Not just grades

The far-reaching consequences of failing to gain a grade 4-9 in English and Maths GCSEs

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Abstract

Teenagers who perform poorly in their core GCSEs at age 16 tend to face worse outcomes not just in education but in health and wellbeing and are more likely to be involved in criminal behaviour compared to their higher achieving peers. This study draws on the UK Millennium Cohort Study to examine the post-16 experiences of teenagers at school in England who did not gain a grade 4-9 in their English language and/or Maths GCSEs [I in 5 both GCSEs; 1 in 5 one of the two exams] in comparison to most teenagers who did. We consider a range of outcomes across several domains recorded from interviews in 2018 at age 17-18. After accounting for a range of individual and family socio-economic factors, we find that those failing to get basic GCSE grades were – perhaps reasonably – less likely to expect to go to university or to have professional or managerial occupation aspirations, and to be in education, employment or training (EET). However, we also find that they were more likely than their peers to experience a range of poorer health outcomes and health behaviours: more reported to be in poor or fair health or to have a longstanding illness, to smoke or vape, and to have been stopped and questioned or formally cautioned by the police. In addition, teenagers who did not gain basic English *and* maths GCSEs were also more likely to have conduct or hyperactivity behaviour problems, to have experienced teenage pregnancy and made a suicide attempt; teenagers who did not gain a grade 4-9 in their English language *or* Maths GCSE were more likely to have taken drugs and engaged in underage sex. These results suggest that the high proportion of teenagers failing to secure basic grades in their key GCSEs is damaging not just for their education and job prospects but also for their future wellbeing. Many of these teenagers come from some of the most under resourced families in our society, highlighting that the circumstances and associated needs of these families must be better addressed if we are to minimise the challenges associated with low education being passed on to future generations of children.

Key words: GCSEs; post-16 transitions; under resourced families; intergeneration transmission.

Acknowledgments

Background

According to the Education Policy Institute (2019) in their report for the Association of School and College Leaders, "Rigorous studies of the long-term impact of failing GCSE exams in English and maths are scant". The key objective of this paper is to help fill this gap by providing new robust evidence from a national UK-wide study, on the more problematic post-16 transitions and outcomes experienced by the 1 in 5 teenagers at school in England who did not gain a grade 4-9 in their English language and Maths GCSE at the end of Year 11 compared to their peers who did. We additionally compare outcomes for the 1 in 5 teenagers who did not gain a grade 4-9 in their English language *or* Maths GCSE.

This research addresses key areas of concern regarding post-16 transitions into further education, training or employment (EET), aspirations for university and future occupations, physical health and mental wellbeing, risky health behaviours and contact with the police. Our findings highlight the multi-dimensional impact of failing to achieve basic English and maths outcomes and point to the need for effective strategies to address the wellbeing of these teenagers who come from some of the most under resourced families in our society if we are to minimise the disadvantage associated with low education and the danger of these patterns being passed on to future generations of children.

Literature Review

An enduring idea in UK government policy is that there are a minority of 'problem' families for whom disadvantage persists across generations, with low education attainment being one such problem. This report focuses on the role education failure at the end of Year 11 has on a range of post-16 transitions and psycho-social outcomes - a research area that continues to demand attention from policy makers.

International comparisons suggest that the UK, at least historically, has had a particular problem in producing school leavers with these fundamental life skills compared with many other nations (Elliot Major & Machin, 2018). As a result, a high proportion of the population are unable to live full and functional   lives and contribute fully to society and the economy. The skills these examination passes represent are critical to our capacity to communicate and live and work together, and their contribution to workforce skills has increasingly been recognised as critical to economic success (Kuczera et al., 2016). Furthermore, the intergenerational transmission of this educational disadvantage is highly likely to persist as low skilled parents find it harder to support their own child's reading or learning (Sammons et al., 2014) and inequalities in education achievement at age 16 are an important factor in determining the persistence of family income disadvantage across generations (Blanden, Gregg & Macmillan, 2010; Blanden & Macmillan, 2016).

For at least 50 years, and probably more, a substantial proportion of school leavers in England have left education with poor literacy and number skills, increasingly defined by their failure to attain a 'good grade' in public examinations in English language and maths at the age of 15 and 16. Since September 2015 students have been required to remain in education or learning until age 18 (Gov.UK, 2022) and many re-sit their English language or maths examination if they do not gain a grade 4 or higher the first-time round.

Members of the UK Millennium Cohort Study (MCS) in England are an ideal population to study the association between students' GCSE performance and their immediate post-16 education transitions and outcomes across different domains. The children were born in 2000/1 and have experienced successive Government policy interventions aimed at improving pupil outcomes, many focused on improving literacy and number skills (see Appendix Table A1). Given the scale of major education reforms experienced, this cohort might be considered a golden generation with more support being offered during their school career than any generation before or since. However, a stubbornly high proportion of Year 11 students – 1 in 5 – do not achieve a grade 4 or higher in GCSE English language and maths (Elliot Major & Parsons, 2022). Attaining a 'good grade' pass in these subjects is increasingly fundamental for accessing the widest range of possible post-16 transitions and prospering in life after school, with this link appearing to be particularly strong in England (Kuczera et al., 2016).

In 2018, 3.6% of 17-year-olds and 12.5% of 18-year-olds were not in education, employment or training (NEET) (DfE, 2019). Concentrating specifically on students not reaching expected standards in GCSE English or maths, Lupton et al (2021) found that post-16 transitions for lower attainers tended to be more complex and difficult when compared with their higher attaining peers. Whether pupils fall far below or just miss the 'expected standard' (grade C or 4) pass line may have equal long-standing consequences. For example, Machin et al (2020) show that pupils who narrowly miss out on a grade C/4 in their English language GCSE by just a few marks can pay a heavy price for this failure: they are for example less likely to study for A-levels and to attend university. Attainment in English language and maths at 16 can also influence later labour market outcomes (see Dickerson et al., 2022), with stronger literacy and numeracy skills in adulthood being associated with higher employment rates (Vignoles, 2016), and in spending increased amounts of time in employment over the lifecourse (Bynner & Parsons 1997, 2002). In general, pupils doing poorly in GCSEs can be scarred for many years, finding it hard to recover in the workplace (Bell & Blanchflower, 2010; Crawford et al., 2011; Ralston et al., 2016; Thompson, 2017)

and face reduced earnings over their lifetime. Hodge et al. (2021) found that a single grade improvement in English language or maths GCSE was associated with an increase in lifetime earnings of £7,266 and £14,579 respectively, although the amount varied along the grade continuum.

Looking beyond labour market outcomes, specifically at the association between attainment in English language and maths at the end of key stage 2 (age 11) and crime outcomes in young adulthood [age 23-24 in 2017] in England, Crosweller et al., (2022) found that fewer young adults who had received a custodial sentence had achieved the expected level of attainment (37%) compared to their peers with non-custodial sentences or cautions (53%) or without any criminal conviction (72%). Looking at wellbeing outcomes associated with education levels more broadly, the prevalence of mental health conditions is higher and has been increasing at a faster rate for those with lower levels of education (Barr, Kinderman & Whitehead, 2015) and higher education levels are associated with the avoidance of risky behaviours such as smoking (Clark & Royer, 2013). Conti et al. (2010) also found that staying on in post-compulsory education reduced smoking, together with substance use, depression, obesity and other poor health outcomes at age 30 in Britain, with the effect being particularly pronounced for men.

