of childhood outcomes. It does not give any indication of whether schools are currently effective or ineffective in their impact on childhood well-being, rather that either way, the impact is consistent across schools. It would be inaccurate, therefore, to interpret this evidence as individual schools not having the capacity to significantly impact on non-cognitive outcomes of their children. As Gutman and Feinstein, 2008, point out, "the school environment and ethos can provide an important backdrop to individual interventions. School policy and practice in relation to bullying will affect the experience of both bully and victim..."

One potential mechanism through which schools could increase their influence on children's well-being is the role and characteristics of teachers. In results Section B, good teacher-child relations are significantly negatively associated with a range of risky behaviours, including smoking and drinking frequently as well as incidences of truancy. In addition, many of the individual child characteristics previously noted such as child beliefs, attitudes and aspirations which help determine a host of behavioural and educational outcomes, provide potential focal points for school-level policy to attempt to improve the overall well-being of children. Teachers can also have substantial bearing on cognitive outcomes. Burgess et al, 2009 show that teachers, or more specifically, teacher quality, matters a great deal. Having a good teacher as opposed to a mediocre or poor teacher makes a big difference. "Raising teacher quality does seem a promising direction for public policy" (Burgess et al, 2009). The recent introduction of a Masters in Teaching and Learning appears to be a step in the right direction to producing more rounded teaching of higher quality. Training teachers to

interact positively with parents and to become increasingly responsive to children's needs would also seem appropriate given the evidence.

Data limitations are, however, important considerations when inferring policy issues from the evidence on teacher quality. Observed characteristics of teachers commonly do not predict their quality particularly well in many datasets used<sup>69</sup>. This suggests that it may be very difficult to identify high quality teachers ex ante, whereas administrative data can be used to identify them ex post. With respect to policy, this potentially implies a greater role for performance management and personnel policies in schools. According to Burgess et al, 2009, "This might include a stronger role for pupil progress analysis in probationary periods, mentoring, more stringent hiring procedures or sharper performance pay using such data" (Burgess et al, 2009).

More generally, picking up again on the point that children experience starkly different school environments within the same school, as Gutman and Feinstein, 2009, argue, it may be the case that the child-school "fit" may be more important for children's well-being than broad school-level characteristics. School characteristics can either exacerbate or buffer dimensions of child well-being. This once again relates to the Personalised Learning Programme aforementioned.

The evidence on the impact of school resources on educational attainment is also relevant for policy design. Financial resources are shown to have a causal impact on test scores<sup>70</sup>, suggesting that they are a valid policy tool in improving childhood outcomes. However, more specifically, Levacic et al highlight that the causal impact of resources on academic attainment at Key Stage 3, peters out by GCSE in some subjects, and suggest the plausible explanation for this; "it may be the case that resources genuinely matter more in the earlier years of education, with less impact on achievement in the later years" (Levacic et al, 2006). The extent to which this is true will have substantial bearing on the provision of resources, and thus warrants further research<sup>71</sup>.

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<sup>69</sup> This is true for most studies with Clotfelter et al (2006, 2007) being the exception. They found that teacher qualifications do have a significant effect.

<sup>70</sup> These effects are found at the margin.

<sup>71</sup> There have been a large number of recent US studies of early childhood investments in children from disadvantaged environments and these are discussed in more detail below in the role of pre-schools section.

## The role of pre-schools

Feinstein, 2003, showed using the 1970 British Cohort Study that there were significant differences in the educational performance of children from different socio-economic groups. Educational inequalities in the UK were found to exist as early as 22 months. Most low-SES children found to be in the bottom quartile at 22 months were still there at age 10, while high-SES children showed much more upward mobility and were more likely to be in the top achievement bracket than the bottom by age 10, even if they were in the bottom bracket at 22 months. Crucially, these findings appear to be stable over time. Blanden and Machin, 2007, use the Millenium Cohort Study to examine the equivalent trends in the 2000s, and show that they are indeed very closely replicated, suggesting that the evolution of inequality for children born in 2000 is similar to what it was for those born in 1970<sup>72</sup>.

As Feinstein points out, these results imply a key policy question: at what point should the government intervene? “In order to address this question, one would want to know (a) the extent to which the correlation between school-age ability and pre-school ability was due to dependence of the former on the latter or to individual heterogeneity underlying both, and (b) the extent to which interventions could improve performance or reduce inequality at each stage” (Feinstein, 2003). The most recent evidence attempting to shed light on these questions has been the Effective Pre-school and Primary Education Project (EPPE). Results suggest that pre-school attendance is beneficial for cognitive and non-cognitive outcomes in the pre-school period, and that these benefits extend through to at least Key Stage 2 (age 11) for both academic and social/behavioural outcomes, as well as pupils’ self-perceptions. The quality of the pre-school was also found to have lasting effects, most notably for English, Mathematics and Hyperactivity. The research goes some way to highlighting the potential beneficial impact of policy-oriented encouragement for parents of young children to have them attend pre-schools. However the point is far from unambiguous. As aforementioned, there is credible evidence that early-years childcare and pre-school attendance can have potentially harmful impacts on a child by altering the dynamics of the relationship between mother and child. Further research is certainly required to better understand the conditions under which attendance at a pre-school, or perhaps more pertinently, time away from a child’s natural mother in the early years, have significantly

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<sup>72</sup> More than 2 periods of data would be required to be concrete on this point.

adverse effects for a child, and the mechanisms defining this relationship. These potential ‘internal’ dynamics embedded within the broader relationship between pre-school attendance and child outcomes are important if policy makers desire to implement effective early years interventions<sup>73</sup>.

