

Bullying, Education and Labour Market Outcomes

Evidence from the National Child Development Study

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Abstract: We explore the effect of bullying at school on the educational attainment of a sample of individuals drawn from the British *National Child Development Study (NCDS)*. Our empirical findings suggest that school bullying has an adverse effect on human capital accumulation both at and beyond school. Moreover, the impact of bullying on educational attainment at age sixteen is found to be similar in magnitude to class size effects, which have attracted recent attention in the economics literature. Furthermore, in contrast to class size effects, the adverse influence of bullying on human capital attainment remains during adulthood. In addition, being bullied at school directly influences wages received during adulthood as well as indirectly influencing wages via educational attainment.

Key Words: Bulling; Education; Harassment; Human Capital; Wages.

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I. Introduction and Background

Since education is a major determinant of quality of life, it is not surprising that there has been considerable interest in the economics literature in the determinants of the educational attainment of individuals. Educational qualifications heavily influence employment and career opportunities, which in turn affect happiness and well-being (see, for example, Layard, 2003, Clark and Oswald, 2002). In this paper, we focus on one particular influence on educational attainment – bullying at school – which has attracted scant attention in the economics literature despite keen interest amongst policy makers. In the UK, for example, there have been a number of reports published recently suggesting that a relatively high proportion of children experience bullying:

‘31% of children experienced bullying during childhood, a further 7% were discriminated against and 14% were made to feel different/an outsider. 43% experienced at least one of these things during childhood.’[Cawson *et al.* 2000, p.26].

Similarly, the State of London’s Children Report (2004), which reviews the health and well-being of children in London, identified bullying as having a range of adverse effects on children’s well-being. Moreover, just under one fifth of the children surveyed in the Greater London Authority stated that they had been bullied.

Furthermore, the detrimental effects of bullying on educational attainment have also been remarked upon by policy-makers. In the foreword to Oliver and Candappa (2003), for example, it is stated that: ‘bullying not only scars the life of too many children, it also reflects a serious weakness in our education system.’ Hence, there is a degree of concern about the adverse effects of bullying on educational attainment amongst policy-makers. In addition to impinging on a child’s happiness and well-being at school, it is apparent that bullying may also have longer-term consequences, which may be felt during adulthood:

‘The emotional distress caused by bullying in whatever form – be it racial, or as a result of a child’s appearance, behaviour or special educational needs, or related to sexual orientation, can prejudice school achievement, lead to lateness or truancy, and in extreme cases, end with suicide.’ [DfEE, 1999: pp. 24-25].

If being bullied at school exerts a negative effect on educational achievement, then the individual's employment prospects may be indirectly influenced by bullying, Elliot and Kilpatrick (1994). For instance, lower levels of educational achievement may influence the labour market status of individuals or impinge upon earnings in adulthood.

Given the current Government policy focus in the UK on introducing programs to alleviate bullying at school,¹ it is surprising that the implications of this much publicised adverse effect on children's happiness and well-being has not been explored by economists. One exception in the economics literature is a study based on Australian twins born between 1961 and 1974 by Le *et al.* (2005) who explore how childhood disorder problems influence schooling and labour market outcomes. They identify two behavioural problems that have the largest negative impacts on the school leaving decisions of males and females; bullying activity and a propensity for starting physical fights. As argued by Waddell (2005), the impact of noncognitive skills on labour market outcomes has been attracting increasing interest in the economics literature. Waddell (2005) finds that youths who have low self-esteem and poor attitude are likely to have relatively low educational attainment, more likely to be unemployed and, if employed, are likely to receive low wages. It is apparent that being bullied at school may be associated with negative attitudes and low self-esteem.

It is important to acknowledge that, although there is a lack of research on bullying at school, there has been a considerable amount of research in the economics literature exploring the issue of work place harassment and bullying focusing on, for example, issues related to gender (see, for example, Kaushik, 2003) and ethnicity (see, for example, Shields and Wheatley Price, 2002).

In stark contrast to the paucity of research on the effects of school bullying in the economics literature, the psychology literature has been active in researching the implications of school bullying. For example, Smith *et al.* (2004) compare profiles of non victims, escaped

¹ For example, the Department of Education and Skills' *'Don't Suffer in Silence'* campaign (see <http://www.dfes.gov.uk/bullying/>).

victims and new victims of school bullying. They find that, irrespective of gender, continuing victims of bullying have fewer friends, are more likely to be absent from school, like other pupils less and dislike break-times. Woods and Wolke (2004), who argue there has been a dearth of research focusing on the association between bullying and academic achievement, explore the relationship between bullying behaviour at primary school, i.e. being a bully, and academic outcomes in the form of National Curriculum Standard Assessment Tasks (SATs).² Surprisingly, the results suggest little evidence of a direct link between being a bully and erosion of academic achievement. In contrast, Varhama and Björkqvist (2005) study the relationship between being bullied at school in adolescence and long term unemployment in adulthood in Finland. Amongst those individuals with long term unemployment problems, 29% responded to having been exposed to bullying at least once per week during adolescence.

In this paper, we attempt to partially redress the imbalance in the economics literature. Our principal aim is to explore the impact of school bullying – focusing on the victim rather than the perpetrator – on individuals’ human capital accumulation at and also beyond age 16. We exploit the rich data available from the *National Child Development Study (NCDS)*, which enables us to relate a child’s experience of bullying at school to their subsequent educational attainment and wages received during adulthood.

II. Data and Methodology

The *NCDS* is a panel survey following a cohort of children born during a given week – March 3rd to March 9th – in 1958. Ideally, a more recent study would exist in order to analyse the effects of school bullying on the current generation.³ Our analysis, however, requires information about the respondent during both childhood and adulthood and there is a scarcity of such data sets. In addition, there is a lack of large scale data sets that survey children or

² SATs are currently employed to assess children’s academic performance in the UK.

³ The *British Cohort Survey (BCS)*, for example, follows individuals born in April 1970, at the ages of 5, 10, 16, 21 and 26. Feinstein (2000) has used the *BCS* to examine the relationship between psychological and behavioural tendencies and academic outcomes. Feinstein finds that conduct disorder which incorporates personality traits such as: disobedience; disruptiveness; defiance of authority and dislike of school, increased short term unemployment spells of males. Unfortunately, the *BCS* does not contain information on whether children are bullied at school.

young adults. One exception is the *British Household Panel Survey (BHPS) Youth Survey*, which targets respondents aged between 11 and 16. In the *BHPS Youth Survey*, however, there are no questions relating to whether children have experienced bullying at school, but there is a question in the *BHPS* youth surveys 1995 to 2002 relating to how much respondents worry about being bullied at school. On average, 36% of respondents state that they worry about being bullied a lot or a little at school. Such figures suggest that the issue of bullying is of much concern to young adults in Great Britain. Given that existing evidence indicates that bullying is more prevalent in primary schools, see, for example, Sharp *et al.* (2002) and the National Children’s Bureau (2004), the proportion of children of primary school age who are concerned about bullying may be significantly higher.

The *NCDS*, which does contain information about a child’s experiences of school bullying, provides a wealth of information relating to family background in addition to having the advantage of tracing an individual over a relatively long time horizon being conducted at ages 7, 11, 16, 23, 33 and 42. The *NCDS* asks the mother of each respondent whether their child is bullied by other children when the child is aged 7 and when the child is aged 11. The response rates to these questions are detailed below:

<i>Bullied</i>	<i>Aged 7 (%)</i>	<i>Aged 11 (%)</i>
<i>0=never</i>	65.47	76.24
<i>1=sometimes</i>	29.33	20.18
<i>2=frequently</i>	5.20	3.57

In accordance with the existing literature, the response rates suggest that bullying is more prevalent at primary school age. From the response rates shown above, we construct two three-point indices to measure the extent of bullying at ages 7 and 11.