The UK still has one of the highest teenage pregnancy rates in Western Europe (Office for National Statistics, 2017), with the majority of these pregnancies being unplanned and around half end in abortion (Nuffield Trust, 2019). Low educational attainment and economic deprivation, more broadly defined, is both a cause and a consequence of teenage pregnancy. Although it is important not to ignore the fact that for some teenagers, pregnancy and motherhood are choices which they find valuable and rewarding (Freedman, 2020), teenage mothers are less likely to finish their education and women who have a child before the age of eighteen are 20% more likely to have no educational qualification by the age of thirty than other women, and 22% more likely to be living in poverty than other mothers (Cook & Cameron, 2015).

Family and individual characteristics associated with low GCSE attainment and poorer post-16 outcomes

The intergenerational transmission of low education attainment or skills is particularly pertinent here, with children whose parents have no or few formal qualifications being far less likely to attain good grade GCSEs at age 16 in England (Sammons et al., 2014; Elliot Major & Parsons, 2022), and children of parents with the poorest numeracy skills being twice as likely to perform poorly in number skills assessments (Bynner & Parsons, 2006). Poor education begets poor education. The social-economic gradient in cognitive and academic achievements over the life-course is well established – whether classified in terms of parental income, social class or education levels (see for example: Halsey et al., 1980; Feinstein, 2003; Blanden et al., 2007; Parsons et al., 2011; Sullivan et al., 2013; Stopforth et al., 2020; Stopforth & Gayle, 2022), with the gap in GCSE attainment in England by eligibility for free school meals being an omnipresent statistic (Sutherland et al., 2015; DfE, 2020, 2022).

Children growing up in a workless household have poorer early academic outcomes and make less progress between age three and five than those living in working households (Parsons, et al. 2014) and have an increased likelihood of also being not in employment, education or training (NEET) between age 16-20 (Schoon, 2014) and being out of work later in adulthood (Gregg et al., 2017). Similarly, disadvantaged neighbourhoods (Sammons et al., 2014), poor housing and overcrowding in the home (Goux & Maurin, 2003; Office of the Deputy Prime Minister, 2004; Schoon, 2020) are also related to lower academic attainment and poorer post-16 outcomes including unemployment (Scottish Government, 2020). The risk of becoming a teenage mother in the UK is nearly ten times higher for girls in the lowest social class than those in the highest social class (Conrad, 2012), with 50% of all teenage pregnancies occurring in the 20% most deprived areas (Cook & Cameron, 2020). Teenage girls from areas of high social and economic deprivation are also much more likely to continue an unplanned pregnancy (Cook & Cameron, 2015).

In terms of individual characteristics, there is persistent evidence to show that girls have outperformed boys in public examinations at age 16 in England since 1988 (Smithers, 2014; DfE, 2020b), and the higher education attainment of boys and girls from (certain) minority ethnic groups compared to their white peers is now well attested (Strand, 2015, 2021; DfE, 2022). Research has also shown that pupils from all ethnic minority backgrounds were substantially more likely to have earned a Level 3 qualification by age 19 than young people from white backgrounds (Farquharson et al., 2022), and to enter university (Crawford & Greaves, 2015; UCAS, 2021) although completion rates are lower among Black students (Roberts & Bolton, 2020).

Focusing specifically on students in England who did not attain a good grade in English language and maths at age 16, Cassen and Kingdon (2007) found the key individual characteristics that predicted being a low achiever at age 16 was to be a British white male, to be diagnosed with special educational needs and to have performed poorly in earlier literacy assessments (KS1 and KS2) in primary school. Elliot Major and Parsons (2022) also found that even earlier assessments of school readiness (age 3) and teacher assessments in the Early Years Foundation Stage (age 5) were strong predictors of GCSE performance.

Goodman and Gregg (2010) found children exhibiting behavioural problems which included attention difficulties and conduct problems contributed to the gap in academic performance between poorer and better-off children in primary school, and Chowdry and McBride (2017) found that children from less well-off families are more likely to experience emotional and behavioural problems at age 5, and that these problems in turn predict reduced academic attainment later in life. Similarly, research by Lindeboom et al. (2010) found that earlier hyperactivity or inattention difficulties was a strong predictor of poor GCSE performance at age 16, whereas emotional symptoms in childhood and adolescence was not associated with low grades.

In terms of post-16 transitions, Hammerton et al. (2019) found that children with conduct problems were more likely to be NEET in adulthood but also that they had a higher risk of criminal behaviour, with other research finding that adolescents with conduct behaviour problems at age 16 are more likely to experience a period of chronic economic inactivity after age 16 into mid adulthood (Richards et al., 2009), and to spend significantly less time in EET between 17-42 than their peers with no conduct behaviour problems, even after accounting for their academic attainment at age 16 (Parsons et al., 2022).

A life course perspective

The life course perspective emphasises the interplay of human development within multi-level contexts (Elder et al., 2015). As already mentioned, those who do not attain a Grade 4-9 GCSE in English language and maths at the end of Year 11 are more likely to stem from relatively under resourced family backgrounds (Elliot Major & Parsons, 2022; Sammons et al., 2014). According to life course theory, early experiences of (dis-) advantage can accumulate and can be compounded over time, leading to an accumulation of (dis)advantage over time (Dannefer, 2003). And indeed, many negative outcomes associated with poor qualification levels are related to the predictors of low attainment such as low levels of parental education, experience of poverty and insecure housing.

However, within life course theory there is also the assumption of turning points, where an individual coming to a road juncture, takes one or another of multiple available routes to proceed (Bernadi et al., 2019). Turning points reflect a disruption of the trajectory an individual has been on (developmental discontinuities) or what was personally or socially expected. This can be the case, for example, if an individual who has left school at an early age with minimum or no qualifications returns to education later on in life. Notably, turning points can be considered as the manifestation of resilience, i.e., positive adjustment in the face of adversity, which is generally not defined by outstanding

achievements, but by meeting key developmental tasks (Masten, 2018), such as gaining relevant qualifications or avoiding unemployment.

The present study

Based on the assumption of cumulative disadvantage, we assume (H1a) that those who do not attain a Grade 4-9 GCSE in English language and maths at the end of Year 11 are growing up in families with fewer socio-economic resources than their peers who did achieve this academic threshold, i.e., their parents have lower levels of education, are less likely to own their home, to be part of a workless household and to live in a deprived area. Moreover, we assume (H1b) that those without a Grade 4-9 GCSE in English language and maths go on to experience more problematic post-16 transitions and experiences than their peers who did. However, recognising potential heterogeneity in experiences, and based on the assumption of turning points, we assume (H2) that some of the teenagers who did not achieve this academic threshold can succeed against the odds and have more favourable post-16 outcomes and transitions.

Aiming to account for possible confounding variables regarding the association between GCSE attainment and post-16 experiences identified in the literature, we take into account indicators of family background (parental education, employment, housing and area deprivation) as well as an individual's characteristics (sex and ethnicity status) including their earlier performance in cognitive assessments and parent reports of them having behaviour difficulties.

Adopting a longitudinal approach and comparing the experiences of those who did and did not achieve this academic threshold, this study will provide new evidence on how the early post-16 transitions and experiences differ among teenagers by GCSE attainment. Moreover, we assess if it is the achievement of this academic threshold per se, or the associated family socio-economic resources, or individual characteristics that most influence post-16 transitions.

