Education Maintenance Allowance: Evaluation with Administrative Data

The impact of the EMA pilots on participation and attainment in post-compulsory education

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Contents

Summary

This report contains the findings of an evaluation of the impact of the Education Maintenance Allowance (EMA) using administrative data. We analyse the effects of its initial piloting – and subsequent extension – on participation in full-time education at ages 16 and 17, and on educational achievement at ages 18 and 19. Furthermore, we conduct subgroup analysis to break down the overall effect by different background characteristics. This allows us to see how the impact of the EMA varies according to characteristics such as sex, ethnic group, and potential indicators of material deprivation and prior academic ability.

We estimate the impacts of the EMA by running multivariate regression models using data from various parts of England. These analyses are all carried out separately for males and females and control for other observed individual, school and local characteristics that might also affect participation and attainment in post-compulsory education. The work has been carried out using various large-scale administrative datasets linked together from the academic years 2001/2002 through 2003/2004, which follow two different cohorts of state-school pupils in England from Year 11 onward and also record background information on them. Further details of the methodology employed can be found in Appendix C.

The estimated impact of the EMA

Overall participation results

We present the estimated impacts of the EMA's introduction in two ways. First we compare the outcomes of interest in the pilot areas that received the EMA in 1999 with those in the specially chosen set of control areas that were used in the main evaluation of the EMA (first method). Our second analysis involves comparing the outcomes of interest across all pilot areas that received the EMA in either 1999 or 2000 with the rest of England. Our estimates of the EMA impact tend to increase as more background characteristics are taken into account, with a final estimate of around 2.0 percentage points for females in the first analysis (but no statistically significant impact for males). With our second analysis, there are significant impacts for both sexes – just under 3.0 percentage points for females and 2.0 percentage points for males. These are shown in Table 1. In addition to the estimated impact of the EMA across all individuals this table also contains estimates of the impact of the policy on those who actually received the EMA. These are computed on the assumption that the EMA had no effect on the education outcomes of those who did not receive it (either because their family income was too high for them to be eligible or because they were eligible but, for whatever reason, they did not take it up).

Table 1. Summary of estimated impact of the EMA on participation in full-time education, by sex, age and methodology

Outcome	Method 1	Method 2
Female FT participation at 16		
Impact across pilot areas as a whole	+0.022	+0.029
Impact across EMA recipients	+0.055	+0.073
Male FT participation at 16		
Impact across pilot areas as a whole	+0.008	+0.022
Impact across EMA recipients	+0.020	+0.055
Female FT participation at 17		
Impact across pilot areas as a whole	+0.021	+0.027
Impact across EMA recipients	+0.063	+0.081
Male FT participation at 17		
Impact across pilot areas as a whole	+0.002	+0.015
Impact across EMA recipients	+0.006	+0.045

These figures, while mostly statistically significant[1], remain lower than the officially quoted overall effect from the main quantitative evaluation. The comparable estimated impact from that study was an increase in full-time participation among all males of 4.4 percentage points and increase of 3.3 percentage points among all females.[2] However it is important to note that these earlier estimates are not statistically significantly different from the estimates presented here.

It is also possible that the overall impact of the EMA that was piloted in 1999 and 2000 might be different from the impact of the scheme that was in place in 2001/2002 and 2002/2003, or indeed what is in place now. In particular the EMA eligibility thresholds and payments did not change while the EMA pilots were in place and therefore fell in value relative to both prices and earnings. Over this period, the maximum weekly award that could be received was £30 (£40 in Variant 2 LEAs) and this amount has stayed at £30 since. Meanwhile, gross family incomes below £13,000 entitled households to the full award while incomes between £13,000 and £30,000 (£20,000 in London) resulted in tapered payments. These figures also remained fixed throughout the duration of the EMA pilots. However, between 1999 and 2004 the Retail Prices Index increased by 12.9 percent while the Average Earnings Index rose by 21.9 percent. The pupils in this analysis, being in Year 11 in 2001/2002 or 2002/2003, were younger than those in the study on which the official estimate is based, and, having made the participation decision later, would have been less likely to qualify for an EMA award. They would also have found the payments to be less generous conditional on being eligible for receipt. The declining generosity of the EMA may naturally mean that the impact of the EMA would be expected to weaken over time.

[1] All of the impacts under Method 2, and the impact on female participation at 16 under Method 1, are significant at the 5 percent level.

[2] 'Education Maintenance Allowance: The First Two Years – A Quantitative Evaluation', Centre for Research in Social Policy and Institute for Fiscal Studies (2002), *DfES Research Report RR352*, Table B.3. (http://www.dfes.gov.uk/research/d ata/uploadfiles/RR352.pdf)

In addition to this, we believe that all the participation and achievement impacts presented in this document are still underestimates relative to those obtained in the main evaluation. That study used surveys containing precise measures of parental income, education and employment status, and therefore had 'better' measures of socioeconomic background than this evaluation, where local-area characteristics have been used as proxies. The fact that the main evaluation took more family characteristics into account may make its findings more authoritative than the ones presented here, and in that sense the impacts we present can be thought of as underestimates.

Rather than being able to provide better estimates of the overall impact of the EMA on participation, the main strength of this study is that it is able to provide more breakdowns by subgroups which will shed light on which groups the EMA is having a relatively large and a relatively small impact upon. Furthermore this study is also better placed to make an assessment of the impact of the EMA on subsequent qualifications, since these were only observed imperfectly for a subset of respondents to the survey on which the study of the initial pilots was based. To the extent to which the estimates for the impact of the EMA on participation that are presented here are underestimates of the overall impact of the policy then it might also be the case that the other estimates presented here – whether by background characteristics, or on other outcomes – are also underestimates of the true impact.

Subgroup participation results

The subgroup analysis we conduct reveals some key findings. Firstly, the impacts at age 16 are concentrated among white males and females, for whom participation in the pilot areas rose by 2.9 and 2.4 percentage points respectively. In comparison, there are no statistically significant impacts on the participation of Asian or black students. The one noticeable exception to this is the impact of the EMA on black females – their participation in education at age 17 was increased by 4.7 percentage points as a result of the EMA. These findings are presented in more detail in Tables 3a and 3b.

In Tables 4a and 4b we break down the EMA impacts by the level of neighbourhood deprivation (as measured by IMD scores). Doing so reveals that the effect of the EMA was strongest amongst females in the most deprived 40 percent of neighbourhoods. This is perhaps unsurprising since eligibility for the EMA will be higher among this group. At age 16, females in the most deprived fifth of neighbourhoods saw a 3.7 percentage point rise in their full-time participation; at age 17, the rise was 3.1 percentage points. For males, analysed in Table 4b, the impact is strongest amongst those in fairly deprived, but not the most deprived, neighbourhoods. This group saw participation increases of 3.1 percentage points at 16 and 2.3 percentage points at 17.

Table 5 conducts a similar breakdown as above by examining how the EMA impact varies according to receipt of free school meals (FSM). We again find a stronger impact among more deprived females: at age 16, for example, those were on FSM experienced a rise in participation of 3.3 percentage points compared to 2.5 percentage points for those

who were not. For males, however, the impacts on participation are only significant among those not on FSM – as in Table 4b, it appears that the effects are actually weaker among male, who on average, were from more deprived backgrounds.

The final strand of the subgroup analysis is in Tables 6a and 6b, which break down the impact of the EMA by prior attainment (as measured by Key Stage 2). Females in the pilot areas saw higher participation regardless of their attainment at 11, but with stronger impacts among low achievers – those who had performed the worst at Key Stage 2 enjoyed a 3.9 percentage point increase in participation at age 16. However, there was no significant impact on age-17 participation for this group. A similar pattern emerges amongst males: at age 16, they were more likely to participate in full-time education regardless of their prior achievement, but the worst-performing fifth of males were not more likely to be in full-time education at 17. The remaining four-fifths of males in the EMA pilot areas saw participation increases of between 1.5 and 3.3 percentage points at age 17.