The implications of the evidence on the affect of the *quality* of pre-schools appear to be somewhat clearer. The positive impact of the quality of pre-school on childhood outcomes suggests a number of goals for targeted policy. The mechanisms dictating quality, such as continuous professional development and initiatives to implement, monitor and evaluate pre-school practices are clearly relevant. As are issues such as the skill level of the workforce, particularly teacher qualifications and their impact upon child development. The result that children experience the most cognitive and non-cognitive benefits when attendance at a high quality pre-school is combined with a high quality early-years home learning environment (HLE) suggests the need to support parents with information, advice and practical skills in insuring positive HLEs conducive to all round child development.

Once again, Sure Start Children’s Centres are a promising platform to provide early education, childcare and information on providing positive HLEs, while extending the entitlement to free early learning should help reduce mitigate against the cognitive socio-economic inequalities that are observed<sup>74</sup>.

It is worth spending a moment to consider the vast amount of relevant research from the U.S. Heckman and Carneiro provide a useful overview of the existing literature on the evaluation of early childhood policy interventions. The authors argue, “Recent small-scale studies of early childhood investments from disadvantaged environments have shown remarkable success and indicate that interventions in the early years can effectively promote learning and can be enriched through external channels” (Heckman and Carneiro, 2003). As part of the Perry Preschool Program in Michigan, disadvantaged children with below average IQ were randomly assigned to the program, receiving intensive treatment at

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<sup>73</sup> These considerations should have particular relevance to the government initiative of free child care for all 2 year olds.

<sup>74</sup> Recent evaluations of *Sure Start* can be found here:

<http://www.dcsf.gov.uk/everychildmatters/research/evaluations/nationalevaluation/NESS/nesspublications/>

ages 4 and 5<sup>75</sup>. Treatment was discontinued after a time and the children were observed over their life cycle. Those who were enrolled in the program went on to have comparatively higher earnings and lower levels of criminal behaviour in their late twenties<sup>76</sup>. The Syracuse Preschool program provided family development for disadvantaged children from prenatal care to child age 5. The children in these families experienced very large reductions in the propensity to engage in criminal activity, and the participating girls exhibited greater schools achievement.

The summary evidence that Heckman and Carneiro presents two predominant implications. Firstly, that at the very least, under certain circumstances, early policy interventions can have significant and lasting impacts on childhood outcomes, and secondly that early childhood programs in the U.S. appear to be most effective in changing non-cognitive skills (although they also raise achievement test scores). This second point – that the social skills and motivation of a child appear to be more easily altered than cognitive characteristics such as IQ and test scores - has only recently been receiving adequate attention from academics. As the authors point out, basing the evaluation of the effectiveness of interventions purely on cognitive assessments may be a narrow perspective to adopt, given the observed benefits in the subsequent socialisation and mental health of participating children.

## **7 Section C: The Importance Of Child Outcomes To Later (Adult And Intergenerational) Outcomes:**

### **Intra-generational associations**

It is clear then that a wide range of factors combine to determine cognitive and non-cognitive childhood outcomes. However, childhood outcomes help determine later adult socio-economic, physical and mental outcomes. This is important on the one hand due to

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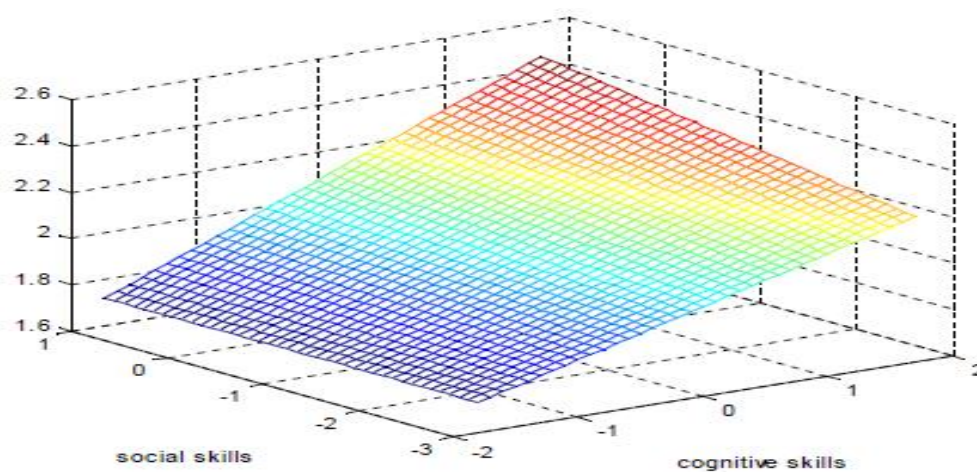
<sup>75</sup> The 'treatment' was composed of three parts: (1) a centre-based program for 2.5 hours per day for each weekday, with a child:teacher ratio of 5:1; (2) home visiting for 1.5 hours per weekday; and (3) group meetings of parents.