It is important to re-iterate that the information pertaining to bullying is elicited from the mother rather than the child. However, given that children are often reluctant to reveal that they have been subjected to bullying such information may be more accurate than if elicited from the child. Furthermore, Oliver and Candappa (2003) report that the majority of pupils

surveyed about bullying stated that they could talk to their mothers, suggesting that mothers are well informed about their child's experiences at school.

In Table 1, we explore how educational attainment at age 16 as well as at three ages in adulthood – 23, 33 and 42 – varies with the extent of bullying at ages 7 and 11. Educational attainment is measured by the number of O levels accumulated at age 16 as well as the proportion of individuals who have no educational qualifications, CSE/O level education, A levels (the school qualification taken at age 18), a diploma (i.e. intermediate qualifications between high school and university degree), a teaching or nursing qualification or a degree (including a higher degree).⁴ The summary statistics indicate that the higher is the incidence of bullying, the greater is the percentage of individuals with no qualifications across the life cycle. In general, higher incidences of school bullying are associated with a lower percentage of qualifications across the various educational categories at each age. In terms of the number of O levels, it is apparent that the proportion of individuals reporting 6 or more O levels is significantly lower for those who were frequently bullied at school. For example, only 3.96% of individuals who were frequently bullied at age 11 have 6 or more O levels as compared to 17.02% for those who report that they were never bullied at age 11. Such descriptive statistics suggest that bullying does adversely influence educational attainment.

In order to explore how bullying affects human capital accumulation within a multi-variate context, we specify an ordered probit model as follows:

$$e_i^T = \mathbf{b}_0 + \mathbf{b}_1 \text{bullied}_i + \mathbf{X}_i' \mathbf{f} + e_{i1} \quad (1)$$

where e_i represents the individual's observed level of education; T denotes the time period at which educational attainment is measured (1974, 1981, 1991 or 2000, i.e. when the individual

⁴ Both CSE (the equivalent of GCSEs grades below C) and O levels (the equivalent of GCSEs grades A to C) were replaced by GCSEs in the 1980s. CSE/O levels were taken after 11 years of formal compulsory education and approximate to the US honours high school curriculum. A levels are public examinations taken by 18 year olds over a two-year period, usually studying a set syllabus in one to four subjects. This qualification is the major determinant of eligibility for entry to higher education in the UK.

is aged 16, 23, 33 or 42, respectively); $bullied_i$ denotes the level of bullying experienced by individual i (which is defined at age 7 or 11) and X_i denotes a vector of explanatory variables.

As outlined above, we specify education in two ways: firstly by the number of O levels or equivalent accumulated by the child at age 16. We focus initially on the accumulation of this specific type of education since this is the type of human capital predominately accumulated at age 16. This index ranges from 0 to 11 such that some individuals have no O levels whilst the maximum number of O levels in our sample is 11. Secondly, we follow Dearden *et al.* (2002) by specifying an educational attainment index, which is defined on a 6-point scale where zero represents no educational qualifications, 1 denotes CSE/O level education, 2 denotes A level education, 3 denotes diploma level education, 4 denotes a nursing or teaching qualification, 5 denotes degree (i.e. a Bachelors degree, a Masters degree or a PhD). We construct three educational attainment indices with the information given by the individual at ages 23, 33 and 42, so that we can explore the effect of bullying on human capital accumulation beyond school age.

The explanatory variables given in X_i are divided into three groups: school quality; family background; and ability, and are largely based on the specifications of Dearden *et al.* (2002), Dustmann *et al.* (2003) and Ermisch and Francesconi (2001). We adopt one of the standard measures of school quality – class size (the number of pupils per teacher in the school) defined at the secondary stage of education, i.e. post age 10. We also include dummy variables to control for whether, at the age of 16, the individual attended a secondary modern school, a technical school, a comprehensive school (i.e. non selective and state run), a grammar school (higher ability and state run) or a private school. We also control for whether the individual attended a single sex school at age 16 as well as a set of dummy variables indicating whether the school lacked library, sports or other facilities. Family background controls include parents' occupation, the years of education of the parents, the number of older siblings and the number of younger siblings. We also include information indicating whether the

teacher considers the mother or father to be interested in the child's education at age 16, whether either parent belonged to a library and the frequency at which parents read to the child. We also control for family difficulties during childhood, including the death of a parent, parental separation, unemployment and alcohol problems. To further proxy for family resources, we include dummy variables indicating whether the individual had a private room for studying at age 16 and whether he/she received free school meals. In order to proxy ability, we include the individuals' scores attained in reading and mathematics tests at the age of 11.

Finally, we consider the impact of school bullying on wages received in adulthood. Summary statistics for wages are shown in the final row of Table 1 across the three categories of the bullying index. Clearly, wages are higher for those individuals who did not experience bullying at school, with the wage differential being the most pronounced between those who have never been bullied and those who were frequently bullied at school. To investigate these sample characteristics further, we augment a standard Mincerian semi log wage equation with the bullying index to ascertain whether wages are affected by having been bullied as a child. The wage equation, which is estimated by OLS, is specified as follows:

$$\ln(Wages)_i^T = g_0 + g_1 \text{bullied}_i + \mathbf{Z}_i' \mathbf{q} + \mathbf{E}_i' \mathbf{p} + e_{i2} \quad (2)$$

where T denotes the time period at which wages are measured (1981, 1991 or 2000, i.e. when the individual is aged 23, 33 or 42, respectively). In the vector \mathbf{Z} , we control for a standard set of variables, see Willis, 1986, including gender, a quadratic in experience, marital status, industry, occupation, firm size and part-time employment, each measured at time T . The effects of highest educational attainment at time T are included in vector \mathbf{E} . We consider employees only and so control for sample selection bias by including an inverse mills ratio term in \mathbf{Z} controlling for the probability of being an employee.⁵

⁵ Being bullied as a child may affect the labour market status of the individual as well as their earnings. Indeed, in order to calculate the inverse mills ratio term, we model labour market status defined as an index: 0=employee; 1=self-employed; 2=unemployed and 3=out of the labour market, via a multinomial logit model controlling for gender, being disabled, marital status, the presence of dependent children under 5, the presence of dependent children aged between 6 and 16, health status, household size, educational attainment and whether the individual was bullied. Our findings suggest that the only influence on the likelihood of being self-employed relative to

It is important to acknowledge that in addition to a direct influence on wages (i.e. g_1), bullying might also indirectly influence wages via educational attainment. To allow for this, we replace educational attainment, E , in equation (2) with its predicted values from equation (1), \hat{e}_i^T , based on highest educational attainment at time T . Thus, we explore whether a direct effect of bullying on wages exists once we allow bullying to influence educational attainment. Table 2 presents summary statistics of all the variables used in the empirical analysis.