Profiling the post-16 experiences of teenagers by their English language and maths GCSE attainment across different domains

Comparing outcomes of teenagers by their GCSE performance at age 16 across a wide range of domains we aim to gain a more comprehensive understanding of the key challenges these teenagers (and their families) are facing. We will profile early post-16 education transitions (i.e., being in education, employment or training (EET)); higher education and occupation aspirations of the young people (how likely they think it is that they will go to university, occupation aspirations, and what they want to have achieved by age 30); their physical health and mental health (e.g., general health, longstanding illnesses, SDQ (Goodman, 1997; 2001), symptoms of depression (Kessler, 2003), self-harm and suicide); health behaviours (e.g., [underage] smoking, use of alcohol and recreational drugs); relationships and sexual activity (e.g., had a boy/girlfriend, had sex, had unprotected sex, been/made someone pregnant); and contact with the police (stopped and questioned or formally cautioned).

Data and Methods

Millennium Cohort Study

The Millennium Cohort Study (MCS) is a multi-purpose ongoing longitudinal study of approximately 19,000 babies born to families living in the UK between September 2000 and January 2002 (Connelly & Platt, 2014; Joshi & Fitzsimons, 2016). Data has been collected when the children were aged around 9 months, 3, 5, 7, 11, 14 and 17 when approximately 10,700 study members participated. Here we draw on information collected from personal interviews administered to parents of the cohort children at child age 9 months and 7 years (University of London, 2022a, 2022b) and child interview and self-completion questionnaires at age 17 (University of London, 2021). The information used includes robust socio-economic, employment and qualification details of the family in the child's early

years, together with information on their outcomes, expectations and aspirations at age 17.

Analytic sample

Of the 18,552 families who first took part in sweep 1, we restrict our sample to the 11,532 families who lived in England who had provided information on the sex and ethnicity of the cohort child, giving a final analytic sample of 11,524. As in all longitudinal studies, MCS suffers from attrition over time, and at age 17 the participation rate of the families who lived in England at sweep 1 was 61% (7,076).

Multiple Imputation

We used Multiple Imputation (MI) to deal with attrition and item non-response to restore sample representativeness, adopting a chained equations approach (White, Royston & Wood, 2011) under the assumption of 'missing at random' (MAR), which assumes that the most important predictors of missing data are included in our models. To maximise the plausibility of the MAR assumption the most important predictors of missing data are included in our models to further reduce bias and retain power (see Mostafa & Wiggins, 2015; Mostafa et al., 2021; Silverwood et al., 2024). All reported analyses are averaged across 25 replicated data sets based upon Rubin's Rule for the efficiency of estimation under a reported degree of missingness across the whole data of around 0.25 (Little & Rubin, 2014).

The analyses were additionally weighted to adjust for the survey's stratified clustered sampling design (Plewis, 2007).

Key Measures: English Language and Maths GCSE attainment

General Certificate in Secondary Education (GCSE) examinations were introduced in the 1980s and remain the standard qualifications that are under-

taken by pupils in England and Wales at the end of Year 11 (aged 15-16) (Department for Education 1985, Mobley et al. 1986, North 1987). Today, students will usually study for seven-eight GCSE subjects on average (Ofqual, 2022), which will include the core subjects of English language and maths for more than 90% of students and science for two-thirds (Lim & Gill 2023). Reforms to GCSEs were introduced in 2015, with the first cohorts taking the new exams in 2017 and 2018. GCSEs grades now range from 1 to 9, with a 'good grade' being a grade 4 or higher. Prior to this, GCSE grades ranged from A*-G, with an A*-C grade representing the expected national standard, with a grade C and grade 4 or 5 being broadly equivalent. However, a grade 4 is viewed as a 'standard pass' whereas a grade 5 is a 'strong pass' (Greening, 2017), and the Government report on both, though increasingly on grades 5-9. Here we focus on the substantial minority of students who did not secure a grade 4 or above in English language and/or maths. Mastering English and maths is the most basic requirement for prospering in life after school – one of the reasons why these core subjects have been increasingly prioritised in school accountability measures. Since 2014 students who did not gain at least a grade C or grade 4 in English language or maths have needed to continue studying the subjects and to re-sit the examination (Lupton et al., 2021).

The MCS teenagers sat their GCSEs in 2016/2017 and reported their grades when interviewed in 2018. We derived a three-category variable with '0' indicating the teenager had reached the expected level of achievement (grade 4 or higher) in both examinations; '1' indicating the teenager had not reached the expected grade threshold in one of the examinations; '2' indicating the teenager had not reached the expected grade threshold in both examinations.

Covariates

The family background measures included in the analyses are:

- Parents highest qualification level (NVQ1 or below v NVQ2+)
- Living in a workless family (no = 0; yes = 1)

- Living in a rented house (no = 0; yes = 1)
- Level of area deprivation where they live, as captured by the Index of Multiple Deprivation (top eight deciles = 0; bottom two deciles = 1)

The individual characteristics included in the analyses are:

- Sex (female = 0; male = 1)
- Ethnicity (White = 0; British Minority Ethnic = 1)
- Standardised internalising and externalising behaviour problem scores (age 7)
- Standardised reading and maths assessment scores (age 7)

Behaviour problems

Behaviour problems were assessed from parent reports on the Strengths and Difficulties Questionnaire [SDQ], Goodman (1997, 2001). The SDQ is widely validated cross-nationally and cross-culturally for use in non-clinical settings. The SDQ includes 25 measures comprising five scales of five items each. For each negative attribute, the parent is asked to say whether it is 'not true' (0), 'somewhat true' (1) or 'certainly true' (2) about their behaviour, with scores reversed for positive attributes. Each behaviour scale ranges from 0-10. For this analysis we use the four sub-scales – emotional symptoms, peer relationship problems, conduct problems, hyperactivity/inattention. We combine emotional with peer problems to represent 'internalising' symptoms (social and emotional adjustment), and conduct with hyperactivity problems to represent 'externalising' symptoms (behaviour) (Goodman et al., 2010). Scores are standardised to have a mean of zero and a standard deviation of 1. A higher score indicates increased behaviour problems.

Cognitive scores

At age seven the cohort members completed a shortened version of the National Foundation for Education Research (NFER) standard Progress in Maths (PiM) test and the Word Reading assessment which is part of The British Ability Scales Second Edition (BAS II), a battery of individually administered tests of cognitive abilities and educational achievement, published by the NFER-NELSON Publishing Company Ltd (Elliott, 1996). The progress in Maths (PiM) test

assesses a child's mathematical skills and knowledge by asking them to complete a series of calculations in a paper and pencil exercise; the Word Reading task assesses the child's educational knowledge of reading by asking them to read a series of words presented on a card. For further details see Connelly (2013). Scores are again standardised to have a mean of zero and a standard deviation of 1. A higher score indicates greater maths and reading skills.

Analytic strategy

We first describe the association between GCSE attainment and a range of outcomes at age 17-18 within different domains, as discussed. We then regress each outcome measure on GCSE attainment, adjusting for the teenager individual characteristics and family socio-economic resources. We run logit models for the majority binary outcome measures report predicted probabilities for ease of interpretation (Mood, 2010). For the (single) continuous outcome measure – likelihood of attending university measured on a 0-100% scale – we run an OLS model and report the linear prediction. The complete adjusted regression tables are included in the appendix.

Results

In the GCSE examinations sat at the end of Year 11 when (overwhelmingly) students are age 16, 72% of our sample achieved a good pass in English language, and 71% in maths. This compares favourably with statistics from the Department for Education (DfE) which show that around 7 in 10 students taking GCSEs in England at the end of Year 11 achieved a grade 4 or higher in English language or maths in 2017 and 2018 (Ofqual, 2018). Considering the benchmark of a grade 4 or higher in both GCSE English language and maths at age 16, we find:

- 61% had a 4-9 (or A*-C) grade in English language and maths
- 21% had a 4-9 (or A*-C) grade in English language or maths
- 18% did not have a 4-9 (or A*-C) grade in English language and maths

The (roughly) 1 in 5 teenagers not gaining a grade 4 or higher in English language and maths equates to approximately 120,000 of the c600,000 students in state schools who take GCSEs each year in England, increasing to 240,000 if we include the additional 1 in 5 students not gaining a grade 4 or higher in English language or maths.