<sup>76</sup> Reported benefit-cost ratios for the program are substantial; the program returns \$5.70 for every dollar spent and when returns are projected for the remainder of the lives of the program participants, the return on the dollar is \$8.70.

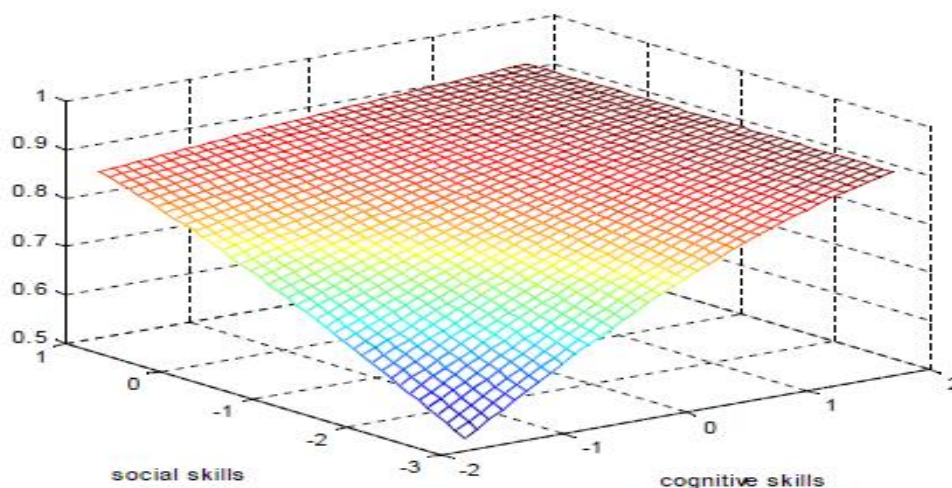


the complementarities and spill-overs which exist with the objectives and priorities of other government departments addressing the adult population and also the intergenerational aspect, as this provides the feedback loop to the next generation. And indeed, recent evidence<sup>77</sup> suggests that cognitive and non-cognitive skills formed in childhood are associated with pertinent outcomes in adulthood.

**Chart 37: Impact Of social and cognitive skills at age 11 on log wages.**



**Chart 38: Impact of social and cognitive skills at age 11 on probability of employment.**



<sup>77</sup> Pedro Carneiro , Claire Crawford , Alissa Goodman, 2007: The Impact of Early Cognitive and Non-Cognitive Skills on Later Outcomes

Research by Carneiro et al, 2007, investigates the relationships between 'skills' in childhood, and adult outcomes of interest. The authors consider the impact of social and cognitive skills<sup>78</sup> measured at age 11 on education outcomes, labour market outcomes, adolescent social outcomes and adult social outcomes.

Good social skills at age 11 are associated with a higher probability of employment at age 42<sup>79</sup>. This is the case even when conditioning on educational attainment, suggesting that social skills are important both because they influence achievement in school and because they impact on labour market performance directly.

Contrastingly when conditioning on the individual's highest qualification at age 42, the effects of both cognitive and social skills are greatly reduced and become statistically insignificant compared to the unconditional regression. This suggests that the impact of cognitive and social skills on hourly wages is transmitted mainly through their effect on schooling.

Results from this analysis also suggest that social skills are very important for some schooling outcomes. Children exhibiting greater social adjustment at age 11 were both more likely to stay on at school post-16 and more likely to have a higher education degree, accounting for cognitive ability and other background factors. The relationship between cognitive performance at age 11 and these education outcomes is even more pronounced.

It is also interesting to note that for those educational outcomes for which social skills are found to be important, the two types of age 11 skills appear to reinforce each other. That is, the higher level of social skills, the larger the impact of cognitive ability, and vice-versa.

The marginal effect of staying in school beyond 16 is quite low if social skills are fixed at a low value, but very high if social skills are fixed at a high value. "This interaction is extremely important, and suggests that an individual with very high cognitive skills but very poor social