III. Results

In Table 3 we summarise the results obtained from estimating equation (1), the educational attainment model. In Panel A, the determinants of the number of O levels obtained by the individual at age 16 are summarised, whilst in Panels B, C and D, the determinants of educational attainment at ages 23, 33 and 42, respectively, are summarised. The control variables in each of these models are shown in Table A1 in the Appendix, which gives the full estimation results relating to Panel A.⁶ For reasons of brevity, in Table 3, we only report the T-statistics and the marginal effects (M.E.) of the impact of class size and bullying on education. We report the effects of class size as a comparison to the impact of bullying, since the former have received a lot of attention in the economics literature, see, for example, Card and Krueger, 1992, and Dearden *et al.*, 2002. The marginal effects are given for the probability of reporting no O levels in Panel A and for no education in the remaining panels.

being an employee is from bullying at 11 where the probability of being self-employed is reduced by 1%. The only scarring impact of bullying comes from age 11, where bullying increases the probability of being unemployed relative to being an employee by approximately 1.6%. School bullying at both ages increases the probability of the individual not being in the labour market relative to being an employee. The inverse mills ratio term included in equation (2) is calculated from the multinomial labour market status model. Full results from estimating the sample selection equation are available on request.

⁶ In general, the results from estimating equation (1), shown in Table A1, tie in with the existing literature (see Dearden *et al.*, 2002, Dustmann *et al.*, 2003 and Ermisch and Francesconi, 2001). Whether the individual is male, attended a comprehensive school, went to a school lacking science facilities, had siblings, received free school meals or had an unemployed parent all had negative effects on educational attainment at age 16 as did class size and experiences of bullying. Factors yielding a positive impact on educational attainment are whether the individual attended a grammar school, attended a single sex school, ability scores in maths and reading, the age parents left school, whether parents belonged to a library, the frequency at which parents read to the child and whether parents showed an interest in their off-spring's schooling. Other factors of influence include parent's socio-economic background.

It is apparent that for our sample of 8,477 individuals, having been bullied at school at ages 7 and/or 11 exerts a statistically significant negative impact on the number of O levels accumulated at age 16. The marginal effects show that achieving no O levels at age 16 is positively associated with being bullied at 7 and 11. In addition, the impact of bullying is greater, the closer the bullying episode is to the timing of the examinations, i.e. the age 11 effect represents the largest marginal effect and differs in magnitude to the age 7 effect at the 1 per cent level. Furthermore, there is an adverse effect of school bullying on human capital accumulation at ages 23, 33 and 42, which suggests that the detrimental effects of bullying are not restricted to time spent at school. At age 42, the pattern remains although the significance level is somewhat abated. Overall, the marginal effects indicate that bullying increases the probability of having no qualifications across the life cycle.⁷

Interestingly, although class size has been a key issue not only in public policy debate but also in the academic literature, it is noticeable that the marginal effects from bullying always outweigh the effects of class size and that the difference between these two influences is statistically significant at the 1 per cent level. Such findings suggest that the economics literature should pay some attention to the effects of bullying on educational attainment. Based on mean individual characteristics (see Table 2), an increase in class size by 1 standard deviation increases the probability of having no O levels by approximately 0.9%. Similarly, the impact of a 1 standard deviation increase in bullying at age 11 increases the probability of having no O levels by around 1.6%.⁸ Moreover, class size only has a significant detrimental impact on educational achievement at 16. In accordance with Harmon and Walker (2000), we

⁷ The *NCDS* also contains information on whether the child bullies other children. Our findings suggest that being a bully is negatively associated with educational attainment suggesting that bullying at school has two adverse effects on educational attainment. The adverse impact of being bullied on human capital accumulation consistently outweighs that of being a bully at the 1 per cent level.

⁸ These calculations are based on the mean sample characteristics of individuals. For example, the 0.94% effect is calculated by multiplying the marginal effect, 0.00105, by the standard deviation of class size, 8.9315.

find that human capital attainment later on in life is unaffected by class size, whereas an individual’s experience of bullying affects educational attainment over the life cycle.^{9,10}

It is apparent that being bullied at school may be influenced by certain personal characteristics and circumstances that may potentially also affect educational attainment. To control for the possibility that bullying may be associated with particular personal characteristics, we model the individual’s experiences of bullying as follows:

$$bullied_i^T = f + G_i' l + e_{i3} \quad (3)$$

where T denotes whether the individual is aged 7 or 11. The vector G_i contains explanatory variables which may influence the level of bullying experienced by the individual. In the vector of explanatory variables at ages 7 and 11, we include a quadratic in maths and reading scores, a quadratic in the child’s weight and height, controls for the number of schools attended, the child’s physical characteristics, whether the child’s family had financial problems or an unemployed parent, whether the child is in care or attends special classes, personality *BSAG* scores,¹¹ an index of how frequently the child prefers to spend time alone and whether the child is upset by new situations. The results from the estimation of the bullying equations for ages 7 and 11 are presented in Table A2.¹²

⁹ The impact of bullying on the probability of having no education is positive, yet the coefficients shown in Table A1 show that bullying decreases educational attainment. The negative sign on the coefficient is driven by the fact that all the marginal effects other than that for no educational attainment are negative.

¹⁰ Our focus is on educational qualifications, which are recognised in the labour market. There is also information on ability test scores at ages 7 and 11 in the *NCDS*, which enable us to explore the effect of bullying on these early measures of ability. We have estimated equations for maths and reading ability test scores at ages 7 and 11 using the same covariates as in equation (1), excluding the ability measures. The results suggest that bullying at both ages has a large and significant influence on maths and reading scores. Moreover, bullying has a larger effect on the maths score than on the reading score and, for both measures of ability, the adverse effect of bullying is larger at age 11 than 7.

¹¹ The *BSAG* personality scores refer to the “Bristol Social-Adjustment Guide” which was designed to describe a child’s behaviour and attitudes in particular settings. ‘Syndrome’ scores were used in the *NCDS* to give a quantitative assessment of the child’s behaviour defined from the following syndromes: Unforthcomingness; Withdrawal; Depression; Anxiety for acceptance by adults; Hostility towards adults; ‘Writing off’ of adults and adult standards; Anxiety for acceptance by children; Hostility towards children; Restlessness; ‘Inconsequential’ behaviour; Miscellaneous symptoms and Miscellaneous nervous symptoms. We use the combined total score to each of these ‘syndromes’ where a higher numerical score signifies greater behavioural problems.

¹² The child’s reading ability and height (aged 7) increase the probability of being bullied at an decreasing rate, whereas the child’s weight and mathematics score have the opposite effects. Males, children wearing glasses, those with eczema, erratic movement, high personality trait scores, preferring to spend time alone and being upset by new situations all have a higher probability of being bullied at both ages.

We then repeat our empirical analysis of the determinants of educational attainment replacing the bullying index with its predicted value based on the relevant bullying equation. The findings are summarised in Table 3B. We find that the negative impact of bullying on human capital attainment prevails when we control for the personal characteristics associated with being bullied. Such findings endorse the robustness of our empirical finding that school bullying adversely influences educational attainment.

Our findings in Tables 3A and 3B suggest that being bullied at school has a detrimental effect on human capital accumulation, which may influence wages received during adulthood. Hence, we explore how bullying influences wages received at the ages of 23, 33 and 42. Our findings are reported in Tables 4 to 6. In Panel A of each table, a standard Mincerian wage equation is estimated for employees for comparison purposes, whilst we consider the effects of bullying on the wages received by employees in Panels B to D.