Overall attainment results

Using exactly the same approach, we also look at the effect of the EMA on various measures of post-16 achievement: the likelihood of attaining the Level 2 and 3 thresholds as well as the average Key Stage 5 (A Level) point score, measured both at age 18 and age 19. Among the pilot areas that introduced the EMA in 1999, we generally do not find any statistically significant impacts on qualifications achieved for females. For males, though, there is a statistically significant positive impact on achievement: by age 18, attainment of the Level 3 threshold rose by 1.2 percentage points and average Key Stage 5 tariffs rose by 5.0 points.

To put the latter effect into context, it corresponds to an improvement of about one quarter of an A Level grade across all 18-year-old males in EMA pilot areas. Alternatively, this impact corresponds to an improvement in A Level performance of around 8.9 percent on the base level of 56.7, which we measure as the average Key Stage 5 tariff across all individuals in the pilot and control areas.

Nationally, by comparing all EMA pilot areas (initial and extension LEAs) with the rest of England, we find an impact on the Level 2 and 3 attainment rates of around 2.5 percentage points for females and just under 2.0 percentage points for males. There are also significant effects on A Level points obtained – around 5.0 points for females and 4.0 points for males. The corresponding base levels for the Key Stage 5 outcomes (see Table 1b) imply that, for males and females, average A Level performance was improved by around 4.5 percent at ages 18 and 19.

There are no previous estimates of the effect on achievement with which our findings can be compared. However, we still have reason to believe that both our participation and attainment effects are around half of the ‘true’ size. This is because the estimated impacts presented here are merely the effects of residing in an LEA that offered the EMA. We do

not know in our data whether each individual would have *received* the EMA had they chosen to participate in full-time education – all that is known is whether they lived in an LEA where the EMA was available for those that qualified to get it. To the extent that not everyone in an EMA area would be eligible for the cash award even if they choose to participate in full-time education, and that not everyone who would be eligible would actually take it up, our results are underestimates of the effect of *receiving* the EMA.

We attempt to resolve this issue by making back-of-the-envelope calculations of the actual 'receipt rates' in the areas we analyse. Doing so reveals that around 30–40 percent of the 16- and 17-year-olds in EMA areas received some form of EMA award. We therefore suggest as a rule of thumb that, in order to obtain the effect of the EMA across those who received it, the estimates above be multiplied by a factor of 2½ (for outcomes at age 16) or 3 (for participation at age 17 and attainment outcomes). Making this adjustment yields the estimated impacts on EMA recipients that are presented in Table 1 For further details on how exactly this adjustment was arrived at, see Appendix D.

After this adjustment, the effect on female participation of actually receiving the EMA in the original pilot areas is around 5.5 percentage points at 16 and 6.3 percentage points at 17. The participation impacts from the second analysis, once adjusted, are then around 7.3 percentage points for females (8.1 percentage points at 17); and 5.5 percentage points for males (4.5 percentage points at 17). The same adjustment can be made to the estimated attainment impacts at age 18.

Subgroup attainment results

As with the participation results, we also conduct subgroup analysis to see how the attainment impacts vary according to different background characteristics. Table 3a contains some striking effects on post-16 attainment, particularly among ethnic minorities. By age 19, Asian females were 4.3 percentage points more likely to have achieved the Level 3 threshold. Black females saw even stronger impacts, being 5.2 percentage points more likely to achieve full Level 2 and 6.2 percentage points more likely to achieve full Level 3. Black females in particular also saw strong improvement in A Level point tariffs, of around 20 percent on the base. A similar picture emerges for black males, who were significantly more likely to have achieved the Level 2 and 3 thresholds by 18. Indeed, by age 18 their Key Stage 5 tariffs had improved about 10.9 points – this marks an increase of around 27 percent on the base.

Tables 4a and 4b confirm that the impacts of the EMA on attainment were concentrated among pupils from the most deprived backgrounds. Females from the most deprived backgrounds, for example, were found to be 2.4 percentage points more likely to meet the Level 3 threshold by age 19, with a corresponding improvement in A Level tariffs of around 8.1 percent on the base. For males from deprived backgrounds the impacts are generally smaller, but there are still significant gains at Level 3 by age 18: males in the most deprived neighbourhoods were 1.3 percentage points more likely to reach this

threshold by age 18. The 3.0 point increase Key Stage 5 points that this group of males also saw implies a 9.4 percent improvement on the base.

Table 5, which breaks the impacts down by FSM eligibility, shows that the impacts on attainment were statistically significant for the poorest females but generally not for the poorest males. By the age of 19, FSM-eligible females were 2.8 percentage points more likely to have achieved Level 2, 2.7 percentage points more likely to have achieved Level 3 and had A Level tariffs that were about 3.7 points (8.3 percent) higher.

Finally, in Tables 6a and 6b, it appears that the impacts on Level 2 attainment were concentrated amongst females who were not the highest prior achievers and males with moderate amounts prior achievement. Conversely, the Level 3 impacts were concentrated among higher prior achieving males and females. Females who had the highest Key Stage 2 grades were around 2.5 percentage points more likely to achieve the Level 3 threshold by age 19. Males who had above-average (but not the best) performance at Key Stage 2 were 2.9 percentage points more likely to reach the Level 3 threshold by 18, and saw a 6.1 point (5.4 percent) improvement in average A Level scores.

Analysis

Overall results

Table 1a below illustrates the results obtained from our analysis of the EMA pilots based on the original pilot and control areas in 1999.[3] For each of the participation and attainment outcomes listed, the columns provide the raw difference, estimated EMA impact and base level, all split by sex. The raw differences are the initial gaps in each outcome between the pilots and controls without controlling for any characteristics. These differences are all small and statistically insignificant. This is perhaps unsurprising given that by design these pilot and control areas were quite similar to each other. The base levels provide the average value of the outcome of interest across the whole sample of pupils under analysis. For indicator variables such as whether or not an individual is in full-time education this is the proportion of individuals for which that indicator is true.

The first base level in the Table 1a indicates that 68.1 percent of females in the sample (Year 1 pilot and control areas) had stayed on in full-time education at age 16, while the corresponding raw difference reveals that female participation at 16 was 0.9 percentage points higher in the pilot areas than in the controls. The estimated impact for this group is +0.022, that is, we find that the EMA increased female full-time participation at 16 by 2.2 percentage points in the pilot LEAs. This impact is statistically significant at the 5 percent level. We find an impact of a similar magnitude – 2.1 percentage points – on female participation at age 17, but that estimated effect is less precisely measured and is therefore not significant at the 5 percent level.

Elsewhere, while we generally find positive rather than negative point estimates of the impact of the EMA these are typically small in magnitude and most are not statistically significant. There is no statistically significant evidence that it increased the attainment of females in the initial pilot areas. For males, we cannot find any evidence that the EMA increased participation rates but we do find a small, yet statistically significant, increase (1.2 percentage points) in attainment at Level 3 by age 18. This is accompanied by an increase in average KS5 scores of around 5.0 points, which corresponds to an improvement in A Level performance of around 8.9 percent on the base level of 56.7 points.[4] The results for males imply that while the introduction of the EMA did not seem to increase the participation rate among males, it led to an improvement in the academic performance of those who had chosen to stay on post-16.

[3] Except rural LEAs and LEAs not used in the main quantitative evaluation; see Appendix C.

[4] Strictly speaking, this calculation does not compare like with like since the estimated impact is the average effect across pilot areas whereas the base reported is the average level across the whole sample (pilot and control areas). However the choice of an appropriate base is not clear and this calculation provides a reasonable approximation.