Table 1 shows that in comparison to those who gained a grade 4-9 in both English language and maths, teenagers who did not achieve a grade 4 or higher in both examinations, or in one of them, were more likely to be male, to have a higher number of both internalising and externalising behaviour problems and have lower maths and reading scores at age 7. They were also more likely to live in rented housing and/or in a deprived area of the country with parent(s) who were not in work and more likely to only have NVQ1 or lower qualifications. The findings do however suggest that teenagers were equally distributed in terms of ethnicity and age. Differences were most pronounced for teenagers who did not achieve a grade 4 or higher in both examinations.

Table 1: Teenager's individual characteristics, parent qualifications and area deprivation by GCSE English language and maths attainment

	Grade 4+ (EL + M)	<Grade 4 (EL or M)	<Grade 4 (EL + M)
Individual Characteristics (9 months)			
Male	0.49	**0.53**	**0.58**
British Minority Ethnic	0.15	0.15	0.13
Age (mean)	17.2	17.2	17.2
Age 7			
Standardised Maths score (mean)	0.32	**-0.16**	**-0.53***
Standardised Word Reading score (mean)	0.31	**-0.22**	**-0.65***
Standardised Internalising SDQ score (mean)	-0.20	**0.08**	**0.25***
Standardised Externalising SDQ score (mean)	-0.25	**0.19**	**0.50***
Family Resources (9 months)			
Parent NVQ1 or lower qualifications	0.16	**0.30**	**0.39***
Workless household	0.11	**0.22**	**0.30***
Rented housing	0.28	**0.45**	**0.55***
Live in bottom two deciles of area deprivation	0.17	**0.26**	**0.33**
N(100%)=	*7,030*	*2,420*	*2,074*

*Note: Bold indicates statistically different (p<.05 or higher) from teenagers with a Grade 4+ in both English Language and maths; * indicates statistically (p<.05 or higher) different from teenagers with a Grade 4+ in English Language or maths.*

Post-16 transitions and hopes and expectations for the future

Table 2 shows the unadjusted and adjusted association between GCSE attainment and the teenagers' post-16 education transitions and their university expectations and occupation aspirations. In line with official statistics for 2018 (DfE, 2019), the data shows that around 4% of the cohort were not in EET) but that even when individual and family characteristics are taken into account, in comparison to their peers who did gain a grade 4 or higher in both examinations, teenager boys and girls who did not gain a grade 4-9 in one or both examinations were significantly less likely to be in education, employment or training (EET) when they were interviewed, to be far less likely – perhaps reasonably – to think they will go to university, or to aspire to a professional occupation. Teenagers who did not gain a grade 4-9 in both examinations were additionally less likely

than their peers with a grade 4-9 in either English language or maths to think they will go to university. See Appendix A2 for adjusted regression results.

Table 2: Predicted probability of teenagers being in EET, their university expectations and occupation aspirations by GCSE English language and maths attainment

	Grade 4+ (EL + M)	<Grade 4 (EL or M)	<Grade 4 (EL + M)
Unadjusted			
In Education, Employment or Training	0.96	**0.92**	**0.88**
In Education or Training	0.95	**0.90**	**0.87**
How likely to go to university: mean 0-100%	63.41	**44.81**	**33.35***
Want to have a professional/managerial job	0.43	**0.32**	**0.25***
Adjusted[1]			
In Education, Employment or Training	0.96	**0.93**	**0.90**
In Education or Training	0.95	**0.90**	**0.87**
How likely to go to university: mean 0-100%	59.82	**48.01**	**42.11***
Want to have a professional/managerial job	0.41	**0.34**	**0.29**
N(100%)=	*7,030*	*2,420*	*2,074*

*Note: Bold indicates statistically different (p<.05 or higher) from teenagers with a Grade 4+ in both English Language and maths; * indicates statistically (p<.05 or higher) different from teenagers with a Grade 4+ in English Language or maths.*

[1]*Adjusted models control for: GCSE attainment, sex, ethnicity, age, maths and word reading standardised cognitive scores [age 7], internalising and externalising problem behaviour scores [age 7], working status of family, parent's highest qualification, housing tenure and area deprivation.*

Health, behaviour and mental wellbeing

We consider a wide range of outcomes in this section, including established scales of depression and behaviour problems. Table 3 shows both the direct and adjusted association between GCSE attainment in English language and maths and indicators of the teenagers' health and mental wellbeing. The findings suggest that after controlling for individual and family resources, teenagers who did not achieve a grade 4 or higher in English language and maths are more likely to experience peer, conduct and hyperactivity behaviour problems (SDQ), and they also to have attempted suicide. Teenagers without a grade 4-9 in both

or one GCSEs also had a higher probability of poor or fair general health and experience of a longstanding illness. See Appendix A3 for adjusted regression results.

Table 3: Predicted probability of poorer mental and physical health; behaviour problems; or self-harming and attempting suicide by GCSE English language and maths attainment

	Grade 4+ (EL + M)	<Grade 4 (EL or M)	<Grade 4 (EL + M)
Unadjusted			
Poor or fair general health	0.05	**0.09**	**0.11**
Longstanding illness	0.17	**0.21**	**0.27***
SDQ Emotional problems	0.13	0.12	0.13
SDQ Conduct problems	0.04	0.05	**0.09***
SDQ Hyperactivity problems	0.13	0.16	**0.19**
SDQ Peer problems	0.03	0.05	**0.07**
Kessler (high levels of depression: 13+)	0.15	0.15	0.16
Self-harmed: in some way	0.25	0.27	0.28
Attempted suicide	0.06	0.07	**0.10**
Adjusted[1]			
Poor or fair general health	0.06	**0.08**	**0.09**
Longstanding illness	0.17	**0.20**	**0.24***
SDQ Emotional problems	0.12	0.11	0.11
SDQ Conduct problems	0.04	0.05	**0.06**
SDQ Hyperactivity problems	0.13	0.14	**0.16**
SDQ Peer problems	0.03	0.04	0.04
Kessler (high levels of depression: 13+)[2]	0.15	0.15	0.15
Self-harmed: in some way	0.25	0.27	0.27
Attempted suicide	0.06	0.06	**0.08**
N(100%)=	*7,030*	*2,420*	*2,074*

*Note: Bold indicates statistically different (p<.05 or higher) from teenagers with a Grade 4+ in both English Language and maths; * indicates statistically (p<.05 or higher) different from teenagers with a Grade 4+ in English Language or maths.*

[1]*Adjusted models control for: GCSE attainment, sex, ethnicity, age, maths and word reading standardised cognitive scores [age 7], internalising and externalising problem behaviour scores [age 7], working status of family, parent's highest qualification, housing tenure and area deprivation.*

[2]*The six-item Kessler Psychological Distress (K6) scale is an abbreviated version of the K10. Each question pertains to an emotional state and response choices are based on five-point Likert-type scale ranging from 0 (none of the time) to 4 (all of the time). Scores range from 0-24, with a cut-off of 6+ indicates moderate psychological distress; 13+ serious psychological distress. Using the 13+ cut-off, 16% of teenagers in the overall sample display signs of serious psychological distress.*

Health behaviours: smoking, alcohol use and drug taking

Table 4 shows the direct and adjusted association between indicators of the teenager's health behaviours and GCSE attainment. The findings suggest that a higher proportion of teenagers who did not gain a grade 4-9 in both or either English language and maths, have smoked at some point, started smoking when they were younger than age 16 or 15 and also currently smoke. They are also more likely to have vaped, with teenagers who did not gain a grade 4-9 in both English language and maths also being more likely to be a current vaper, although the association was attenuated in the adjusted model. In terms of alcohol consumption, more than 8 in 10 of all teenagers had tried alcohol with around 4 in 10 having their first alcoholic drink before age 15, but there were no differences by GCSE attainment. In terms of illegal drug use, a higher proportion of teenagers who did not gain a grade 4-9 in either English language or maths had taken drugs, but the association was again attenuated in the adjusted model. GCSE attainment was not associated with current drug use. See Appendix A4 for adjusted regression results.