Table 4 presents the determinants of wages at age 23 based on a sample of 3,971 employees. The estimated coefficient on the sample selection term is negative and significant indicating that its exclusion would bias wages upwards. The results in Panel A conform with the existing literature, indicating that greater levels of education attainment are associated with higher wages. In Panel B, being bullied at school exerts a statistically significant negative effect on earnings. Indeed, a 1 point move up the bullying index as a child at age 7 (11) decreases the wage by approximately 3.3% (2.7%), *ceteris paribus*. In Panel C of Table 4, we investigate whether the direct effect of bullying on wages remains once we allow for an indirect effect to operate via educational attainment. The indirect effect is captured by predicted educational attainment, \hat{e}_i^{23} , modelled conditional on bullying. The results indicate that the direct negative effect of bullying at ages 7 and 11 on wages received at age 23 remains when we allow for the indirect effect of bullying operating via educational attainment. Finally, in Panel D, the indirect effect is captured by predicted educational attainment, \tilde{e}_i^{23} , modelled conditional on predicted bullying. Hence, this specification controls for the possibility that

bullying may be associated with particular personal characteristics and circumstances. In Table 4, Panels C and D, the direct effect of bullying on wages is negative and statistically significant. Furthermore, the magnitude of the direct effect (as well as its sign) accords with the corresponding estimate in Panel B suggesting that the inverse relationship between wages and bullying is a particularly robust finding.

Table 5 (6) reveals that 4,619 (4,886) individuals are employees by the age of 33 (42). Noticeably, the influence of school bullying on earnings at 33 is larger than that at age 23. A 1 point move up the bullying index as a child at age 7 (11) decreases the wage received at age 33 by approximately 5.7% (4.5%), *ceteris paribus*. Again this finding is robust to allowing for the direct and indirect effects of bullying. By the age of 42, bullying does not appear to influence wages, see Table 6. However, bullying does impact indirectly upon wages at 42 operating via educational attainment.

Finally, it is apparent that bullying may influence lifetime earnings. To ascertain the implications of school bullying for lifetime earnings, Figure 1 presents three estimated experience-earnings profiles: for those individuals who did not experience school bullying; for those individuals who experienced school bullying sometimes; and, finally, for those who were frequently bullied at school.¹³ For those individuals who did not experience bullying and those individuals who sometimes experienced bullying at school, the experience-earnings profiles are similar although marginally steeper for the latter group until around the fifth year in the labour market. Thereafter, the experience-earnings profile for those who did not experience bullying becomes steeper. The turning point of the experience-earnings profile for those who were never bullied occurs at 16 years 2 months, whilst the turning point of the experience-earnings profile for those who were sometimes bullied, occurs at 16 years 8 months. In contrast, the turning

¹³ The experience-earnings profiles are based on pooled wage equations estimated by panel fixed effects (pooling wage data at ages 23, 33, 42) separately for individuals who did not experience any bullying, for those individuals who experienced bullying sometimes and for those individuals who experienced bullying frequently. The estimates are based on equation (2) omitting the bullying index and the male dummy which is time invariant. The results are shown in Table A3 in the appendix. Following Murphy and Welch, 1990, we experimented with higher order polynomial terms in experience but these were always insignificant.

point of the experience-earnings profile for those who were frequently bullied occurs at a lower level of experience, 14 years 3 months. Moreover, for those individuals who were frequently bullied, the experience-earnings profile always lies below that of the other two groups implying lower earnings and growth in earnings over the life cycle, *ceteris paribus*. Overall, our findings suggest that school bullying influences earnings over the life cycle in terms of both the shape and position of the experience-earnings profile.¹⁴

IV. Conclusion

Our empirical findings suggest that school bullying has an adverse effect on human capital accumulation both at and beyond school. Much focus in the existing literature has been directed towards primary schools where bullying appears to be more prevalent. Our findings suggest that it is also important to curb bullying in secondary schools in order to alleviate the adverse effects on human capital attainment. We find that these adverse effects are consistently larger if bullying occurred when the individual was aged 11, i.e. closer to the examination period. In addition, our findings suggest that being bullied at school is inversely associated with wages received in adulthood.

Given the current British Government's focus on alleviating bullying at school, our findings should be of interest to policy-makers as well as serving to stimulate further academic interest in this important area of research. In order to facilitate research in this area, the collection of more recent individual level data on this crucial aspect of children's experiences at school is imperative. In addition, there is a shortage of statistics on bullying at an aggregate level which has hindered attempts to ascertain the nature of trends in bullying behaviour.¹⁵ In order to alleviate the adverse effects of bullying at school and to effectively deploy

¹⁴ On entering the labour market, i.e. experience of one month, the wage differential between those not bullied and those frequently bullied is £35. Moreover, at the peak of the profile for those not bullied, the wage differential between these individuals and those frequently bullied is estimated to be around £60 per month. This is consistent with the impact of bullying at the age of 33 (a maximum of 17 years in the labour market) where both the indirect and direct effects of bullying upon wages are larger than at ages 23 or 42 – see Tables 4 to 6.

¹⁵ For example, the lack of comparable data on bullying at a national level has prevented the State of London's Children Report (2004) to determine whether or not the level of bullying in London is in decline relative to the rest of the country.

Government funding in this area, it is apparent that policy-makers need to be better informed about children's experiences of bullying at school.

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Table 1: Educational Attainment and Wages across the Incidence of Bullying at Ages 7 and 11

	NEVER BULLIED		SOMETIMES BULLIED		FREQUENTLY BULLIED	
	Aged 7	Aged 11	Aged 7	Aged 11	Aged 7	Aged 11
<u>Number of O levels at Age 16</u>						
0	43.10%	43.51%	50.20%	52.19%	62.59%	69.64%
1	12.54%	12.25%	11.54%	12.33%	11.56%	10.23%
2	11.05%	11.06%	9.81%	9.53%	10.88%	8.91%
3	5.68%	5.40%	4.91%	5.08%	2.04%	3.30%
4	5.26%	5.45%	4.79%	3.68%	2.49%	2.31%
5	5.50%	5.31%	4.26%	4.68%	4.31%	1.65%
6-11	16.87%	17.02%	14.49%	12.51%	6.13%	3.96%
<u>Educational attainment at 23</u>						
No education	41.66%	42.05%	48.87%	51.08%	61.00%	67.33%
O level	43.19%	42.67%	38.42%	38.16%	32.65%	28.05%
A level	2.07%	2.10%	1.81%	1.69%	1.59%	0.66%
Diploma	1.48%	1.42%	1.13%	1.05%	0.45%	0.66%
Teaching/Nursing	0.83%	0.84%	0.64%	0.47%	0.00%	0.00%
Degree	10.77%	10.91%	9.13%	7.54%	4.31%	3.30%
<u>Educational attainment at 33</u>						
No education	38.58%	38.84%	45.21%	47.63%	57.14%	63.37%
O level	36.05%	35.74%	32.78%	32.96%	28.80%	22.77%
A level	1.71%	1.72%	1.53%	1.46%	1.13%	0.66%
Diploma	8.85%	8.73%	7.84%	7.25%	5.22%	6.93%
Teaching/Nursing	2.72%	2.75%	2.41%	1.87%	2.04%	3.30%
Degree	12.09%	12.22%	10.22%	8.83%	5.67%	2.97%
<u>Educational attainment at 42</u>						
No education	34.70%	34.69%	40.27%	43.13%	51.93%	58.09%
O level	34.67%	34.61%	31.42%	31.62%	31.52%	21.78%
A level	2.32%	2.37%	2.37%	2.05%	1.13%	1.65%
Diploma	11.05%	11.03%	10.62%	9.35%	6.12%	10.23%
Teaching/Nursing	3.80%	3.95%	4.14%	3.39%	3.17%	4.95%
Degree	13.46%	13.35%	11.18%	10.46%	6.12%	3.30%
<u>Wages at 23</u>						
Log wage rate	4.449	4.441	4.393	4.378	4.263	4.289