Table 1b repeats the above analysis across England, by comparing all the pilot areas that received the EMA in 1999 or 2000 with the rest of the country.[5] All the raw differences among both males and females are strongly negative. This is unsurprising given that the EMA was piloted in areas with higher levels of deprivation than seen in the rest of England. The table indicates that pupils in EMA areas were around 4.0 percentage points less likely to be in post-16 education than pupils in the rest of England; furthermore, those in the pilot areas were about 8.0 percentage points less likely to gain the qualifications necessary to meet the Level 2 and 3 thresholds.

These differences are very large – to put them into context, for example, only 42 percent of females and 32 percent of males achieved the Level 3 threshold by age 18. In terms of A Level attainment, the raw deficit at Key Stage 5 in EMA areas was roughly equivalent to performing a full grade worse in one A Level subject.

However, after controlling for the full set of observed characteristics that might contribute to participation and attainment decisions, we find positive and strongly statistically significant effects of the EMA. For females, the EMA increased full-time participation in the pilot areas by just under 3.0 percentage points at ages 16 and 17, while for males participation was 2.2 percentage points higher at 16 and 1.5 percentage points higher at 17. The impacts of the EMA on attainment are slightly weaker but still statistically significant: we find that the EMA boosted the proportion of females achieving the Level 2 and 3 thresholds by around 2.5 percentage points; with the increase in male achievement just under 2.0 percentage points.

These effects are accompanied by a corresponding increase in A Level scores at ages 18 and 19: among females, the EMA increased A Level tariffs in the pilot areas by 4.9 points at 18 5.7 points at 19, implying gains relative to the base of 4.5 and 4.9 percent respectively. Among males, Key Stage 5 tariffs in the pilot areas were 3.7 points higher at 18 and 4.0 points higher at 19, which similarly correspond to improvements of 4.7 and 4.6 percent on the base level.

[5] Except EMA(T) areas, which were excluded from all analysis; see Appendix C for details.

Table 1a. EMA impacts: Year 1 urban pilot LEAs used in main quantitative evaluation

	Females			Males		
	Raw difference	Estimated impact	Base level	Raw difference	Estimated impact	Base level
Participation						
FT education at age 16	**+0.009** (0.013)	**+0.022**** (0.009)	**0.681**	**–0.007** (0.014)	**+0.008** (0.013)	**0.604**
FT education at age 17	**+0.003** (0.015)	**+0.021*** (0.011)	**0.540**	**–0.013** (0.017)	**+0.002** (0.011)	**0.473**
Achievement						
Level 2 by age 18	**–0.000** (0.022)	**+0.016** (0.013)	**0.629**	**–0.016** (0.022)	**–0.002** (0.012)	**0.524**
Level 2 by age 19	**–0.003** (0.022)	**+0.011** (0.013)	**0.667**	**–0.020** (0.022)	**–0.001** (0.012)	**0.573**
Level 3 by age 18	**–0.004** (0.022)	**+0.008** (0.007)	**0.342**	**+0.000** (0.016)	**+0.012**** (0.004)	**0.248**
Level 3 by age 19	**–0.003** (0.023)	**+0.012** (0.007)	**0.398**	**–0.012** (0.016)	**+0.007** (0.005)	**0.311**
KS5 points by 18	**+0.498** (6.406)	**+4.828** (3.015)	**80.994**	**+1.117** (4.797)	**+5.032**** (2.013)	**56.743**
KS5 points by 19	**–0.131** (6.490)	**+4.948*** (2.810)	**88.658**	**+0.043** (5.069)	**+4.465**** (1.956)	**64.036**
Sample size	*45,789*	*44,948*		*47,098*	*46,692*	

Notes: Statistical significance denoted by * for the 10% level, ** for the 5% level, and *** for the 1% level. The numbers in brackets are standard errors, which allow for clustering at the LEA level.

Table 1b. EMA impacts: Year 1 and Year 2 pilot LEAs

	Females			Males		
	Raw difference	Estimated impact	Base level	Raw difference	Estimated impact	Base level
Participation						
FT education at age 16	**–0.039***** (0.009)	**+0.029***** (0.009)	**0.734**	**–0.037***** (0.010)	**+0.022***** (0.008)	**0.658**
FT education at age 17	**–0.052***** (0.010)	**+0.027***** (0.008)	**0.600**	**–0.043***** (0.010)	**+0.015**** (0.007)	**0.520**
Achievement						
Level 2 by age 18	**–0.076***** (0.009)	**+0.025***** (0.006)	**0.698**	**–0.083***** (0.009)	**+0.020***** (0.006)	**0.587**
Level 2 by age 19	**–0.070***** (0.008)	**+0.025***** (0.006)	**0.730**	**–0.078***** (0.009)	**+0.018***** (0.006)	**0.629**
Level 3 by age 18	**–0.093***** (0.010)	**+0.024***** (0.005)	**0.423**	**–0.085***** (0.009)	**+0.018***** (0.004)	**0.318**
Level 3 by age 19	**–0.079***** (0.011)	**+0.029***** (0.005)	**0.481**	**–0.079***** (0.010)	**+0.016***** (0.005)	**0.382**
KS5 points by 18	**–31.541***** (3.620)	**+4.871**** (2.137)	**107.843**	**–26.191***** (3.092)	**+3.680**** (1.702)	**78.583**
KS5 points by 19	**–28.576***** (3.773)	**+5.671***** (2.157)	**116.391**	**–24.078***** (3.370)	**+4.015**** (1.813)	**86.911**
Sample size	*507,091*	*501,529*		*523,439*	*517,571*	

Notes: Statistical significance denoted by * for the 10% level, ** for the 5% level, and *** for the 1% level. The numbers in brackets are standard errors, which allow for clustering at the LEA level.

Subgroup results

After estimating the overall EMA pilot impacts for men and women, we split up the data along several other dimensions – cohort, ethnic group, local deprivation level, FSM eligibility and prior ability – in order to see how the EMA impact varies by each of these categories. For the purposes of this analysis, the estimates we present are based on the same sample as that used to produce Table 1b: Year 1 and Year 2 pilot areas compared to the rest of England.

Table 2 presents the EMA impacts broken down by cohort. Under each sex, the first column contains the EMA effects across pupils in pilot LEAs who were in Year 11 in the 2001/2002 academic year; the second column provides the same but for the following crop of Year 11 pupils in 2002/2003. Given the sex, none of the estimated impacts from 2001/2002 is statistically different from the corresponding impact in 2002/2003, meaning that the effect of the EMA pilots on all of our outcomes of interest remained relatively constant over the period in question. As a result the impacts in Table 2 are similar to those presented in Table 1b, which are effectively an average effect across both cohorts.

Table 3a presents the estimated EMA impacts broken down by ethnicity, which, for simplicity, have been aggregated into three categories using the most prevalent ethnicities in the data. For white males and females, the impacts on participation are quite similar to the overall participation effects presented in Table 1b, which is not surprising since white pupils constitute over 80 percent of the population in question. These are again of the magnitude of 2.0–2.5 percentage points.

For Asian males and females, however, we do not find any statistically significant effect of the EMA on post-16 participation. This may be due the base levels – a high proportion of Asian pupils already stay on in 16 and 17, leaving less scope for a noticeable effect – or cultural issues around awareness of and applying for the EMA. We also do not find any effect of the EMA on black male participation.

Intriguingly, for black females we find no participation effect at 16 but a strong and statistically significant effect (4.7 percentage points) at 17. Together, this implies that either a higher proportion of the black females participating at 16 continued in education at 17, or that some of the black females who left school at 16 returned to education a year later to take advantage of the EMA. To investigate this further, we look at the EMA's effect on both of these outcomes separately, the results of which are contained in Table 3b below.