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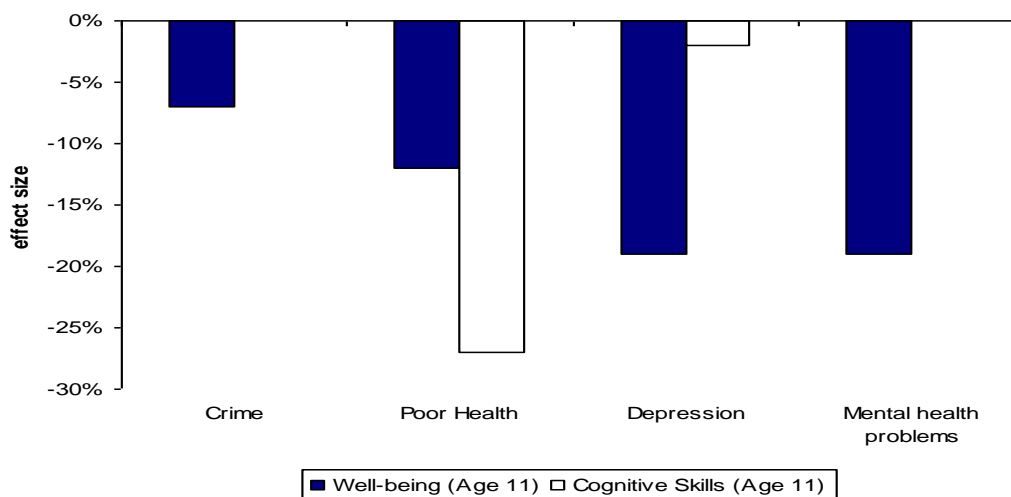
<sup>78</sup> Indicators of age 11 cognitive skills are maths, reading, copying and general ability scores, while social skills indicators were the Bristol Social Adjustment Guide (BSAG).

<sup>79</sup> A one standard deviation increase in social adjustment at age 11 gave rise to a 4.2 percentage point (5 percent) increase in the likelihood of being in work at age 42 for individuals with fathers in the low SES group.

skills is relatively unlikely to stay on at school beyond age 16 (at least at the mean value of the remaining regressors)” (Carneiro et al, 2007). Similar results are found when considering the predicted probability that an individual obtains a degree as their highest qualification by age 42, although the increase in the marginal effect of cognitive skills as social skills improve is less pronounced.

Age 11 social and cognitive skills are also significantly associated with future non-cognitive outcomes and indicators of overall well-being.

**Chart 39: Impact of age 11 social and cognitive skills on adult non-cognitive outcomes.**



Social skills and well-being at age 11 are associated with a lower propensity to be involved in crime, better physical and mental health. The association between age 11 social maladjustment and age 42 depression is particularly striking indicating that depression in childhood may persist into later adulthood as is the connection between a lack of social skills at age 11 and crime carried out between the ages of 33 and 42. Age 11 cognitive skills appear to have less of a connection with adult social outcomes, although they do appear to be strongly associated with adult health.

Other significant intra-generational associations stem from living in social housing during childhood. Children born in social housing in 1970 were over 3 times more likely to be living

in social housing in adulthood even after controlling for extensive individual and socio-economic controls.

Given the relationship between social housing and multiple indicators of disadvantage<sup>80</sup>, this intra-generational association appears to be something which should be addressed, and warrants further research on the determinants of being in social housing in adulthood. Feinstein et al, 2008 also show that even controlling on many measures, some of which could be themselves considered possible channels for social housing effects, there remain significant differences in the adult outcomes of those living in social housing in childhood, and those not.

### **Inter-generational associations**

Given the discussion of the determinants of childhood outcomes in addition to the evidence on the significant and persistent intra-generational associations between cognitive and non-cognitive outcomes, it is perhaps not surprising that inter-generational associations in outcomes are robust.

Gregg et al, 2006<sup>81</sup>, estimate the intergenerational correlation in income. Conditional on average parental age and age-squared, they find the intergenerational correlation in income to be 0.27, i.e. they show that a son's future income is significantly and strongly associated with his father's income<sup>82</sup>. The authors then attempt to characterise the pathways through which parental income affects children's earnings. Almost all of the possible mediating factors are found to be strongly related to family income<sup>83</sup>, with cognitive measures, in general, having stronger associations with parental income than non-cognitive measures. Application and locus of control have the strongest association with parental income among the non-cognitive variables. These mediating variables were then also found to be significantly associated with future earnings, either directly or indirectly through education.

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<sup>80</sup> Feinstein et al, 2008; "The public value of social housing: a longitudinal analysis of the relationship between housing and life chances", IOE.

<sup>81</sup> Blanden, Gregg and MacMillan (2006) "Explaining Intergenerational Income Persistence: Non-cognitive Skills, Ability and Education" CMPO Working Paper 06/146

<sup>82</sup> Estimated for the 1970 cohort.

<sup>83</sup> Mediating factors include cognitive and non-cognitive characteristics at age 10 and 16, education and higher education indicators.

Non-cognitive and cognitive variables, when included separately, explain approximately 22% and 27% of the intergenerational persistence in income, and interestingly, when included together the explained variance only rises to 30%, suggesting that in determining income, these two sets of variables strongly overlap in the effects. Summary variables of educational attainment and participation account for almost 30% of intergenerational persistence. Finally labour market attachment variables account for 10% of the correlation. It is interesting to note that when education and labour market attachment measures are conditioned upon, cognitive and non-cognitive measures are each responsible for only 6%, suggesting the routes through which cognitive and non-cognitive scores operate in affecting adult income.

However, it is not just active labour market outcomes which exhibit inter-generational associations. Recent work by Macmillan<sup>84</sup> has also shown that there is a large correlation in workless experiences between parents and children. Sons are over twice as likely to experience workless spells themselves if they come from a family where the father was long-term unemployed. Increasing the intensity of the sons' workless measures leads to an even larger inter-generational correlation. This shows that inter-generational associations exist across the full spectrum of labour market outcomes.