Table 2: Summary Statistics

PANEL A: EDUCATION ATTAINMENT EQUATION (1)				
	Mean	S. Deviation	Minimum	Maximum
<u>Dependent Variable(s)</u>				
Number of O levels at age 16	2.0560	2.6288	0	11
Index of highest educational attainment at age 23	1.0185	1.4762	0	5
Index of highest educational attainment at age 33	1.2948	1.6449	0	5
Index of highest educational attainment at age 42	1.4763	1.7114	0	5
<u>Independent Variables</u>				
Bullied at 7	0.3973	0.5861	0	2
Bullied at 11	0.2733	0.5197	0	2
Male	0.4948	0.5000	0	1
Class size (pupil-teacher ratio)	23.7921	8.9315	2	45
Attended comprehensive school	0.4883	0.4999	0	1
Attended grammar school	0.1027	0.3036	0	1
Attended technical college	0.0047	0.0685	0	1
Attended a single sex school	0.2043	0.4032	0	1
Parent-teacher association in school	0.1626	0.3690	0	1
School lacks library facilities	0.1779	0.3824	0	1
School lacks sports facilities	0.2788	0.4484	0	1
School lacks science facilities	0.1865	0.3895	0	1
School lacks other facilities	0.8407	0.3659	0	1
Father professional	0.1662	0.3723	0	1
Father non-manual	0.1061	0.3079	0	1
Father skilled manual	0.2811	0.4496	0	1
Father semi-skilled manual	0.0845	0.2781	0	1
Father unskilled manual	0.0911	0.2877	0	1
Mother professional	0.0217	0.1457	0	1
Mother non-manual	0.3314	0.4707	0	1
Mother skilled	0.0242	0.1536	0	1
Mother semi-skilled	0.0751	0.2636	0	1
Mother unskilled manual	0.0649	0.2463	0	1
Age father left full-time education	16.4209	1.2575	16	23
Age mother left full-time education	16.3605	1.0400	16	23
Number of older siblings	0.9023	1.3092	0	12
Number of younger siblings	0.9409	1.2316	0	10
Mother belonged to library in past 12 months	0.4239	0.4942	0	1
Father belonged to library in past 12 months	0.3979	0.4895	0	1
Frequency father reads to child [(0) low to (3) high]	2.0117	0.8785	0	3
Frequency mother reads to child [(0) low to (3) high]	2.3187	0.7663	0	3
Father and/or mother shown interest in child's education	0.4135	0.4925	0	1
Whether has a room to do homework	0.7110	0.4533	0	1
Whether has free school meals	0.0790	0.2698	0	1
Whether mother is a native English speaker	0.9756	0.1544	0	1
Family difficulties – father dead by age 7	0.0105	0.1019	0	1
Family difficulties – mother dead by age 7	0.0029	0.0542	0	1
Family difficulties – separated, widowed or divorced by age 7	0.0307	0.1724	0	1
Family difficulties – unemployed parent by age 7	0.0294	0.1689	0	1
Family difficulties – alcohol problems for parent by age 7	0.0088	0.0936	0	1
Mathematics test score aged 11	16.6275	10.8105	0	40
Reading comprehension test aged 11	15.5542	7.1526	0	35
Whether child spent time in school before the age of 5	0.2720	0.4450	0	1
<i>OBSERVATIONS</i>		8,477		

Table 2: Summary Statistics – Continued

		Mean	S. Deviation	Minimum	Maximum
PANEL B: WAGE EQUATION (2)					
AGE 23					
	<u>Dependent Variable</u>				
Log wage		5.9151	0.4479	1.3863	7.7142
	<u>Independent Variables</u>				
Male		0.5374	0.4987	0	1
Employee experience (months)		42.6041	24.9947	0	100
Employee experience squared		2439.6890	2522.5530	0	10000
Firm size 11-25 employees		0.1461	0.3532	0	1
Firm size 26-99 employees		0.2073	0.4054	0	1
Firm size 100-499 employees		0.2239	0.4169	0	1
Firm size 500+ employees		0.2005	0.4004	0	1
Married or cohabiting		0.4216	0.4939	0	1
Part time		0.0254	0.1575	0	1
Index of highest educational attainment		0.8902	1.2886	0	5
Bullied at 7		0.3979	0.5826	0	2
Bullied at 11		0.2644	0.5124	0	2
<i>OBSREVIATIONS</i>			<i>3,971</i>		
AGE 33					
	<u>Dependent Variable</u>				
Log wage		6.6173	0.9645	1.5136	14.5548
	<u>Independent Variables</u>				
Male		0.5346	0.4989	0	1
Employee experience (months)		102.4786	61.1392	0	216
Employee experience squared		14239.0500	12621.7500	0	46656
Firm size 11-25 employees		0.1416	0.3486	0	1
Firm size 26-99 employees		0.2318	0.4220	0	1
Firm size 100-499 employees		0.2266	0.4187	0	1
Firm size 500+ employees		0.2043	0.4033	0	1
Married or cohabiting		0.6948	0.4605	0	1
Part time		0.2225	0.4159	0	1
Index of highest educational attainment		1.4641	1.71156	0	5
Bullied at 7		0.3952	0.5834	0	2
Bullied at 11		0.2639	0.5113	0	2
<i>OBSREVIATIONS</i>			<i>4,619</i>		
AGE 42					
	<u>Dependent Variable</u>				
Log wage		6.6674	0.9751	1.7535	11.8672
	<u>Independent Variables</u>				
Male		0.4836	0.4998	0	1
Employee experience (months)		139.2136	72.9123	0	312
Employee experience squared		24695.5300	21159.1500	0	97344
Firm size 11-25 employees		0.1684	0.3742	0	1
Firm size 26-99 employees		0.2514	0.4339	0	1
Firm size 100-499 employees		0.2246	0.4174	0	1
Firm size 500+ employees		0.1811	0.3851	0	1
Married or cohabiting		0.7332	0.4423	0	1
Part time		0.2897	0.4537	0	1
Index of highest educational attainment		1.6612	1.7408	0	5
Bullied at 7		0.3950	0.5807	0	2
Bullied at 11		0.2682	0.5180	0	2
<i>OBSREVIATIONS</i>			<i>4,886</i>		

Table 3A: The Effect of School Bullying on Educational Attainment

PANEL A: NUMBER OF O LEVELS AT AGE 16				
	<u>M.E.</u>	<u>TSTAT</u>	<u>M.E.</u>	<u>TSTAT</u>
Class size	0.00104	(2.09)	0.00105	(2.11)
Bullied at 7	0.01951	(2.27)		
Bullied at 11			0.03132	(3.09)
Chi Squared (42)	4461.93 $p=[0.000]$		4499.96 $p=[0.000]$	
Pseudo R Squared	0.1741		0.1743	
PANEL B: EDUCATIONAL ATTAINMENT AT AGE 23				
	<u>M.E.</u>	<u>TSTAT</u>	<u>M.E.</u>	<u>TSTAT</u>
Class size	0.00032	(0.59)	0.00032	(0.60)
Bullied at 7	0.02250	(2.44)		
Bullied at 11			0.03276	(3.04)
Chi Squared (42)	3282.87 $p=[0.000]$		3307.96 $p=[0.000]$	
Pseudo R Squared	0.2383		0.2385	
PANEL C: EDUCATIONAL ATTAINMENT AT AGE 33				
	<u>M.E.</u>	<u>TSTAT</u>	<u>M.E.</u>	<u>TSTAT</u>
Class size	0.00003	(0.06)	0.00003	(0.05)
Bullied at 7	0.01845	(2.14)		
Bullied at 11			0.02927	(2.90)
Chi Squared (42)	2936.96 $p=[0.000]$		2951.05 $p=[0.000]$	
Pseudo R Squared	0.1617		0.1619	
PANEL D: EDUCATIONAL ATTAINMENT AT AGE 42				
	<u>M.E.</u>	<u>TSTAT</u>	<u>M.E.</u>	<u>TSTAT</u>
Class size	-0.00041	(0.87)	-0.00041	(0.87)
Bullied at 7	0.01325	(1.67)		
Bullied at 11			0.02017	(2.15)
Chi Squared (42)	2752.46 $p=[0.000]$		2759.87 $p=[0.000]$	
Pseudo R Squared	0.1353		0.1354	
OBSERVATIONS ACROSS PANELS	8,477			

Control variables are as shown in Table A1. M.E. refers to the marginal effects.