Table 2. EMA impacts by cohort

	Females		Males	
	2001/2002	2002/2003	2001/2002	2002/2003
Participation				
FT education at age 16	**+0.029*****	**+0.030*****	**+0.024*****	**+0.020****
	(0.008)	(0.011)	(0.008)	(0.009)
Base level	0.737	0.734	0.664	0.655
FT education at age 17	**+0.031*****	**+0.024*****	**+0.016***	**+0.014***
	(0.009)	(0.008)	(0.008)	(0.008)
Base level	0.589	0.613	0.515	0.527
Achievement				
Level 2 by age 18	**+0.023*****	**+0.027*****	**+0.016****	**+0.023*****
	(0.006)	(0.006)	(0.006)	(0.007)
Base level	0.689	0.709	0.577	0.599
Level 2 by age 19	**+0.024*****	**+0.026*****	**+0.015****	**+0.019*****
	(0.006)	(0.006)	(0.006)	(0.006)
Base level	0.723	0.740	0.620	0.641
Level 3 by age 18	**+0.024*****	**+0.024*****	**+0.019*****	**+0.017*****
	(0.006)	(0.006)	(0.005)	(0.005)
Base level	0.417	0.432	0.317	0.322
Level 3 by age 19	**+0.028*****	**+0.029*****	**+0.016*****	**+0.016*****
	(0.006)	(0.006)	(0.005)	(0.005)
Base level	0.476	0.488	0.380	0.387
Key Stage 5 points by 18	**+4.711****	**+4.938****	**+3.178***	**+4.007****
	(2.294)	(2.273)	(1.884)	(1.730)
Base level	108.044	108.466	79.039	78.868
Key Stage 5 points by 19	**+5.811****	**+5.406****	**+3.711***	**+4.136****
	(2.309)	(2.273)	(2.010)	(1.850)
Base level	117.123	116.512	87.871	86.752
Sample size	*243,536*	*257,857*	*251,702*	*265,140*

Notes: Statistical significance denoted by * for the 10% level, ** for the 5% level, and *** for the 1% level. The numbers in brackets are standard errors, which allow for clustering at the LEA level.

Table 3a. EMA impacts by ethnic group

	Females			Males		
	White	Asian	Black	White	Asian	Black
Participation						
FT education at 16	**+0.029*** **	**+0.017**	**+0.005**	**+0.024*** **	**–0.007**	**+0.022**
	(0.008)	(0.013)	(0.020)	(0.008)	(0.013)	(0.016)
Base level	0.728	0.828	0.768	0.645	0.812	0.712
FT education at 17	**+0.026*** **	**+0.013**	**+0.047** **	**+0.017** **	**–0.013**	**+0.012**
	(0.008)	(0.015)	(0.019)	(0.007)	(0.017)	(0.017)
Base level	0.589	0.737	0.630	0.505	0.697	0.556
Achievement						
Level 2 by age 18	**+0.019*** **	**+0.021** **	**+0.057*** **	**+0.014** **	**+0.025*** **	**+0.033** **
	(0.006)	(0.009)	(0.018)	(0.006)	(0.007)	(0.016)
Base level	0.698	0.763	0.638	0.589	0.649	0.480
Level 2 by age 19	**+0.019*** **	**+0.020** **	**+0.052*** **	**+0.012***	**+0.010**	**+0.025**
	(0.006)	(0.010)	(0.017)	(0.006)	(0.008)	(0.016)
Base level	0.730	0.797	0.681	0.631	0.691	0.529
Level 3 by age 18	**+0.021*** **	**+0.024** **	**+0.055*** **	**+0.015*** **	**+0.025** **	**0.027** **
	(0.005)	(0.012)	(0.015)	(0.004)	(0.010)	(0.013)
Base level	0.423	0.501	0.331	0.320	0.374	0.199
Level 3 by age 19	**+0.022*** **	**+0.043*** **	**+0.062*** **	**+0.010** **	**+0.031*** **	**+0.026***
	(0.006)	(0.011)	(0.018)	(0.005)	(0.008)	(0.014)
Base level	0.475	0.615	0.428	0.377	0.502	0.293
KS5 points by 18	**+3.815***	**+4.150**	**+15.047*** **	**+2.663**	**+8.610** **	**+10.872*** **
	(2.150)	(3.794)	(3.571)	(1.747)	(3.581)	(2.783)
Base level	108.329	127.998	70.844	79.410	93.372	39.807
KS5 points by 19	**+4.316***	**+8.632** **	**+16.060*** **	**+2.900**	**+10.199*** **	**+10.343*** **
	(2.204)	(4.344)	(4.167)	(1.860)	(3.610)	(3.269)
Base level	115.089	153.518	85.937	85.954	119.753	52.493
Sample size	*417,501*	*32,767*	*15,234*	*429,430*	*34,535*	*15,036*

Notes: Statistical significance denoted by * for the 10% level, ** for the 5% level, and *** for the 1% level. The numbers in brackets are standard errors, which allow for clustering at the LEA level.

Table 3b. Breakdown of the age-17 participation effect for black females

	FT participation at both 16 and 17	FT participation at 17 but not at 16	Overall FT participation at 17
EMA impact	**+0.041****	**+0.006**	**+0.047****
	(0.019)	(0.009)	(0.019)
Base level	0.581	0.049	0.630
Sample size	*15,234*	*15,234*	*15,234*

Notes: Statistical significance denoted by * for the 10% level, ** for the 5% level, and *** for the 1% level. The numbers in brackets are standard errors, which allow for clustering at the LEA level.

The first two columns in Table 3b present the impacts on each of these subsidiary outcomes, while the final column reiterates the overall participation effect at age 17 (0.047), as found in Table 3a. Since one of these outcomes must be true for every individual participating in full-time education at age 17, the impact and base level in the first two columns sum to the corresponding entry in the third column. From Table 3b, it emerges that the EMA reduced the probability of dropping out of education at 17 by around 4.0 percentage points. Hence almost all of the overall participation effect at age 17 is accounted for by increased retention. In other words, while black females were not more likely to stay in full-time education at 16 as a result of the EMA, those that had chosen to stay on at 16 were significantly more likely to continue at 17.

Returning to Table 3a, we find significant impacts on achievement among females, particularly those of Asian and black origin. For white females, the introduction of the EMA led to an increase of around 2.0 percentage points full Level 2 and Level 3 attainment. These effects are slightly lower than the headline figures in Table 1b, and are compensated for by the stronger effects for ethnic minority females. Asian females were around 2.0 percentage points more likely to have met the Level 2 thresholds, while black females were over 5.0 percentage points more likely to do so. Furthermore, by the age of 19, Asian females were 4.3 percentage points more likely to have achieved the full Level 3 threshold while black females were 6.2 percentage points more likely to do so. These achievement gains seem to have arisen through the academic route: by age 19, the EMA increased the average A Level scores of these two groups by around 8.6 points and 16.1 points respectively. As previously, given the respective base levels for these outcomes, the impacts imply that academic attainment by 19 was increased by around 5.6 percent among Asian females and 18.7 percent among black females. In comparison, there was no statistically significant (at the 5 percent level) impact on the academic attainment of white females.

Repeating the attainment analysis for males of different ethnic groups, we find stronger impacts on achievement among both Asian and black males than among white males at age 18. Asian males were 2.5 percentage points more likely to reach full Level 2 and Level 3, while black males were 3.3 and 2.7 percentage points more likely to reach the same thresholds. For white males, the EMA increased the likelihood of reaching these thresholds by 1.4 and 1.5 percentage points, respectively. The stronger increases in attainment for Asians and blacks are also reflected in the KS5 impacts. By age 18 the KS5 tariffs were 8.6 points higher for Asian males, representing a 9.2 percent improvement on the base. Even more impressive is the impact among black s males – KS5 tariffs for this subgroup were 10.9 points higher, which roughly translates into a one-grade improvement in an AS Level subject across all black males in the pilot areas. It also represents a very strong improvement on the base level, of 27.3 percent.