Blanden et al, 2010, show that intergenerational conditional correlations between parent and child outcomes exist for all five ECM areas of childhood outcomes<sup>85</sup>.

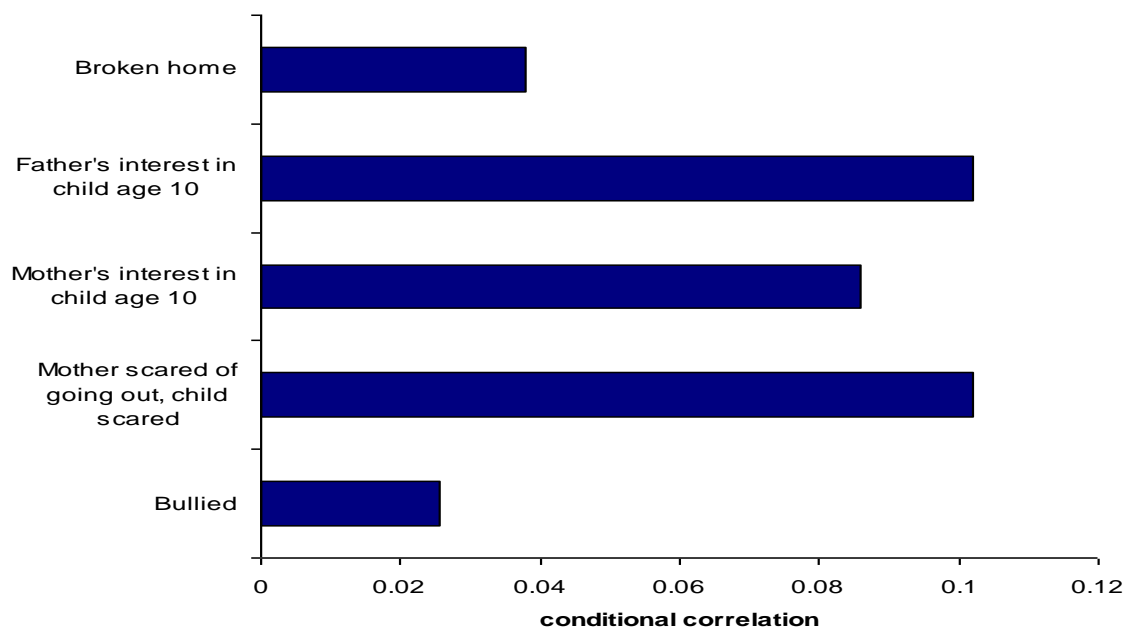
Some indicators of the *stay safe* ECM category are significantly correlated across associations. Being bullied and growing up in a broken home is moderately correlated across generations while parental interest in their child and being scared of going out appears to be significantly associated between generations, although It is impossible to say whether this is picking up a persistence in living in unsafe areas, or a persistence in fearfulness.

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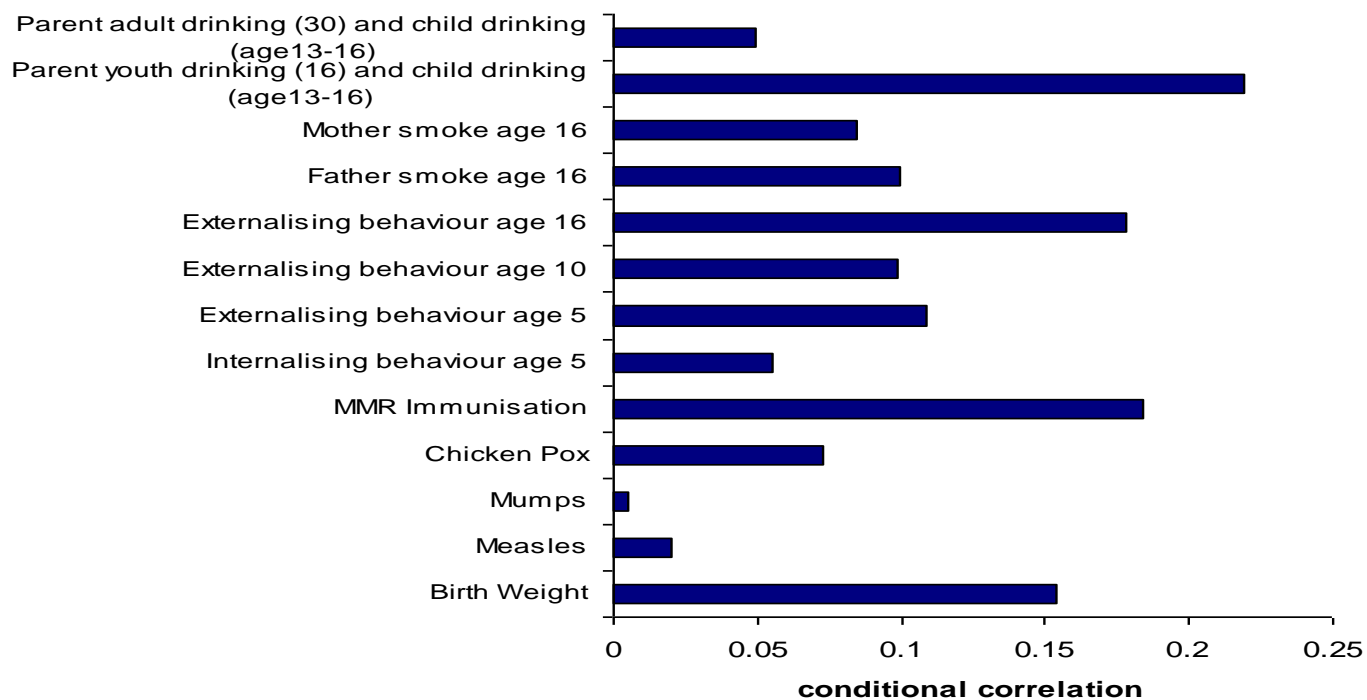
<sup>84</sup> Macmillan, 2009; "The intergenerational transmission of worklessness in The U.K."