Table 4: Predicted probability of teenage smoking, alcohol use and illegal drug taking by GCSE English language and maths attainment

	Grade 4+ (EL + M)	<Grade 4 (EL or M)	<Grade 4 (EL + M)
Unadjusted			
Ever smoked	0.48	**0.59**	**0.63**
Currently smokes daily	0.06	**0.09**	**0.16***
Age first smoked: <16	0.35	**0.47**	**0.48**
Age first smoked: <15	0.20	**0.27**	**0.28**
Ever vaped	0.52	**0.59**	**0.63**
Currently vapes daily	0.03	0.03	**0.06***
Ever had alcohol	0.86	0.86	0.84
Age first had alcohol: <16	0.66	0.65	0.62
Age first had alcohol: <15	0.41	0.41	**0.37**
Ever taken illegal drugs	0.41	**0.46**	0.44
Currently takes illegal drugs	0.14	0.13	0.14
Adjusted[1]			
Ever smoked	0.49	**0.59**	**0.61**
Currently smokes daily	0.06	0.08	**0.13***
Age first smoked: <16	0.36	**0.46**	**0.45**
Age first smoked: <15	0.20	**0.26**	**0.26**
Ever vaped	0.53	**0.58**	**0.60**
Currently vapes daily	0.03	0.03	**0.05***
Ever had alcohol	0.87	0.89	0.88
Age first had alcohol: <16	0.65	0.66	0.64
Age first had alcohol: <15	0.40	0.42	0.38
Ever taken illegal drugs	0.41	**0.46**	0.43
Currently takes illegal drugs	0.13	0.13	0.14
N(100%)=	*7,030*	*2,420*	*2,074*

*Note: Bold indicates statistically different (p<.05 or higher) from teenagers with a Grade 4+ in both English Language and maths; * indicates statistically (p<.05 or higher) different from teenagers with a Grade 4+ in English Language or maths.*

[1]*Adjusted models control for: GCSE attainment, sex, ethnicity, age, maths and word reading standardised cognitive scores [age 7], internalising and externalising problem behaviour scores [age 7], working status of family, parent's highest qualification, housing tenure and area deprivation.*

Relationships and sexual activity

Table 5 shows the direct association between GCSE attainment and indicators of the teenager's romantic and sexual activity with and without controls. The

findings suggest that in comparison to their peers, teenagers without a grade 4-9 in either both or one of English language and maths were no more likely to have had a boy- or girlfriend, but they were more likely to have had sex, including underage sex. In addition, although they were no more likely to have engaged in unprotected sex an increased proportion had either been or made someone pregnant (although proportions were low). When the teenager's individual and family background characteristics were adjusted for, teenagers without a grade 4-9 qualification in English language or maths remained more likely to have engaged in underage sex, with more teenagers without a grade 4-9 qualification in English language and maths experiencing a pregnancy, although the overall proportion is low (3%). See Appendix A5 for adjusted regression results.

Table 5: Predicted probability of teenage relationships and sexual activity by GCSE English language and maths attainment

	Grade 4+ (EL + M)	<Grade 4 (EL or M)	<Grade 4 (EL + M)
Unadjusted			
Boy or girlfriend: yes	0.34	0.35	0.38
Had sex: yes	0.42	**0.47**	**0.48**
Age first had sex: <16	0.31	**0.41**	**0.39**
Had unprotected sex	0.17	0.18	0.18
Experienced a pregnancy	0.02	**0.03**	**0.04**
Adjusted[1]			
Boy or girlfriend: yes	0.34	0.34	0.35
Had sex: yes	0.43	0.46	0.45
Age first had sex: <16	0.32	**0.39**	0.36
Had unprotected sex	0.16	0.17	0.16
Experienced a pregnancy	0.02	0.02	**0.03**
N(100%)=	*7,030*	*2,420*	*2,074*

Note: Bold indicates statistically different (p<.05 or higher) from teenagers with a Grade 4+ in both English Language and maths; * indicates statistically (p<.05 or higher) different from teenagers with a Grade 4+ in English Language or maths.

[1]*Adjusted models control for: GCSE attainment, sex, ethnicity, age, maths and word reading standardised cognitive scores [age 7], internalising and externalising problem behaviour scores [age 7], working status of family, parent's highest qualification, housing tenure and area deprivation.*

Contact with the police

Table 6 shows the association between GCSE attainment in English language and maths and contact with the police with and without controls. The findings suggest that compared to their peers, teenagers who did not reach the expected standard in both or one of English language and maths GCSEs, had a significantly higher incidence of being stopped and questioned and to have been formally cautioned by the police. Even when controlling for individual and family characteristics, these differences remained. Less than 1% of all teenagers had been arrested, although this was statistically higher among those who did not gain a grade 4-9 in English language and maths GCSE. See Appendix A6 for adjusted regression results.

Table 6: Predicted probability of teenage contact with the police by GCSE English language and maths attainment

	Grade 4+ (EL + M)	<Grade 4 (EL or M)	<Grade 4 (EL + M)
Unadjusted			
Police contact: stopped and questioned	0.20	**0.28**	**0.35***
Police contact: cautioned	0.06	**0.10**	**0.16***
Police contact: arrested	0.00	**0.01**	**0.01**
Adjusted[1]			
Police contact: stopped and questioned	0.21	**0.25**	**0.29**
Police contact: cautioned	0.06	**0.09**	**0.12**
Police contact: arrested	0.00	0.01	**0.01**
N(100%)=	*7,030*	*2,420*	*2,074*

*Note: Bold indicates statistically different (p<.05 or higher) from teenagers with a Grade 4+ in both English Language and maths; * indicates statistically (p<.05 or higher) different from teenagers with a Grade 4+ in English Language or maths.*

[1]Adjusted models control for: GCSE attainment, sex, ethnicity, age, maths and word reading standardised cognitive scores [age 7], internalising and externalising problem behaviour scores [age 7], working status of family, parent's highest qualification, housing tenure and area deprivation.

Discussion

Completing Year 11 having gained the key qualifications of a General Certificate of Secondary Education (GCSE) grade 4-9 in English language and maths and transitioning into further education, employment or training (EET) is a key developmental milestone on the way to independent living. In the UK, attaining a 'good grade' GCSE or equivalent examination pass, particularly in English Language and maths, is increasingly fundamental for accessing the widest range of possible post-16 transitions and can influence later labour market outcomes (see Dickerson et al., 2022). Indeed, those doing poorly in their GCSEs at age 16 can be scarred for many years, finding it hard to strive in the workplace (Bell & Blanchflower, 2010; Crawford et al., 2012; Ralston et al., 2016).