We now turn to analysing the impact of the EMA across different levels of local-area deprivation, as detailed in Tables 4a (females) and 4b (males). The five columns in each table refer to quintiles of the national IMD[6] distribution; the higher the IMD score, the more deprived an area is. In other words, the first column contains the results for pupils in the most affluent fifth of English neighbourhoods, while the last column contains the results for pupils in the most deprived fifth. Interestingly, there is evidence that some females – and, to a lesser extent, males – in the wealthiest neighbourhoods benefited from and responded to the EMA. Since the IMD only measures neighbourhood-level deprivation, we infer that a number of low-income households still exist in otherwise upscale areas.

Pupils in the second and third IMD quintiles were not generally likely to qualify for EMA receipt; therefore it is not surprising that their participation and achievement levels are not greatly affected by the EMA. Instead, Tables 4a and 4b show that the impact of the EMA was concentrated among pupils in the most deprived 40 percent of neighbourhoods. For the very most disadvantaged females, in the fifth column on Table 4a, the EMA increased participation in full-time education at age 16 by 3.7 percentage points, and by 3.1 percentage points at age 16. The impacts are slightly weaker among females in the fourth IMD quintile, at just under 3.0 percentage points. But both subgroups saw statistically significant increases in Level 2 and Level 3 attainment: by age 19, females in the fourth IMD quintile were 2.1 percentage points more likely to meet the Level 3 threshold, while females in the top IMD quintile were 2.4 percentage points to do so. Average A Level tariffs were also significantly higher among this latter group, with a 4.7 point increase in raw KS5 tariffs which corresponds to an improvement of 8.1 percent on the base level.

[6] Index of Multiple Deprivation
(http://www.neighbourhood.gov.uk/page.asp?id=1057)

Table 4a. EMA impacts by IMD deprivation level: females

	Bottom quintile (least deprived)	2nd quintile	3rd quintile	4th quintile	Top quintile (most deprived)
Participation					
FT education at 16	**+0.013***	**+0.007**	**+0.016****	**+0.029*****	**+0.037*****
	(0.007)	(0.008)	(0.008)	(0.009)	(0.013)
Base level	0.841	0.795	0.751	0.697	0.622
FT education at 17	**+0.016****	**+0.009**	**+0.004**	**+0.028*****	**+0.031****
	(0.008)	(0.009)	(0.008)	(0.008)	(0.013
Base level	0.746	0.677	0.614	0.543	0.463
Achievement					
Level 2 by age 18	**+0.000**	**+0.006**	**+0.006**	**+0.014****	**+0.018****
	(0.005)	(0.007)	(0.006)	(0.006)	(0.007)
Base level	0.855	0.792	0.730	0.640	0.525
Level 2 by age 19	**–0.001**	**+0.003**	**+0.007**	**+0.013****	**+0.017****
	(0.005)	(0.006)	(0.006)	(0.005)	(0.007)
Base level	0.875	0.819	0.761	0.679	0.568
Level 3 by age 18	**+0.024*****	**+0.017****	**+0.010**	**+0.014****	**+0.017*****
	(0.007)	(0.008)	(0.007)	(0.006)	(0.006)
Base level	0.629	0.528	0.442	0.342	0.235
Level 3 by age 19	**+0.019*****	**+0.015***	**+0.011***	**+0.021*****	**+0.024*****
	(0.007)	(0.008)	(0.007)	(0.007)	(0.007)
Base level	0.677	0.583	0.501	0.404	0.297
KS5 points by 18	**+7.870***	**+3.017**	**+0.740**	**+2.230**	**+3.789****
	(3.987)	(3.517)	(2.806)	(2.202)	(1.677)
Base level	179.303	140.600	110.070	78.897	48.908
KS5 points by 19	**+8.325****	**+4.881**	**+1.559**	**+3.537**	**+4.687*****
	(3.820)	(3.668)	(2.819)	(2.272)	(1.724)
Base level	187.707	148.974	118.594	87.519	57.651
Sample size	*95,798*	*91,911*	*95,073*	*100,720*	*116,363*

Notes: Statistical significance denoted by * for the 10% level, ** for the 5% level, and *** for the 1% level. The numbers in brackets are standard errors, which allow for clustering at the LEA level.

Table 4b. EMA impacts by IMD deprivation level: males

	Bottom quintile (least deprived)	2nd quintile	3rd quintile	4th quintile	Top quintile (most deprived)
Participation					
FT education at 16	**+0.019****	**+0.008**	**+0.011**	**+0.031*****	**+0.019***
	(0.008)	(0.008)	(0.008)	(0.010)	(0.012)
Base level	0.784	0.714	0.668	0.609	0.547
FT education at 17	**+0.014**	**+0.007**	**+0.006**	**+0.023*****	**+0.009**
	(0.009)	(0.008)	(0.008)	(0.008)	(0.011)
Base level	0.667	0.585	0.525	0.457	0.401
Achievement					
Level 2 by age 18	**+0.007**	**+0.005**	**+0.002**	**+0.017****	**+0.011**
	(0.007)	(0.006)	(0.007)	(0.007)	(0.007)
Base level	0.764	0.685	0.614	0.512	0.409
Level 2 by age 19	**+0.003**	**+0.006**	**–0.001**	**+0.015****	**+0.008**
	(0.007)	(0.005)	(0.007)	(0.007)	(0.007)
Base level	0.795	0.724	0.656	0.559	0.458
Level 3 by age 18	**+0.017***	**+0.018*****	**+0.006**	**+0.016*****	**+0.013*****
	(0.010)	(0.006)	(0.005)	(0.005)	(0.004)
Base level	0.508	0.408	0.329	0.238	0.154
Level 3 by age 19	**+0.013**	**+0.009**	**+0.004**	**+0.015*****	**+0.009****
	(0.009)	(0.007)	(0.006)	(0.005)	(0.005)
Base level	0.570	0.474	0.396	0.302	0.215
KS5 points by 18	**+6.540***	**+1.825**	**+1.564**	**+2.865***	**+2.995****
	(3.507)	(2.682)	(2.196)	(1.567)	(1.276)
Base level	137.826	103.648	79.526	53.161	31.728
KS5 points by 19	**+6.638***	**+2.066**	**+2.546**	**+3.456****	**+3.549*****
	(3.746)	(2.648)	(2.437)	(1.741)	(1.356)
Base level	146.839	112.073	87.938	61.142	39.735
Sample size	*99,959*	*95,645*	*97,886*	*104,248*	*118,573*

Notes: Statistical significance denoted by * for the 10% level, ** for the 5% level, and *** for the 1% level. The numbers in brackets are standard errors, which allow for clustering at the LEA level.

From Table 4b, the largest EMA impact on male participation was among those in fairly deprived areas instead of the most deprived ones: reading from the fourth column, the EMA led to 3.1 and 2.3 percentage point increases in participation at ages 16 and 17 respectively, and also led to increases in Level 2 and Level 3 achievement of 1.5 percentage points. By age 19, these males had A Level scores that were on average 3.5 points higher (a 5.6 percent improvement on the base).

Males in the most deprived fifth of England experienced a similar impact on KS5 tariffs, where the 3.5 point increase by age 19 represents an 8.9 percent improvement on the base. However, for all the other comes the estimated impacts are weaker and/or statistically insignificant, despite the fact that these males were the most likely to be eligible for the EMA. A potential explanation for the weaker results of these individuals may be that they are harder to reach, or they do not have the academic record required to respond effectively to the financial incentive provided by the EMA.