<sup>85</sup> All correlations condition on the socio-economic status of the parents.

**Chart 40: Intergenerational conditional correlations between parent and child outcomes  
(stay safe).**

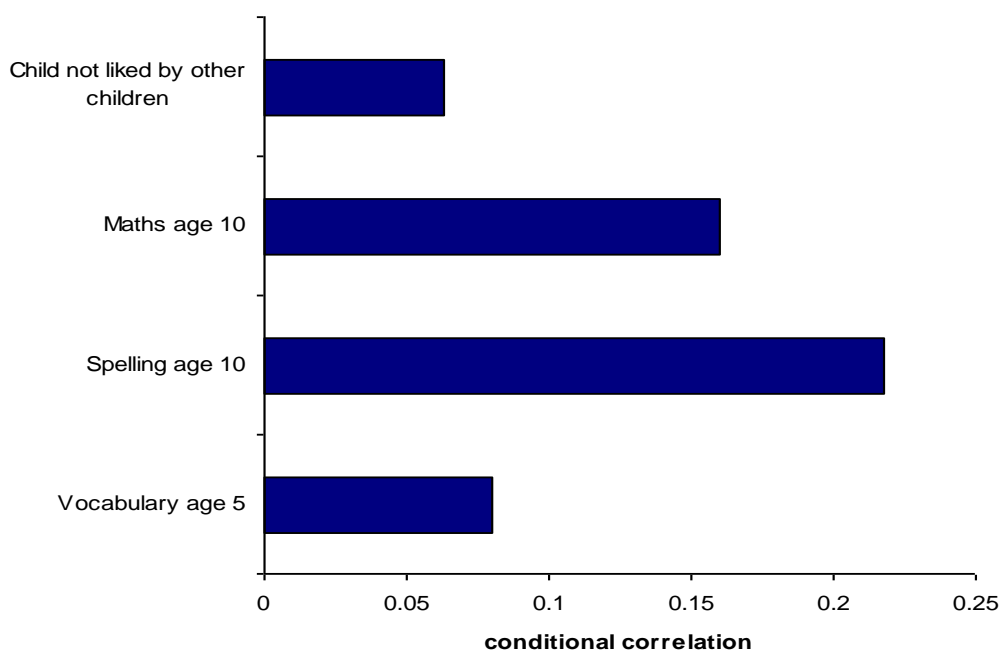


**Chart 41: Intergenerational conditional correlations between parent and child outcomes  
(be healthy).**



The *be healthy* category also includes characteristics which are correlated across generations. Health lifestyles are correlated across generations, especially whether the parent used to drink alcohol age 16 and the child drinking between the ages of 13 and 16. Mental health is also significantly correlated, particularly externalising behaviour at age 16.

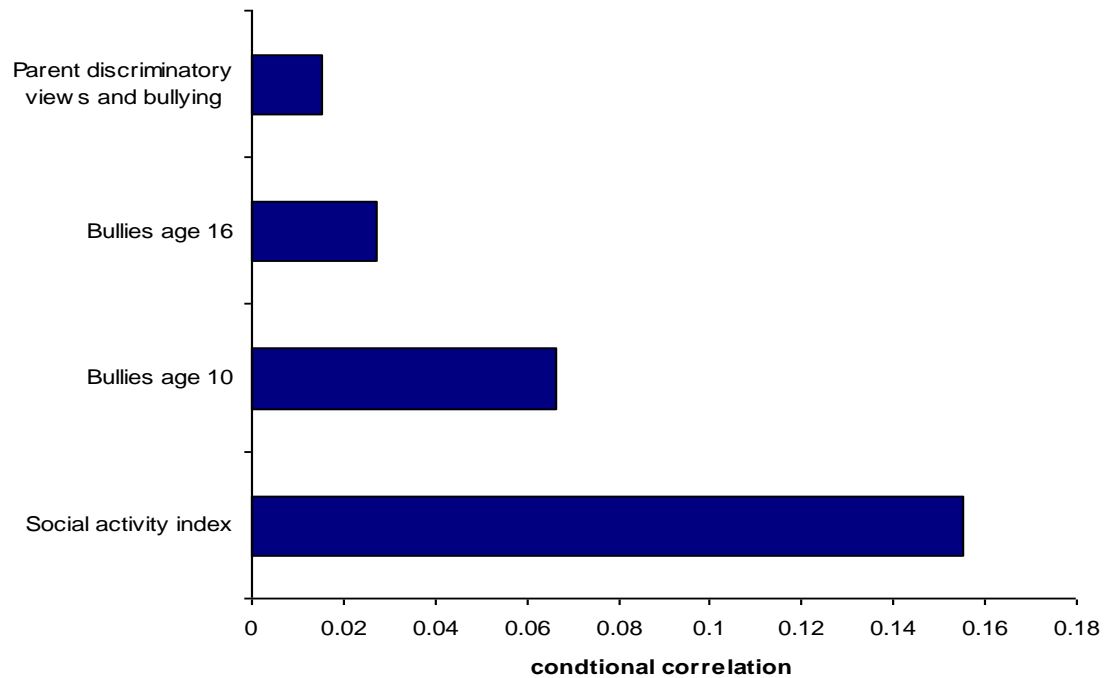
**Chart 42: Intergenerational conditional correlations between parent and child outcomes (*enjoy and achieve*).**