This research adds support to existing evidence and has shown that many teenagers who do not reach the expected standard of a 'good pass' or a grade 4-9 in GCSE English language and maths at the end of Year 11 face more difficult post-16 education transitions and are more likely to experience negative outcomes across a whole range of domains. Using rich data from the nationally representative MCS, this broad profile of teenage outcomes illustrates the importance GCSE attainment has for shaping not just education and employment outcomes but a whole host of health, wellbeing characteristics as well as the likelihood for illicit or criminal behaviour that has resulted in contact with the police.

It is unsurprising that we find that those who did not gain a grade 4-9 in English language and/or maths have fewer family socio-economic resources than their peers who did, confirming the assumption of cumulative disadvantage H1a. More with poor examination results were born into families with less educated parents, were part of a workless family and lived in rented accommodation in a deprived area (see also Elliot Major & Parsons, 2022). However, even when controlling for individual characteristics and their family resources, the findings show that teenagers who ended year 11 without a grade 4 in English language

and/or maths encountered more problematic post-16 transitions as indicated by fewer being in EET or expecting to go on to higher education or to aspire to have a professional or managerial occupation. In line with national figures, 4% of the majority teenagers with a grade 4-9 in English and maths were NEET but this increased to 7% for those with no grade 4-9 in English or maths and to 10% for those not reaching the expected standard in both exams. The findings thus confirm the assumption of disadvantage persisting into the next generation (H1b), with poorer outcomes being most notable among those not reaching the expected threshold in both English language and maths.

The findings have also highlighted how teenagers not achieving the expected education threshold at the end of Year 11 have a higher propensity to experience adverse outcomes in other domains of life, from being more likely to have had contact with the police, to report poorer general health or a longstanding illness, to smoking or vaping (and first smoking at a young age), to have behaviour problems, to have attempted to end their life, and to have first had sex under 16 and to have experience of pregnancy (although it is important to note that proportions are very low). However, although this is true, it also needs to be highlighted that the majority of teenagers falling short of the expected education threshold at the end of Year 11, were in EET at age 17, and did not have the negative outcomes in the different domains detailed above, thus the findings confirm the assumption of developmental discontinuity (H2). In addition, these teenagers were no more likely than their peers to drink alcohol, to take illegal drugs, to self-harm or to experience symptoms associated with depression.

In future research we will examine how the teenagers' fare relative to their peers when they reach their early 20s, to see if the disadvantage cumulates and importantly to see which of the teenagers have since taken a more positive pathway, returned to education, training or are in employment and do not have increased levels of risky behaviour or negative health and wellbeing outcomes. This current research has clearly shown that academic qualifications act as a protective factor for post-16 transitions, and that not gaining a grade 4-9 in

English language and/or maths was associated with the lower aspirations and expectations together with adverse outcomes across different domains including health, health behaviours and being in contact with the police. Going forward we will also assess the association between parent and teenage health behaviours or wellbeing outcomes, where similar or identical measures are available in the data. Examples include smoking, drug use, physical health and mental wellbeing.

Strengths and limitations

A key strength of this research lies in its use of the Millennium Cohort Study, a large population-based and representative prospective longitudinal study with a design that ensured adequate representation of disadvantaged groups and families from minority ethnic backgrounds. By using self-reported grades attained in public examinations sat at the end of Year 11, we have been able to draw attention to the experiences of the teenage children who do or do not gain the expected grade 4-9 in English language and/or maths across different domains of life and highlight where the lives of the teenagers who did not reach the expected threshold are more challenging in comparison to their peers who did.

However, given the data are derived from an observational longitudinal study, bias due to unmeasured confounding cannot be ruled out. As in any longitudinal survey, missing data due to attrition are unavoidable, thus we employed multiple imputation and included the most important predictors of missing data in our models to maximise the plausibility of the missing at random assumption and restore sample representativeness. However, bias due to a non-ignorable missing data generating mechanism cannot be ruled out. A further limitation is that our findings strictly can only be generalised to those born in Britain in 2000/2, or close to these years.

Conclusion

This report has identified different aspects of disadvantage in post-16 outcomes that is associated with poor GCSE attainment. Here we find a reduced probability that teenagers who did not gain a grade 4-9 in English language and maths are in Education Employment of Training, expect to go on to university or to have high occupation aspirations, even in comparison to those who got a grade 4-9 in English language or maths. More also self-report poorer health together and higher rates of smoking or vaping, and more experience behaviour problems, have attempted suicide and had contact with the police and experience of pregnancy. More of those who did not get a grade 4-9 in English language or maths had engaged in underage sex and taken illegal drugs, although they were no more likely to be current drug users. Taken together, these disadvantages across domains illustrate the far reaching and multi-dimensional impacts of educational failure.

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Appendix

Table A1: Policy Reforms that the MCS cohort will have been exposed to

Year	Policy reform
1996	National Literacy Task Force: Set-up by Labour to develop a strategy to raise standards of literacy in primary schools over a five- and ten-year period. Built on work of the National Literacy Project. http://www.educationengland.org.uk/documents/literacytaskforce/implementation.html
1997	Numeracy Task Force set up in a similar vein to literacy – built on work of the National Numeracy project (Sept 1996). http://www.educationengland.org.uk/documents/literacytaskforce/implementation.html
1997	Excellence in Schools White Paper: Set out an agenda to raise standards and highlighted underachievement in Maths and English. Targets literacy and numeracy priorities in primary education. Sets targets for 75% and 80% of 11-year-olds to reach expected standards for their age in maths and English respectively by 2002. In 1996 fewer than 6 in 10 achieved these levels. http://www.educationengland.org.uk/documents/wp1997/excellence-in-schools.html
1997	Guidelines for teachers developed to spend at least an hour a day on English and an hour on maths in primary schools as part of the national strategies for improving standards of literacy and numeracy. http://www.educationengland.org.uk/documents/wp1997/excellence-in-schools.html
1999	Sure Start programme launched aimed at improving the health, well-being and educational attainment of 0- to 3-year-olds in disadvantaged areas through a wide range of health, education and social services. https://researchbriefings.files.parliament.uk/documents/CBP-7257/CBP-7257.pdf
2000	Network of 'city academies' independent of local authority, effectively private schools paid for by the state. https://dera.ioe.ac.uk/3000/1/City_academies_-_schools_to_make_a_difference_(July_2000).pdf
2001	Building on Our Success Green paper. Aim to build on success at primary level in secondary schools with targets for 14-year-olds in English and Maths. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/250873/5050.pdf
2001	Schools Achieving Success White Paper: Detailed post-election plans. By 2007 85% of 14-year-olds were to achieve Level 5 or above in English, Maths and ICT at the end of Key Stage 3. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/355105/Schools_Achieving_Success.pdf
2001	Secondary National Strategy set-up to improve English and Maths at key stage 3 https://www.nfer.ac.uk/media/1347/91018.pdf
2002	Education Act: Establishes into law targets at Key Stages 1,2, 3 & 4 http://www.educationengland.org.uk/documents/acts/2002-education-act.html#06
2003	Primary National Strategy combines the literacy and numeracy strategies. https://dera.ioe.ac.uk/4817/7/pri_excel_enjoy_strat_Redacted.pdf
2004	Making Mathematics Count: Critical Review of arrangements http://www.mathsinquiry.org.uk/report/MathsInquiryFinalReport.pdf

Year	Policy reform
2005	White Paper 14-19 Education and Skills: Details plans on extending functional skills in English and Maths to GCSE level. http://www.educationengland.org.uk/documents/pdfs/2005-white-paper-14-19-education-and-skills.pdf
2010	Pupil premium introduced to improve outcomes for children on Free School meals, alongside Education Endowment Foundation evidence informed guidance to spend the pupil premium effectively. https://researchbriefings.files.parliament.uk/documents/SN06700/SN06700.pdf
2013	New GCSE syllabuses for English language and maths announced, to be taught in schools from September 2015. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/254513/GCSE_consultation_-_government_s_response.pdf