Table 3B: The Effect of School Bullying (Predicted) on Educational Attainment

PANEL A: NUMBER OF O LEVELS AT AGE 16				
	<u>M.E.</u>	<u>TSTAT</u>	<u>M.E.</u>	<u>TSTAT</u>
Class size	0.00107	(2.13)	0.00110	(2.19)
Bullied at 7 (Predicted)	0.17997	(4.89)		
Bullied at 11 (Predicted)			0.25421	(2.75)
Chi Squared (42)	4487.12 $p=[0.000]$		4444.22 $p=[0.000]$	
Pseudo R Squared	0.1747		0.1743	
PANEL B: EDUCATIONAL ATTAINMENT AT AGE 23				
	<u>M.E.</u>	<u>TSTAT</u>	<u>M.E.</u>	<u>TSTAT</u>
Class size	0.00034	(0.62)	0.00038	(0.69)
Bullied at 7 (Predicted)	0.17846	(4.59)		
Bullied at 11 (Predicted)			0.27457	(2.88)
Chi Squared (42)	3286.36 $p=[0.000]$		3265.15 $p=[0.000]$	
Pseudo R Squared	0.2392		0.2386	
PANEL C: EDUCATIONAL ATTAINMENT AT AGE 33				
	<u>M.E.</u>	<u>TSTAT</u>	<u>M.E.</u>	<u>TSTAT</u>
Class size	-0.00001	(0.01)	0.00004	(0.07)
Bullied at 7 (Predicted)	0.15572	(4.11)		
Bullied at 11 (Predicted)			0.23801	(3.06)
Chi Squared (42)	2923.53 $p=[0.000]$		2934.18 $p=[0.000]$	
Pseudo R Squared	0.1625		0.1621	
PANEL D: EDUCATIONAL ATTAINMENT AT AGE 42				
	<u>M.E.</u>	<u>TSTAT</u>	<u>M.E.</u>	<u>TSTAT</u>
Class size	-0.00038	(0.80)	-0.00036	(0.76)
Bullied at 7 (Predicted)	0.16918	(4.63)		
Bullied at 11 (Predicted)			0.17769	(2.60)
Chi Squared (42)	2748.07 $p=[0.000]$		2739.77 $p=[0.000]$	
Pseudo R Squared	0.1363		0.1356	
OBSERVATIONS ACROSS PANELS	8,477			

Control variables are as shown in Table A1. M.E. refers to the marginal effects.
The bully index at 7 (11) is predicted from the specification shown in Table A2.

Table 4: The Impact of School Bullying on Wages at Age 23

PANEL A: WAGE EQUATION AT AGE 23				
	<u>COEF</u>	<u>TSTAT</u>		
Intercept	5.47616	(90.52)		
Male	0.34917	(23.08)		
Experience	0.00198	(2.15)		
Experience squared	-0.00170	(1.88)		
Inverse Mills ratio 23	-0.08708	(2.99)		
Highest education index at 23	0.02625	(5.06)		
R Squared			0.3016	
OBSERVATIONS			3,971	
PANEL B: EFFECTS OF BULLYING ON WAGES AT AGE 23 (SUMMARY RESULTS)				
	<u>COEF</u>	<u>TSTAT</u>	<u>COEF</u>	<u>TSTAT</u>
Highest education index at 23	0.02565	(4.93)	0.02548	(4.90)
Bullied at 7	-0.03281	(3.27)		
Bullied at 11			-0.02716	(2.55)
R Squared	0.3034		0.3025	
Observations	3,971			
PANEL C: DIRECT AND INDIRECT EFFECTS OF BULLYING ON WAGES AT AGE 23 (SUMMARY RESULTS)				
	<u>COEF</u>	<u>TSTAT</u>	<u>COEF</u>	<u>TSTAT</u>
$\hat{\epsilon}_i^{23}$ – Bullied at 7 in equation (1)	0.02382	(4.20)		
Bullied at 7	-0.03071	(3.05)		
$\hat{\epsilon}_i^{23}$ – Bullied at 11 in equation (1)			0.02574	(4.59)
Bullied at 11			-0.02517	(2.36)
R Squared	0.3027		0.3024	
Observations	3,971			
PANEL D: DIRECT AND INDIRECT EFFECTS OF BULLYING ON WAGES AT AGE 23 (SUMMARY RESULTS)				
	<u>COEF</u>	<u>TSTAT</u>	<u>COEF</u>	<u>TSTAT</u>
$\tilde{\epsilon}_i^{23}$ – Predicted Bullied at 7 in equation (1)	0.02365	(4.16)		
Bullied at 7	-0.03163	(3.15)		
$\tilde{\epsilon}_i^{23}$ – Predicted Bullied at 11 in equation (1)			0.02344	(4.13)
Bullied at 11			-0.02668	(2.50)
R Squared	0.3026		0.3018	
Observations	3,971			

Controls in each panel are marital status, part time, firm size, occupation and industry dummy variables.

Table 5: The Impact of School Bullying on Wages at Age 33

PANEL A: WAGE EQUATION AT AGE 33				
	<u>COEF</u>	<u>TSTAT</u>		
Intercept	6.40560	(107.77)		
Male	0.35303	(12.17)		
Experience	0.00100	(2.30)		
Experience squared	-0.00054	(1.75)		
Inverse Mills ratio 33	-0.10643	(2.42)		
Highest education index at 33	0.08956	(14.68)		
R Squared		0.5072		
Observations		4,619		
PANEL B: EFFECTS OF BULLYING ON WAGES AT AGE 33 (SUMMARY RESULTS)				
	<u>COEF</u>	<u>TSTAT</u>	<u>COEF</u>	<u>TSTAT</u>
Highest education index at 33	0.08841	(14.46)	0.08867	(14.54)
Bullied at 7	-0.05729	(3.52)		
Bullied at 11			-0.04460	(2.39)
R Squared	0.5084		0.5077	
Observations		4,619		
PANEL C: DIRECT AND INDIRECT EFFECTS OF BULLYING ON WAGES AT AGE 33 (SUMMARY RESULTS)				
	<u>COEF</u>	<u>TSTAT</u>	<u>COEF</u>	<u>TSTAT</u>
$\hat{\epsilon}_i^{33}$ – Bullied at 7 in equation (1)	0.06905	(9.41)		
Bullied at 7	-0.05283	(3.20)		
$\hat{\epsilon}_i^{33}$ – Bullied at 11 in equation (1)			0.07017	(9.65)
Bullied at 11			-0.04131	(1.73)
R Squared	0.4982		0.4977	
Observations		4,619		
PANEL D: DIRECT AND INDIRECT EFFECTS OF BULLYING ON WAGES AT AGE 33 (SUMMARY RESULTS)				
	<u>COEF</u>	<u>TSTAT</u>	<u>COEF</u>	<u>TSTAT</u>
$\tilde{\epsilon}_i^{33}$ – Predicted Bullied at 7 in equation (1)	0.06981	(9.56)		
Bullied at 7	-0.05633	(3.42)		
$\tilde{\epsilon}_i^{33}$ – Predicted Bullied at 11 in equation (1)			0.06927	(9.41)
Bullied at 11			-0.04765	(2.52)
R Squared	0.4983		0.4974	
Observations		4,619		

Controls in each panel are marital status, part time, firm size, occupation and industry dummy variables.