In order analyse the impact of the EMA along an individual-specific measure of deprivation, Table 5 presents EMA impacts by free school meal (FSM) eligibility as recorded for the relevant year. Interestingly, we observe significant effects on all outcomes among males and females in EMA areas who were *not* FSM-eligible. For non-FSM females the impacts are slightly weaker than the overall effects in Table 1b, and are compensated for by the stronger impacts on participation and Level 2 for FSM-eligible females. This is consistent with the picture that emerged from Table 4a, where the most disadvantaged females were the ones who experienced the strongest impacts.

For non-FSM males the impacts broadly mirror the overall impacts in Table 1b. The existence of statistically significant impacts for non-FSM pupils is not necessarily surprising, however, as some of them would still have been eligible for EMA payments: in Year 1 and Year 2 pilot areas, 65 percent of age-16 participants received some sort of EMA award while only 21 percent of them had been eligible for FSM while in Year 11.

FSM-eligible females generally responded more to the EMA – being more likely to be eligible for it if they did stay in full-time education – than their non-FSM counterparts, with participation and Level 2 attainment both driven up by around 3.0 percentage points in the pilot areas. But the impacts on Level 3 and A Level attainment, while statistically significant, are weaker for FSM females than for non-FSM females, perhaps reflecting the increased challenge of these qualifications and the poorer previous academic record that FSM-eligible pupils are likely to have. An alternative possible explanation could be FSM females, being from poorer backgrounds, may have been more likely to engage in part-time work during term, thereby restricting the amount of time available to spend studying.

Meanwhile, the effects for FSM-eligible males are significant for only one outcome, Level 2 attainment by age 18, which rose by 1.7 percentage points. The remaining impacts are smaller than for non-FSM males and not significant at the 5 percent level. As above, this may be due to part-time work commitments or because males who are FSM-eligible tend to be less well-placed academically to continue their education beyond 16.

This pattern is consistent with the conclusion that emerged from Table 4b, where it appeared that the very most disadvantaged males responded less to the EMA than some of their counterparts.

Table 5. EMA impacts by FSM eligibility

	Females		Males	
	Non-FSM	FSM	Non-FSM	FSM
Participation				
FT education at age 16	**+0.025*** **	**+0.033** **	**+0.021*** **	**+0.014**
	(0.008)	(0.014)	(0.008)	(0.013)
Base level	0.758	0.601	0.680	0.533
FT education at age 17	**+0.025*** **	**+0.027** **	**+0.018** **	**–0.009**
	(0.007)	(0.012)	(0.007)	(0.011)
Base level	0.629	0.436	0.544	0.383
Achievement				
Level 2 by age 18	**+0.019*** **	**+0.030*** **	**+0.016*** **	**+0.017** **
	(0.005)	(0.008)	(0.006)	(0.008)
Base level	0.740	0.456	0.629	0.344
Level 2 by age 19	**+0.019*** **	**+0.028*** **	**+0.015*** **	**+0.010**
	(0.005)	(0.009)	(0.006)	(0.008)
Base level	0.771	0.499	0.670	0.390
Level 3 by age 18	**+0.022*** **	**+0.019*** **	**+0.018*** **	**+0.008** *
	(0.005)	(0.006)	(0.005)	(0.004)
Base level	0.465	0.182	0.353	0.117
Level 3 by age 19	**+0.026*** **	**+0.027*** **	**+0.015*** **	**+0.008**
	(0.006)	(0.008)	(0.005)	(0.006)
Base level	0.522	0.243	0.418	0.172
Key Stage 5 points by 18	**+4.335** *	**+2.809** *	**+3.695** **	**+0.821**
	(2.332)	(1.496)	(1.861)	(0.925)
Base level	120.286	36.279	88.094	23.202
Key Stage 5 points by 19	**+5.253** **	**+3.718** **	**+4.219** **	**+0.794**
	(2.358)	(1.815)	(1.986)	(1.246)
Base level	128.848	44.752	96.580	30.769
Sample size	*429,493*	*71,394*	*443,691*	*73,292*

Notes: Statistical significance denoted by * for the 10% level, ** for the 5% level, and *** for the 1% level. The numbers in brackets are standard errors, which allow for clustering at the LEA level.

The final subgroup analysis we conduct is by prior academic ability as measured by achievement at age 11. Using the linked Key Stage 2 records, we calculate a Key Stage 2 level for each individual, and use quintiles of this variable to split the data up into five equally-sized ranks. Tables 6a and 6b contain the results of this analysis for males and females respectively.

According to Table 6a, female participation rose regardless of prior ability following the introduction of the EMA, with statistically significant gains at 16 of 2.0 percentage points or above in each of the bottom four quintiles, and a 1.7 percentage point increase among those in the top quintile. The impact is greatest amongst the lowest-achieving fifth of females (3.9 percentage points), diminishing as one moves up the ability distribution. In the top quintile the effect is more than halved; this reduction is to be expected since 90.5 percent of high-achieving females participated at 16, leaving less room for improvement than in other quintiles. At age 17 the impact on the highest-achieving females is larger, at 2.9 percentage points, while the impact on the lowest achievers is smaller and not statistically significant. This perhaps reflects the greater difficulty involved in continuing in education at both 16 and 17, which may lie beyond the lowest achievers.

Attainment impacts at Level 2 among females are concentrated in the bottom 60 percent of the (prior) ability distribution, and hover around 2.0 percentage points. In the fourth quintile the effect is smaller at around 1.4 percent points, while for females in the top quintile – of whom 97 percent achieved Level 2 – it is negligible and statistically insignificant. Attainment of the full Level 3 is more difficult to achieve, hence the impacts on Level 3 attainment follow a reversed pattern: they are smallest in the bottom quintile, where only a tenth of females achieve Level 3 by 18, whereas stronger and significant impacts are distributed across the remaining 80 percent of the distribution. The impacts are of the magnitude of 2.0 to 3.0 percentage points, with no clear or consistent pattern in how they spread across the quintiles.

The effects on A Level tariffs broadly mirror this trend, being weakest amongst the lowest prior achievers and then largely distributed across the remaining four quintiles. However, while the absolute impact by age 19 on KS5 tariffs is smallest amongst the lowest-achieving females, at around 2.4 points, the relative impact it represents is still quite strong – 13 percent of the base level. In comparison, the 4.6 point increase for females in the middle Key Stage 2 quintile represents a gain of 4.8 percent on the base level. Furthermore, the estimated impacts for females in the top two quintiles are imprecisely measured, and therefore not statistically significant.

For males, the impacts on participation at 16 and 17 are significant outside the bottom KS2 quintile, peaking around the third and fourth quintiles of the prior ability distribution. Males in the middle quintile enjoyed a 2.6 percentage point increase in participation at 16 and a 3.3 percentage point increase in participation at 17. The stronger impacts may indicate that students with moderate academic credentials are more marginal in their decision to participate or not; they are therefore more likely to change their participation status in response to the EMA's financial incentive. In contrast, the effect among males in the top fifth of the ability distribution is much smaller at just over 1

percentage point, probably because the overwhelming majority of this group expect to participate in post-compulsory education anyway. This group also experienced no statistically significant impact on their Level 2 attainment as a result of the introduction of the EMA, most likely due to the fact that 95 percent of them had achieved it. For the marginal students described above, though, there are statistically significant effects on Level 2 attainment: those in the middle quintile, for example, were 2.1 percentage points more likely to achieve Level 2 by 18 and 1.6 percentage points more likely to achieve it by 19.

Achievement at A Levels and Level 3 more generally presents a greater challenge, which would explain why the impacts on these outcomes are concentrated in the top three-fifths of the ability distribution. The males in this range of KS2 achievement experienced an increase in the likelihood of full Level 3 attainment of around 2 to 2½ percentage points, as is the case in the middle quintile. In the top quintile, the impacts are slightly weaker: 2.1 percentage points at age 18 and 1.7 percentage points at age 19. The effects on total A Level scores closely parallel those presented for females: among the more marginal students it is around 4.5 points by age 19, which represents an improvement on the base of 6.6 percent for males in the middle KS2 quintile and 3.8 percent for males in the fourth KS2 quintile. For the most able males our central estimate of the impact is even higher, but, as with the most able females, it is relatively imprecise and therefore not statistically significant.