Appendix Table A2a: OLS Regression results: % likelihood of going to university by GCSE English Language and Maths attainment [unstandardised coefficients]

	Adjusted
Teenage Characteristics	
GCSEs (Ref: Grade 4-9 EL + M)	
<Grade 4-9 Eng Lang *or* Maths	-11.81***
	(1.14)
<Grade 4-9 Eng Lang *&* Maths	-17.71***
	(1.29)
Male	-4.91***
	(0.72)
British Minority Ethnic	15.52***
	(1.18)
Externalising behaviour [std]	-2.79***
	(0.55)
Internalizing behaviour [std]	0.44
	(0.55)
BAS Word Reading [std]	5.45***
	(0.60)
Maths [std]	2.87***
	(0.60)
Family Resources	
Parent NVQ2+ quals	-4.60***
	(1.15)
Workless household	1.29
	(1.59)
Rented home	-4.42**
	(1.25)
Live in deprived area	-0.77
	(1.02)
R^2	
N	11524

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.00$

	In EET	In Edu/Training	Prof/Man Occupation
Teenage Characteristics			
GCSEs (Ref: Grade 4-9 EL + M)			
<Grade 4-9 Eng Lang *or* Maths	0.48***	0.49***	0.74***
	(0.08)	(0.07)	(0.06)
<Grade 4-9 Eng Lang & Maths	0.32***	0.38***	0.60***
	(0.06)	(0.06)	(0.06)
Male	1.31**	1.23*	0.90
	(0.13)	(0.10)	(0.05)
British Minority Ethnic	1.32	1.44**	1.37***
	(0.19)	(0.18)	(0.11)
Externalising behaviour [std]	0.97	0.92	0.95
	(0.06)	(0.05)	(0.04)
Internalising behaviour [std]	0.94	0.99	1.01
	(0.06)	(0.05)	(0.04)
BAS Word Reading [std]	0.99	1.00	1.16**
	(0.07)	(0.06)	(0.05)
Maths [std]	0.99	0.98	1.10*
	(0.07)	(0.06)	(0.04)
Family Resources			
Parent <NVQ2 quals	1.06	0.96	0.92
	(0.13)	(0.11)	(0.06)
Workless household	0.77	0.77	1.04
	(0.11)	(0.10)	(0.13)
Rented home	0.64**	0.57***	0.88
	(0.08)	(0.07)	(0.07)
Live in deprived area	0.99	0.94	0.92
	(0.12)	(0.10)	(0.07)
R^2			
N	11524	11524	11524

Exponentiated coefficients; Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Appendix Table A3: Logistic Regression results: health, behaviour problems, self-harm and suicide by GCSE English Language and Maths attainment [Odds Ratios]

Teenage Characteristics	Poor/Fair Health	Longstanding Illness	SDQ Emotional	SDQ Peer	SDQ Conduct	SDQ Hyper	13+ Kessler	Self harmed	Suicide attempt
GCSEs (Ref: Grade 4-9 EL + M)									
<Grade 4-9 Eng Lang *or* Maths	1.41**	1.21*	0.84	1.07	1.12	1.17	1.00	1.09	1.14
	(0.16)	(0.11)	(0.09)	(0.19)	(0.17)	(0.12)	(0.10)	(0.08)	(0.16)
<Grade 4-9 Eng Lang & Maths	1.65***	1.57***	0.92	1.21	1.50**	1.35**	1.01	1.13	1.47*
	(0.22)	(0.13)	(0.10)	(0.23)	(0.22)	(0.15)	(0.10)	(0.11)	(0.23)
Male	0.79**	0.82**	0.43***	0.70**	1.05	1.04	0.56***	0.70***	0.56***
	(0.07)	(0.05)	(0.04)	(0.09)	(0.12)	(0.08)	(0.04)	(0.04)	(0.06)
British Minority Ethnic	1.02	0.70**	0.50***	0.69	0.91	0.66***	0.76*	0.67***	0.70*
	(0.13)	(0.08)	(0.05)	(0.13)	(0.14)	(0.07)	(0.08)	(0.06)	(0.10)
Externalising behaviour [std]	1.13*	1.21***	1.02	1.21**	1.57***	1.50***	1.13**	1.07	1.09
	(0.07)	(0.05)	(0.05)	(0.08)	(0.11)	(0.06)	(0.05)	(0.04)	(0.06)
Internalizing behaviour [std]	1.16**	1.21***	1.28***	1.27***	0.98	0.99	1.10*	1.07	0.98
	(0.06)	(0.05)	(0.05)	(0.08)	(0.07)	(0.05)	(0.04)	(0.04)	(0.05)
BAS Word Reading [std]	0.98	0.98	1.16**	0.89	0.99	1.02	1.13**	1.08*	0.96
	(0.06)	(0.05)	(0.06)	(0.07)	(0.07)	(0.05)	(0.05)	(0.04)	(0.07)
Maths [std]	1.02	1.06	0.96	1.00	1.01	1.14**	0.95	1.01	1.05
	(0.06)	(0.05)	(0.04)	(0.07)	(0.07)	(0.05)	(0.04)	(0.04)	(0.06)
Family Resources									
Parent <NVQ2 quals	0.96	0.84	1.07	0.91	1.03	0.98	0.95	0.93	0.94
	(0.11)	(0.08)	(0.10)	(0.14)	(0.15)	(0.10)	(0.09)	(0.08)	(0.12)
Workless household	1.12	1.17	0.94	0.99	1.05	0.96	1.09	1.11	1.41*
	(0.15)	(0.12)	(0.12)	(0.16)	(0.16)	(0.10)	(0.11)	(0.11)	(0.21)
Rented home	1.30*	1.01	1.18	1.79***	1.44*	1.06	1.21*	1.18*	1.56**
	(0.16)	(0.08)	(0.12)	(0.28)	(0.21)	(0.10)	(0.11)	(0.09)	(0.21)
Live in deprived area	1.07	1.04	0.96	1.06	0.87	0.92	0.93	0.92	0.99
	(0.12)	(0.10)	(0.09)	(0.15)	(0.13)	(0.09)	(0.08)	(0.07)	(0.12)
R^2									
N	11524	11524	11524	11524	11524	11524	11524	11524	11524

Exponentiated coefficients; Standard errors in parentheses; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