The authors find significant associations in parent and child *enjoy and achieve* indicators, with cognitive achievement at age 10 particularly strong correlated. Interestingly, even an indicator such as vocabulary at age 5 appears to be significantly correlated across generations.

It can also be seen with the *positive contribution* category highly active parents tend to have children who are also particularly active. On the other side, parent and child tendencies to bully or be discriminatory are also moderately correlated.

**Chart 43: Intergenerational conditional correlations between parent and child outcomes  
(positive contribution).**

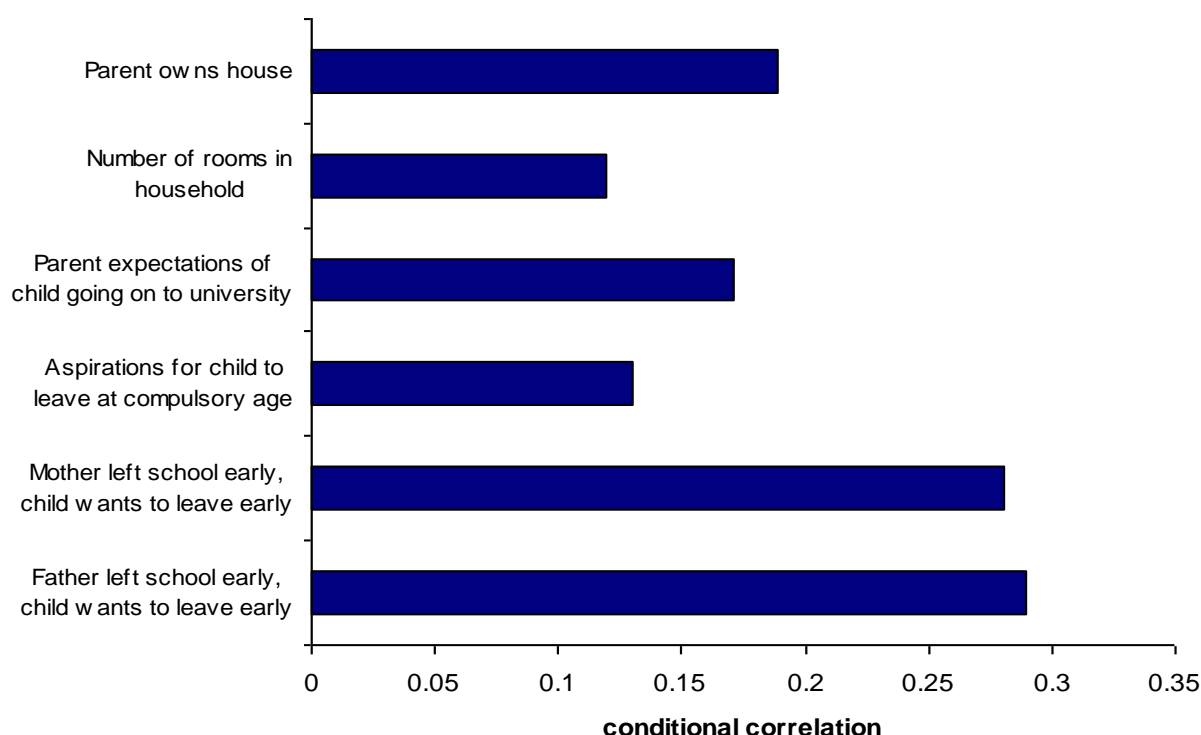


Finally, some of the strongest conditional inter-generational correlations exist within the *achieve economic well-being* category. Parents who left school early are significantly more likely to have children who do the same. Other expectations and aspirations towards education and higher education are also correlated across generations, while home tenure and home environment also appears to be strongly correlated across generations.

As has been reiterated throughout this report, the intergenerational correlations observed in this section cannot be considered causal. However, these correlations are independent of parental socio-economic status.