Table 6a. EMA impacts by prior achievement (Key Stage 2): females

	Bottom quintile (least able)	2nd quintile	3rd quintile	4th quintile	Top quintile (most able)
Participation					
FT education at 16	**+0.039*** **	**+0.036*** **	**+0.029*** **	**+0.023*** **	**+0.017** **
	(0.013)	(0.013)	(0.010)	(0.008)	(0.007)
Base level	0.564	0.673	0.757	0.833	0.905
FT education at 17	**+0.018**	**+0.032*** **	**+0.025** **	**+0.034*** **	**+0.029*** **
	(0.011)	(0.011)	(0.010)	(0.009)	(0.007)
Base level	0.380	0.501	0.612	0.720	0.849
Achievement					
Level 2 by age 18	**+0.021** **	**+0.024*** **	**+0.020*** **	**+0.014** **	**+0.001**
	(0.009)	(0.009)	(0.007)	(0.006)	(0.003)
Base level	0.383	0.607	0.774	0.891	0.968
Level 2 by age 19	**+0.021** **	**+0.024*** **	**+0.021*** **	**+0.013** **	**+0.001**
	(0.010)	(0.009)	(0.006)	(0.005)	(0.003)
Base level	0.453	0.654	0.802	0.903	0.971
Level 3 by age 18	**+0.008** **	**+0.021*** **	**+0.023*** **	**+0.032*** **	**+0.026*** **
	(0.004)	(0.006)	(0.008)	(0.008)	(0.007)
Base level	0.099	0.266	0.439	0.610	0.802
Level 3 by age 19	**+0.014** **	**+0.033*** **	**+0.025*** **	**+0.028*** **	**+0.025*** **
	(0.006)	(0.007)	(0.008)	(0.007)	(0.007)
Base level	0.174	0.346	0.503	0.657	0.829
KS5 points by 18	**+1.509***	**+4.897*** **	**+3.964***	**+4.307**	**+5.899**
	(0.860)	(1.513)	(2.248)	(3.386)	(4.942)
Base level	12.678	42.547	87.240	152.222	268.304
KS5 points by 19	**+2.358** **	**+5.396*** **	**+4.617** **	**+4.931**	**+7.194**
	(1.192)	(1.726)	(2.239)	(3.268)	(4.879)
Base level	18.117	49.907	95.921	162.383	279.317
Sample size	*82,313*	*86,733*	*88,446*	*90,361*	*89,929*

Notes: Statistical significance denoted by * for the 10% level, ** for the 5% level, and *** for the 1% level. The numbers in brackets are standard errors, which allow for clustering at the LEA level.

Table 6b. EMA impacts by prior achievement (Key Stage 2): males

	Bottom quintile (least able)	2nd quintile	3rd quintile	4th quintile	Top quintile (most able)
Participation					
FT education at 16	**+0.023***	**+0.024****	**+0.026****	**+0.028*****	**+0.012****
	(0.013)	(0.012)	(0.011)	(0.008)	(0.005)
Base level	0.472	0.584	0.686	0.787	0.893
FT education at 17	**–0.001**	**+0.020****	**+0.033*****	**+0.025*****	**+0.015****
	(0.012)	(0.010)	(0.009)	(0.008)	(0.006)
Base level	0.311	0.414	0.528	0.657	0.823
Achievement					
Level 2 by age 18	**+0.011**	**+0.015***	**+0.021****	**+0.014****	**–0.001**
	(0.007)	(0.009)	(0.008)	(0.006)	(0.003)
Base level	0.273	0.483	0.667	0.825	0.946
Level 2 by age 19	**+0.005**	**+0.013***	**+0.016***	**+0.011***	**–0.001**
	(0.008)	(0.008)	(0.008)	(0.006)	(0.003)
Base level	0.343	0.547	0.709	0.846	0.952
Level 3 by age 18	**+0.008*****	**+0.012****	**+0.025*****	**+0.029*****	**+0.021*****
	(0.003)	(0.005)	(0.007)	(0.008)	(0.007)
Base level	0.052	0.168	0.316	0.500	0.743
Level 3 by age 19	**+0.005**	**+0.012****	**+0.020*****	**+0.021****	**+0.017*****
	(0.004)	(0.006)	(0.007)	(0.008)	(0.006)
Base level	0.115	0.251	0.396	0.565	0.784
KS5 points by 18	**+1.289****	**+1.776**	**+3.973****	**+6.141****	**+6.247**
	(0.521)	(1.156)	(1.808)	(2.689)	(4.242)
Base level	7.104	26.329	58.590	113.875	234.726
KS5 points by 19	**+1.484***	**+2.499***	**+4.463****	**+4.777***	**+6.622**
	(0.832)	(1.399)	(1.933)	(2.842)	(4.327)
Base level	11.500	33.174	67.355	125.225	247.337
Sample size	*92,785*	*88,303*	*86,503*	*84,518*	*85,090*

Notes: Statistical significance denoted by * for the 10% level, ** for the 5% level, and *** for the 1% level. The numbers in brackets are standard errors, which allow for clustering at the LEA level.

Conclusion

This study has had two main aims: firstly, to support previous research into the impacts of the EMA pilots on participation; secondly, to extend the body of research by examining the impact of the pilots on attainment, and breaking down all the impacts for different groups of young people.

Our overall participation analysis of the Year 1 (and Year 2) pilots provides mixed results, with no consistent story appearing except that our estimates are generally weaker than the ones found in previous studies. We provide some potential explanations for this discrepancy in the Summary but concede that where differences arise, previous research that used individual-level survey data should take precedence. This is because evaluations based on survey data are able to control for parental education and EMA eligibility in ways that are not possible with the administrative data we have used. In any case the differences between the estimates presented here and those presented in previous research are generally not statistically significantly different.

The faults of administrative data in this respect are, however, offset by its strengths: tracking an entire cohort of pupils facilitates the subgroup analysis we have conducted, and the much lower risk of attrition has enabled us to record detailed attainment outcomes up to three years after the end of secondary school. Such information was not available in the survey data used in previous evaluations. In this report we are therefore able to supplement previous analysis with some key findings on attainment: in the Year 1 and Year 2 pilot areas, females were 2.5 percentage points more like to reach the Level 2 and 3 thresholds, while males were around 2.0 percentage points more likely to do so. Both males and females saw improvements in average A Level tariffs of roughly 4.5 percent of the base level.

Furthermore, combining both strengths of the data we have employed leads to one of the most striking findings of this evaluation, whereby the attainment of ethnic minorities experienced strong and significant increases in the pilot areas. Black females stand out as a case in point, with strong and significant improvements on every single indicator of attainment that we measure. The gains among black males and Asians as a whole – while perhaps slightly weaker and more sporadic – are still impressive overall.

Another positive impact that can be taken from this study is that males and females in relatively disadvantages areas did experience higher participation and attainment, and that these improvements are nontrivial relative to their base levels. For males in the most deprived areas, however, the impacts are quite sparse and weak. These individuals, along with the lowest prior achieving males and females, may represent areas where support in pre- and post-16 education needs to be strengthened further so that improvements in participation are followed by improvements in qualifications.