Table 6: The Impact of School Bullying on Wages at Age 42

PANEL A: WAGE EQUATION AT AGE 42				
	<u>COEF</u>	<u>TSTAT</u>		
Intercept	6.58021			(92.36)
Male	0.43826			(15.69)
Experience	0.00114			(2.02)
Experience squared (×100)	-0.00064			(3.13)
Inverse Mills ratio 42	-0.03606			(0.61)
Highest education index at 42	0.04839			(6.75)
R Squared			0.4156	
Observations			4,886	
PANEL B: EFFECTS OF BULLYING ON WAGES AT AGE 42 (SUMMARY RESULTS)				
	<u>COEF</u>	<u>TSTAT</u>	<u>COEF</u>	<u>TSTAT</u>
Highest education index at 42	0.04821	(6.74)	0.04811	(6.71)
Bullied at 7	-0.01673	(0.87)		
Bullied at 11			-0.02409	(1.22)
R Squared	0.4157		0.4158	
Observations		4,886		
PANEL C: DIRECT AND INDIRECT EFFECTS OF BULLYING ON WAGES AT AGE 42 (SUMMARY RESULTS)				
	<u>COEF</u>	<u>TSTAT</u>	<u>COEF</u>	<u>TSTAT</u>
$\hat{\epsilon}_i^{42}$ – Bullied at 7 in equation (1)	0.05338	(7.06)		
Bullied at 7	-0.00970	(0.50)		
$\hat{\epsilon}_i^{42}$ – Bullied at 11 in equation (1)			0.05233	(6.86)
Bullied at 11			-0.01622	(0.82)
R Squared	0.4163		0.4161	
Observations		4,886		
PANEL D: DIRECT AND INDIRECT EFFECTS OF BULLYING ON WAGES AT AGE 42 (SUMMARY RESULTS)				
	<u>COEF</u>	<u>TSTAT</u>	<u>COEF</u>	<u>TSTAT</u>
$\tilde{\epsilon}_i^{42}$ – Predicted Bullied at 7 in equation (1)	0.05330	(6.93)		
Bullied at 7	-0.01186	(0.61)		
$\tilde{\epsilon}_i^{42}$ – Predicted Bullied at 11 in equation (1)			0.05317	(6.91)
Bullied at 11			-0.01892	(0.95)
R Squared	0.4162		0.4163	
Observations		4,886		

Controls in each panel are marital status, part time, firm size, occupation and industry dummy variables.

Table A1: Estimated Educational Attainment Equation Age 16

	<i>COEF</i>	<i>TSTAT</i>	<i>COEF</i>	<i>TSTAT</i>
Male	-0.1216	(4.85)	-0.1178	(4.69)
Pupil-teacher ratio (class size)	-0.0027	(2.09)	-0.0027	(2.11)
Attended comprehensive school	-0.0686	(2.29)	-0.0669	(2.23)
Attended grammar school	0.4936	(10.77)	0.4935	(10.76)
Attended technical college	0.2269	(1.27)	0.2253	(1.26)
Attended a single sex school	0.2064	(5.93)	0.2056	(5.90)
Parent-teacher association in school	0.0133	(0.39)	0.0156	(0.46)
School lacks library facilities	0.0372	(1.08)	0.0361	(1.05)
School lacks sports facilities	-0.0232	(0.75)	-0.0219	(0.70)
School lacks science facilities	-0.0740	(2.17)	-0.0738	(2.16)
School lacks other facilities	0.1616	(3.49)	0.1254	(3.49)
Father professional	0.1616	(3.46)	0.1627	(3.49)
Father non-manual	0.0722	(1.45)	0.0751	(1.50)
Father skilled manual	-0.0245	(0.59)	-0.0259	(0.62)
Father semi-skilled manual	-0.0784	(1.39)	-0.0795	(1.41)
Father unskilled manual	-0.0113	(0.21)	-0.0119	(0.22)
Mother professional	-0.0610	(0.71)	-0.0650	(0.76)
Mother non-manual	-0.0441	(1.44)	-0.0455	(1.48)
Mother skilled	-0.1676	(2.03)	-0.1707	(2.07)
Mother semi-skilled	-0.1128	(2.18)	-0.1124	(2.16)
Mother unskilled manual	-0.0485	(0.87)	-0.0515	(0.93)
Age father left full-time education	0.0543	(4.57)	0.0536	(4.50)
Age mother left full-time education	0.1041	(6.97)	0.1047	(6.98)
Number of older siblings	-0.0772	(6.90)	-0.0765	(6.84)
Number of younger siblings	-0.0570	(4.79)	-0.0569	(4.78)
Mother belonged to library in past 12 months	0.1546	(4.85)	0.1539	(4.52)
Father belonged to library in past 12 months	0.1296	(4.11)	0.1319	(4.18)
Frequency father reads to child	0.0382	(2.14)	0.0393	(2.20)
Frequency mother reads to child	0.0518	(2.62)	0.0511	(2.59)
Father and/or mother shown interest in child's education	0.2161	(7.79)	0.2174	(7.83)
Whether has a room to do homework	0.1134	(3.43)	0.1122	(3.39)
Whether has free school meals	-0.3274	(5.87)	-0.3245	(5.81)
Whether mother is a native English speaker	0.0393	(0.49)	0.0348	(0.44)
Family difficulties – father dead by age 7	0.2384	(1.77)	0.2379	(1.77)
Family difficulties – mother dead by age 7	-0.1529	(0.70)	-0.1542	(0.70)
Family difficulties – separated, widowed or divorced	-0.1247	(1.56)	-0.1228	(1.53)
Family difficulties – unemployed parent	-0.2963	(2.80)	-0.2956	(2.80)
Family difficulties – alcohol problems for parent	0.2483	(1.70)	0.2460	(1.68)
Mathematics test score aged 11	0.0557	(30.29)	0.0556	(30.10)
Reading comprehension test aged 11	0.0105	(3.20)	0.0105	(3.19)
Whether child spent time in school before the age of 5	0.0411	(1.47)	0.0404	(1.44)
Bullied at 7	-0.0498	(2.27)		
Bullied at 11			-0.0775	(3.09)
Chi Squared (42)	4461.93		4499.96	
Pseudo R Squared	0.1741		0.1743	
OBSREVATIONS		8,477		