**Chart 44: Intergenerational conditional correlations between parent and child outcomes  
(achieve economic well-being).**



## 8 Policy Discussion: Section C

### Intra- and Inter-generational associations

There is substantial evidence that cognitive and non-cognitive skills in childhood are important determinants of schooling and labour market outcomes, both directly and indirectly via their effect on educational attainment. Non-cognitive skills are also very strong predictors of engagement in risky behaviours. This highlights that in addition to an inherent desire to ensure children are not socially and cognitively disadvantaged there is also a comprehensive socio-economic argument advocating the same desire. The social and economic costs on society of future engagement in crime and systematic lack of employment are high, and are associated with these childhood dimensions of character. Thus this serves to reinforce the policy importance of insuring children are at the

appropriate standard with respect to their social and cognitive skills, especially vulnerable children. This in turn increases the importance of reducing socio-economic inequalities in childhood outcomes.

More broadly, and relating back to the policy discussion of section A, the intra-generational evidence here makes clear that “a vision of the world in which skills is a one dimensional object is extremely inadequate” (Blanden et al, forthcoming). The evidence suggests that depending on context, social and cognitive skills as defined can be complimentary and reinforcing in the impact on later outcomes, or the dynamics can be such that only one of the set of skills is required to perform in the given outcome. In addition, the research by Blanden et al only includes two categories (measures of cognitive and non-cognitive characteristics), and as the authors point out, it is quite likely that a much larger variety of skills is important. Thus the importance of evaluating childhood development broadly and incorporating many measures of cognitive, non-cognitive, mental and physical characteristics is again reinforced.

The intra-generational evidence briefly outlined also provides impetus and direction for policy. The findings demonstrate that living in social housing in childhood is associated with a range of unfavourable outcomes in adulthood. “Subsidised housing is apparently either insufficient, or wrongly designed to protect against unemployment or labour market disadvantage, lack of qualifications, or mental or physical ill health, or to combat intergenerational multiple disadvantage”. (Feinstein et al, 2008). The authors provide a number of policy alternatives to the existing system of providing social housing. These alternatives address potentially problematic characteristics of social housing, such as being most often rented and not owned, having subsidies linked to the home and not the individual, and that they are provided by a non-profit landlord on a large-scale and with clustered provision. However, justified and efficient policy can only be formed when the relationship between living in social housing in childhood and adult outcomes is further characterised.

Gregg et al, 2006, measure intergenerational persistence in the U.K. and find that education, ability, non-cognitive skills and labour market experience taken together, explain half of the association between parental income and children’s earnings. Inequalities in achievements

at age 16 and in post-compulsory education are extremely important in determining the level of intergenerational mobility, although the dominant role of education disguises the important role for cognitive and non-cognitive skills in generating persistence, in that these variables work indirectly through influencing the level of education obtained as well as directly influencing adult earnings. Thus, with respect to policy, Gregg et al argue that policy could attempt to close the gap in non-cognitive skills between rich and poor children, with particular focus on personal efficacy, concentration and anxiety of children from low income backgrounds. Given the role of education observed in transmitting inter-generational persistence in income, continued action to raise attainment of children from less affluent backgrounds at 16 and support for continued learning at Higher Education is crucial. Raising the participation age to 18 will help address this issue, if it succeeds in raising the attainment of poor children. From 2013 young people will be required to continue in education or training post-16 and will have four routes available to them post-14; Apprenticeships, Diplomas, Foundation Learning and GCSEs/A-Levels. This variety from an earlier age, it can be argued, should be able to accommodate more young people and their preferences. Finally, Gregg et al draw attention to the results regarding the role of labour market outcomes, highlighting the potential importance of ensuring that children from poorer backgrounds get a good start to their careers and do not experience long-term early unemployment. This particular implication is given added pertinence by the inter-generational associations in worklessness found by Macmillan.

The report by Blanden et al, estimated the intergenerational correlations of a very large number of ECM outcomes and they find strong persistence in outcomes from all five of the ECM categories. Although it would not be appropriate to think that improving outcomes for children will necessarily pass onto the next generation, it does suggest that there is scope to impact upon a very wide of choices of the next generation by altering parents' attitudes towards education and risky behaviours, and overall well-being. This corroborates the earlier evidence on the importance of parents and the family environment in explaining variation in childhood outcomes.

## 9 Concluding Remarks

While very little of the evidence highlighted in this report identifies causal associations, taken as a whole, it presents a highly complex structure of robust relationships characterising childhood outcomes. 'Major' childhood outcomes have been shown to interact with each other, and are themselves determined by myriad distinct characteristics and environments. With evidence also emphasising the importance of childhood outcomes for future success, both own and of the next generation, this detailed framework for individual development across generations has clear relevance for policy design and implementation.

As touched upon in each of the Policy Discussion sections, this evidence as part of a much broader evidence base is being used to aid policy design to ensure maximum effectiveness across a broad range of childhood domains. However, socio-economic inequalities still exist, appearing early and persist, through a complex network of mediating mechanisms, into adulthood. This suggests that further research is required to better understand the associations referred to in this report and potentially to move beyond correlative characterisation in the attempt to identify causality, allowing more justified and increasingly effective policy.

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