	Ever Smoked	Smokes Daily	Smoked <16	Smoked <15	Ever Vaped	Vapes Daily
Teenage Characteristics						
GCSEs (Ref: Grade 4-9 EL + M)						
<Grade 4-9 Eng Lang *or* Maths	1.47***	1.38**	1.47***	1.38***	1.23*	0.92
	(0.10)	(0.16)	(0.10)	(0.12)	(0.09)	(0.17)
<Grade 4-9 Eng Lang & Maths	1.60***	2.43***	1.41***	1.37**	1.31**	1.69**
	(0.12)	(0.29)	(0.12)	(0.13)	(0.12)	(0.29)
Male	0.89*	0.86	0.93	0.96	1.11*	1.59**
	(0.05)	(0.08)	(0.05)	(0.05)	(0.06)	(0.23)
British Minority Ethnic	0.43***	0.37***	0.57***	0.74***	0.60***	0.56*
	(0.03)	(0.06)	(0.04)	(0.06)	(0.04)	(0.12)
Externalising behaviour [std]	1.18***	1.29***	1.12***	1.08*	1.18***	1.36***
	(0.04)	(0.07)	(0.03)	(0.04)	(0.05)	(0.10)
Internalizing behaviour [std]	0.85***	0.84**	0.91**	0.96	0.84***	0.75***
	(0.03)	(0.04)	(0.03)	(0.03)	(0.03)	(0.06)
BAS Word Reading [std]	0.97	1.03	0.97	0.99	0.94	0.97
	(0.03)	(0.05)	(0.03)	(0.04)	(0.04)	(0.07)
Maths [std]	1.02	1.09	1.00	1.00	1.02	1.13
	(0.03)	(0.06)	(0.04)	(0.04)	(0.04)	(0.09)
Family Resources						
Parent <NVQ2 quals	1.02	1.04	1.09	1.11	1.11	0.95
	(0.07)	(0.12)	(0.08)	(0.08)	(0.08)	(0.16)
Workless household	1.34**	1.33*	1.15	1.14	1.01	0.90
	(0.12)	(0.17)	(0.10)	(0.11)	(0.08)	(0.18)
Rented home	1.24**	1.46***	1.25***	1.21*	1.31***	1.23
	(0.09)	(0.16)	(0.08)	(0.10)	(0.09)	(0.20)
Live in deprived area	0.95	0.97	0.97	0.98	1.06	1.20
	(0.06)	(0.10)	(0.07)	(0.08)	(0.07)	(0.20)
R^2						
N	11524	11524	11524	11524	11524	11524

Exponentiated coefficients; Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

	Ever drank alcohol	Alcohol <16	Alcohol <15	Ever taken drugs	Current drug use
Teenage Characteristics					
GCSEs (Ref: Grade 4-9 EL + M)					
<Grade 4-9 Eng Lang *or* Maths	1.21	1.01	1.06	1.23**	0.97
	(0.13)	(0.07)	(0.08)	(0.09)	(0.09)
<Grade 4-9 Eng Lang & Maths	1.09	0.94	0.91	1.09	1.06
	(0.13)	(0.08)	(0.08)	(0.08)	(0.13)
Male	0.95	0.92	0.92	1.16**	1.26**
	(0.06)	(0.05)	(0.05)	(0.06)	(0.09)
British Minority Ethnic	0.16***	0.39***	0.63***	0.69***	0.79
	(0.02)	(0.03)	(0.05)	(0.05)	(0.09)
Externalising behaviour [std]	1.03	1.04	1.06*	1.14***	1.20***
	(0.05)	(0.04)	(0.03)	(0.04)	(0.05)
Internalizing behaviour [std]	0.80***	0.91**	0.96	0.88***	0.83***
	(0.04)	(0.03)	(0.03)	(0.03)	(0.04)
BAS Word Reading [std]	1.04	1.00	1.02	1.05	1.10
	(0.05)	(0.03)	(0.04)	(0.04)	(0.05)
Maths [std]	1.03	1.09*	1.08*	1.04	1.11*
	(0.05)	(0.04)	(0.04)	(0.04)	(0.05)
Family Resources					
Parent <NVQ2 quals	0.65***	0.83**	0.93	0.88	0.71***
	(0.06)	(0.05)	(0.06)	(0.06)	(0.07)
Workless household	0.85	1.10	1.15	1.29**	1.16
	(0.08)	(0.09)	(0.09)	(0.11)	(0.12)
Rented home	1.32**	1.00	0.98	1.17*	1.16
	(0.12)	(0.06)	(0.06)	(0.07)	(0.10)
Live in deprived area	0.69***	0.87	0.92	0.94	0.88
	(0.07)	(0.06)	(0.06)	(0.07)	(0.09)
R^2					
N	11524	11524	11524	11524	11524

Exponentiated coefficients; Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

	Had a Boy/Girlfriend	Had Sex	Had Sex <16	Unprotected Sex	Experienced pregnancy
Teenage Characteristics					
GCSEs (Ref: Grade 4-9 EL + M)					
<Grade 4-9 Eng Lang *or* Maths	1.01	1.13	1.34***	1.04	1.25
	(0.08)	(0.08)	(0.10)	(0.09)	(0.28)
<Grade 4-9 Eng Lang & Maths	1.05	1.08	1.15	1.01	1.76*
	(0.09)	(0.08)	(0.09)	(0.12)	(0.38)
Male	0.76***	0.88*	0.97	0.92	0.83
	(0.04)	(0.05)	(0.05)	(0.06)	(0.14)
British Minority Ethnic	0.45***	0.34***	0.57***	0.38***	0.39**
	(0.04)	(0.03)	(0.05)	(0.05)	(0.11)
Externalising behaviour [std]	1.07	1.14***	1.10**	1.18***	1.23*
	(0.04)	(0.04)	(0.04)	(0.05)	(0.12)
Internalizing behaviour [std]	0.95	0.85***	0.95	0.87**	0.88
	(0.03)	(0.03)	(0.03)	(0.04)	(0.08)
BAS Word Reading [std]	0.98	0.90**	0.93	0.95	0.89
	(0.04)	(0.03)	(0.03)	(0.04)	(0.09)
Maths [std]	1.01	1.06	1.00	1.12**	1.21
	(0.03)	(0.04)	(0.04)	(0.05)	(0.14)
Family Resources					
Parent <NVQ2 quals	1.08	0.95	1.02	0.90	0.99
	(0.08)	(0.07)	(0.07)	(0.08)	(0.17)
Workless household	1.16	1.17	1.18	1.00	1.59*
	(0.12)	(0.11)	(0.10)	(0.11)	(0.33)
Rented home	1.23**	1.36***	1.32***	1.35**	2.31***
	(0.09)	(0.10)	(0.10)	(0.12)	(0.52)
Live in deprived area	1.06	0.98	0.94	1.02	0.93
	(0.08)	(0.07)	(0.07)	(0.08)	(0.17)
R^2					
N	11524	11524	11524	11524	11524

Exponentiated coefficients; Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Appendix Table A6: Logistic Regression results: contact with police by GCSE English Language and Maths attainment [Odds Ratios]

	Stopped & Questioned	Cautioned	Arrested
Teenage Characteristics			
GCSEs (Ref: Grade 4-9 EL + M)			
<Grade 4-9 Eng Lang *or* Maths	1.27**	1.39*	1.66
	(0.10)	(0.19)	(0.57)
<Grade 4-9 Eng Lang & Maths	1.54***	2.00***	2.19*
	(0.16)	(0.26)	(0.81)
Male	1.41***	1.21*	1.49
	(0.09)	(0.11)	(0.41)
British Minority Ethnic	0.75**	0.79	1.11
	(0.08)	(0.12)	(0.35)
Externalising behaviour [std]	1.25***	1.42***	1.67***
	(0.05)	(0.09)	(0.24)
Internalizing behaviour [std]	0.91	0.88*	0.70*
	(0.04)	(0.05)	(0.11)
BAS Word Reading [std]	0.94	0.98	1.01
	(0.05)	(0.07)	(0.14)
Maths [std]	1.00	1.03	1.12
	(0.04)	(0.06)	(0.19)
Family Resources			
Parent <NVQ2 quals	1.00	1.10	1.08
	(0.08)	(0.12)	(0.27)
Workless household	1.38**	1.39*	1.60
	(0.14)	(0.18)	(0.53)
Rented home	1.21*	1.17	1.91*
	(0.12)	(0.14)	(0.59)
Live in deprived area	1.13	1.00	1.08
	(0.10)	(0.13)	(0.32)
R^2			
N	11524	11524	11524

Exponentiated coefficients; Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$