Table A2: Estimated Bullying Equations at Ages 7 and 11

	<i>AGED 7</i>		<i>AGED 11</i>	
	<i>COEF</i>	<i>TSTAT</i>	<i>COEF</i>	<i>TSTAT</i>
Male	0.0749	(2.65)	0.1634	(5.39)
Mathematics test score aged 7 (11)	-0.0410	(1.85)	-0.0170	(2.42)
Mathematics test score aged 7 (11) squared	0.0030	(1.47)	0.0002	(0.91)
Reading comprehension test aged 7 (11)	0.0156	(1.81)	0.0215	(2.29)
Reading comprehension test aged 7 (11) squared	-0.0005	(2.16)	-0.0006	(2.16)
Moved region by age 7	0.0724	(2.19)	0.0748	(2.03)
Number of schools attended 7 (11)	0.0083	(0.41)	0.0404	(2.38)
Whether disabled	0.0784	(1.09)	0.1441	(1.90)
Whether wears glasses 7 (11)	0.1182	(2.19)	0.0927	(2.26)
Whether child spent time in school before the age of 5	-0.0239	(0.78)	-0.0318	(0.95)
Whether family had financial problems 7	0.2953	(5.09)	0.0691	(1.31)
Whether unattractive 7 (11)	0.0413	(1.42)	0.0996	(3.06)
Whether disfigured 7 (11)	0.0710	(1.24)	-0.0409	(0.63)
Whether has eczema 7 (11)	0.1937	(2.33)	0.1466	(2.01)
Whether attends special education classes 7 (11)	0.0787	(1.15)	0.4729	(4.29)
Whether has erratic movement 7 (11)	0.2303	(3.11)	0.1969	(3.39)
Whether has leg problems 7	-0.0387	(0.49)	0.1330	(1.63)
Whether has speech problems 7 (11)	0.0902	(1.30)	0.0755	(1.49)
Weight 7 (11)	-0.0276	(2.02)	-0.0154	(2.14)
Weight 7 (11) squared	0.0002	(1.77)	0.0007	(1.87)
Height 7 (11)	0.3148	(2.12)	-0.0287	(0.18)
Height 7 (11) squared	-0.0031	(2.04)	0.0002	(0.14)
BSAG personality traits score 7 (11)	0.0090	(5.09)	0.0118	(6.06)
Whether in care 7 (11)	0.1025	(1.01)	-0.0583	(0.58)
Whether parent unemployed 7 (11)	-0.0788	(0.82)	0.0855	(2.22)
Number of pupils at the school 7 (11)	0.0001	(1.11)	0.0001	(1.36)
Prefers time alone 7 (11)	0.1857	(9.81)	0.1571	(7.70)
Upset by new environments and situations 7 (11)	0.2736	(9.32)	0.3053	(9.90)
CONTROLS	Father's Occupation			
Chi Squared (34)	452.79		585.62	
Pseudo R Squared	0.0348		0.0540	
OBSREVAIONS	8,477			

Table A3: Panel Fixed Effects Wage Equations

PANEL A: SAMPLE = NEVER BULLIED AT SCHOOL		
	<u>COEF</u>	<u>TSTAT</u>
Experience	0.00871	(13.05)
Experience squared	-0.00224	(8.66)
Highest education index	0.08409	(5.96)
Turning Point	16 Years & 2 Months	
R Squared	0.2621	
Observations	7,464	
PANEL B: SAMPLE = SOMETIMES BULLIED AT AGE 7 AND/OR 11		
	<u>COEF</u>	<u>TSTAT</u>
Experience	0.00764	(6.08)
Experience squared	-0.00189	(4.05)
Highest education index	0.05984	(2.36)
Turning Point	16 Years & 8 Months	
R Squared	0.2401	
Observations	1,644	
PANEL C: SAMPLE = FREQUENTLY BULLIED AT AGE 7 AND/OR 11		
	<u>COEF</u>	<u>TSTAT</u>
Experience	0.01052	(4.72)
Experience squared	-0.00307	(3.63)
Highest education index	0.11955	(2.27)
Turning Point	14 Years & 3 Months	
R Squared	0.1902	
Observations	562	

Notes:

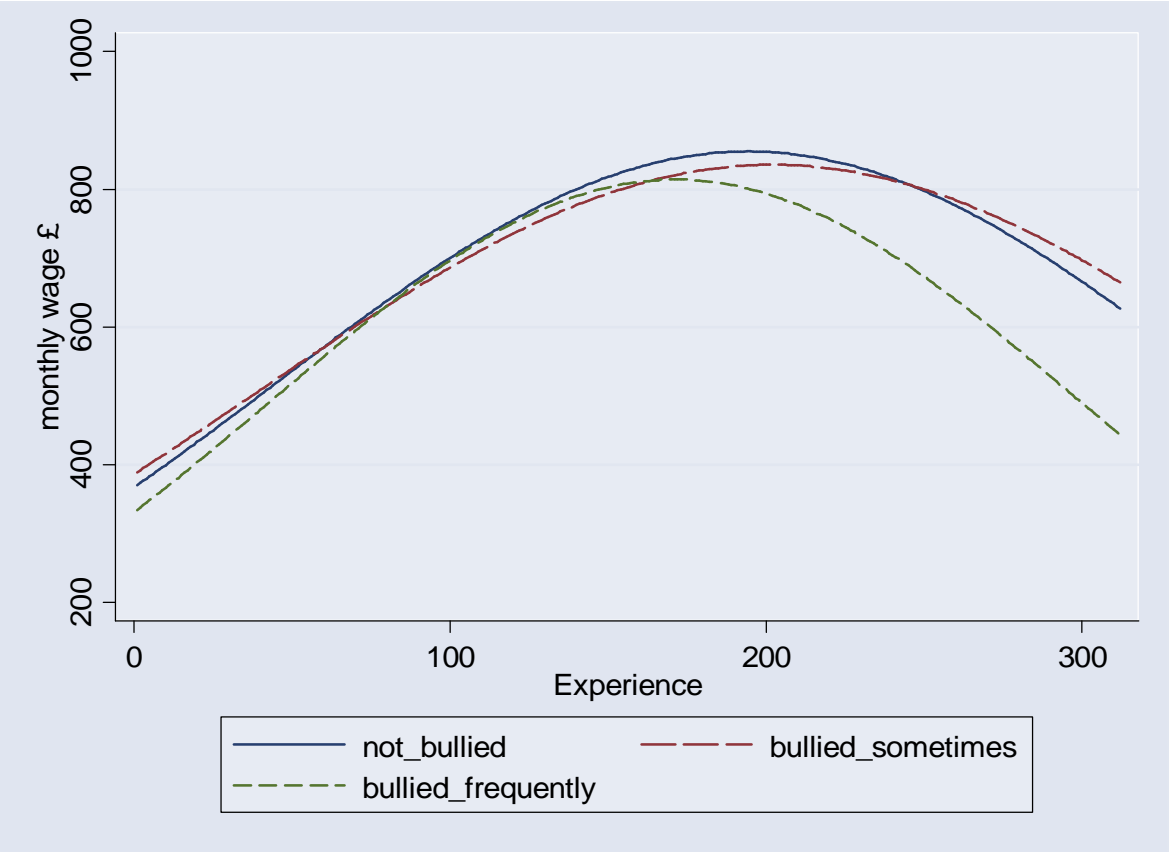
(i) Controls in each panel are marital status, part time, firm size, occupation and industry dummy variables.

(ii) The turning points are estimated from:

$$\frac{\partial \ln Wage}{\partial Exp} = \hat{q}_1 + 2\hat{q}_2 Exp = 0$$

where Exp represents experience and \hat{q}_1 and \hat{q}_2 are the estimated coefficients given in Table A3.

Figure 1: Estimated Experience-Earnings Profiles



Note: 'not_bullied' refers to the profile where the individual did not experience bullying, 'bullied_sometimes' refers to individuals who were bullied sometimes at either or both ages, 'bullied_frequently' refers to individuals who were bullied frequently at either or both ages. Experience is defined as months in employment (across all jobs held since leaving school).