Appendix A: Summary statistics

	Average for 2001/2002 cohort	Average for 2002/2003 cohort	Average for 2003/2004 cohort
Outcomes of interest			
Age 16 participation dummy	0.690	0.692	0.706
Age 17 participation dummy	0.545	0.568	0.596
Level 2 reached by age 18	0.632	0.652	0.675
Level 2 reached by age 19	0.670	0.688	**N/A**
Level 3 reached by age 18	0.367	0.375	0.382
Level 3 reached by age 19	0.427	0.435	**N/A**
Key Stage 5 points by age 18	93.812	93.100	90.978
Key Stage 5 points by age 19	102.541	100.961	**N/A**
Individual characteristics			
White British ethnicity	0.827	0.798	0.811
Other White ethnicity	0.026	0.022	0.023
Black African ethnicity	0.012	0.014	0.014
Black Caribbean ethnicity	0.014	0.015	0.015
Other Black ethnicity	0.008	0.004	0.004
Bangladeshi ethnicity	0.009	0.009	0.009
Indian ethnicity	0.025	0.025	0.024
Pakistani ethnicity	0.025	0.023	0.023
Chinese ethnicity	0.004	0.004	0.004
Mixed ethnicity	0.002	0.018	0.019
Other ethnicity	0.019	0.013	0.014
FSM-eligible	0.143	0.141	0.140
English as an additional language (EAL)	0.090	0.089	0.087
Distance (km) to nearest post-16 establishment	2.241	2.265	2.254
Key Stage 2 level	4.294	4.271	4.442
Key Stage 3 level	5.474	5.564	5.578
School characteristics			
Proportion of non-white pupils	0.147	0.175	0.164
Proportion of FSM pupils	0.156	0.153	0.152
Proportion of EAL pupils	0.088	0.089	0.089
LEA characteristics			
LEA is urbanised	0.539	0.537	0.535
1998 post-16 stay-on rate	0.634	0.633	0.634
Local area characteristics			
Proportion of households with no car or van	0.253	0.254	0.254
Proportion of households owned outright	0.281	0.281	0.281
Proportion of socially rented households	0.199	0.202	0.202
Local labour market unemployment rate	0.051	0.051	0.051
Proportion of individuals with no qualifications	0.309	0.311	0.310
Proportion of individuals qualified up to Level 1	0.173	0.175	0.175
Proportion of individuals qualified up to Level 2	0.194	0.195	0.195
Proportion of individuals qualified up to Level 3	0.073	0.073	0.073
Proportion of individuals qualified up to Level 4/5	0.170	0.171	0.171
IDACI score	0.213	0.214	0.213

Appendix B: Data construction

Data sources

This analysis has made use of the following administrative data sources:

- National Pupil Database (NPD)
- Pupil Level Annual School Census (PLASC – a component of the NPD)
- Individualised Learner Record (ILR)

Year 11 pupils found in PLASC during the academic years 2001/2002 and 2002/2003 form the cohorts of interest for this analysis. Furthermore, we also employ two further releases of PLASC – 2003/2004 and 2004/2005 – to track these cohorts through years 12 and 13 respectively. PLASC also contains various characteristics about the individual pupil (sex, ethnicity, FSM eligibility, etc.), LEA and school identifiers, and the pupil's home postcode. These enable information about the pupil's LEA, school and neighbourhood to be added as controls in our analysis.

We have matched the pupils in this cohort to their NPD attainment records at Key Stages 2, 3 and 5. In addition to providing the A Level points outcome, the Key Stage 5 attainment data was also used to refine our measure of participation (explained in further detail below).

The ILR data come in the form of two datasets. The first, known as the KS45 Cumulative Indicators file, contains derived variables that link together NPD, ILR and NISVQ (National Information Systems for Vocational Qualifications) records for each pupil. This dataset was used to locate individuals and see if they were undertaking any FE at 16 or 17. It also provides the Level 2 and Level 3 attainment indicators that constitute our achievement outcomes. The second dataset is the ILR Learner Source Data file, containing FE and WBL records for each individual going through these routes. Also recorded in this file is the mode of attendance for the learning aims being undertaken – we made use of this variable as well in order to focus on full-time participation.

Defining the participation outcome

After cleaning the various datasets and merging them together, each pupil was defined as participating at age 16 if the constituent datasets contained participation information on that pupil in the academic year after they were in Year 11; participation as 17 was defined analogously according to the information available for each pupil two years after. Pupils were therefore defined as participating full-time in a given academic year if they met any of three conditions:

- They were in Year 12 in PLASC a year after they were in Year 11, or, for age-17 participation, were in Year 13 in PLASC two years after; *and* were recorded as being a full-time pupil;
- There was ILR FE information on that pupil in the year after they were in Year 11, or, for age-17 participation, two years after; *and* if the majority of their records in the ILR Learner file were classified as full-time attendance;
- There were Key Stage 5 records for that individual the year after they were in Year 11, or, for age-17 participation, two years after.

The last option follows since we presume that pupils with a post-16 A Level record must have been participating in education at that stage. Furthermore, this adjustment allowed us to potentially track pupils who switched to the independent sector at 16 and would therefore not appear in any of the other datasets (even though they were still participating). This adjustment generally increased the number of participants at 16 in our sample by roughly 5,000, and the number of participants at 17 by roughly 7,000. One final adjustment made to the participation variables was to assume that any individuals for whom no participation data existed had simply not participated at all – instead of the indicator being missing for these individuals, it was set to zero.

Defining the attainment outcome

The three attainment outcomes used in this analysis are variables that were merged in directly from the KS45 Cumulative Indicators and Key Stage 5 files. The Level 2 and 3 attainment indicators are binary, that is, they take the value 1 if an individual reached the that threshold – through any route – and 0 otherwise. Individuals in the PLASC cohorts who were not found in the KS45 Cumulative Indicators file during the relevant post-16 academic years would therefore have these variables coded as zero instead of missing.

The A Level tariff was also coded as zero (instead of missing) for individuals not found in the Key Stage 5 data over the same period. It was therefore assumed, effectively, that anyone who was not listed in the KS45 Cumulative file or the Key Stage 5 data had no post-16 achievement at all.

Appendix C: Methodology

To examine the impact of the EMA pilots, the first two cohorts (PLASC 2001/2002 and PLASC 2002/2003) were pooled together. Once the merged data for these cohorts was created, two samples were extracted from it in order to perform the analysis. Regression methods, explained below, were performed on these samples in order to estimate the effect of the EMA. The first sample – used to produce the figures in Table 1a – contained all pupils living in the non-rural original pilot and control LEAs that were used in the quantitative evaluation.

The second sample, upon which Tables 1b through 6b are based, consists of all the pupils in English LEAs, but not in EMA(T) areas – areas that implemented the transport variant are neither pilots, controls nor unaffected areas, and are therefore excluded from any analysis whatsoever). The following table clarifies the three samples used:

Table 12. Regression samples for the EMA pilots analysis

Method	Constituent pupils	Treatment group
1	Those in the Year 1 pilot and control LEAs that were used in the quantitative evaluation, except rural LEAs (Cornwall, Devon and Norfolk)	Pupils in the Year 1 pilot areas used in the evaluation, except Cornwall
2	Those in any English LEA (except EMA(T) areas)	Pupils in any of the Year 1 or Year 2 EMA pilot areas

For each sample the estimation framework is the same. We run multivariate regressions[7] to calculate the differences in our outcomes of interest between areas that received the EMA and areas that did not, while controlling on the following set of background characteristics: Key Stage 2 and Key Stage 3 achievement; ethnicity, FSM eligibility, mother tongue, and school-level proportions of these; urbanisation of LEA and historical LEA post-16 stay-on rate; IMD deprivation level (quintile) and IDACI child poverty index; Census neighbourhood-level deprivation and education characteristics; and distance to nearest sixth-form/FE establishment.

In the subgroup analysis, some of these variables are used to split the data into sub-samples, and are therefore not used in the regression

The impact of the EMA is also allowed to vary according to these characteristics, and the coefficients presented in this report are the average EMA impact across all the individuals in EMA areas.

[7] Specifically, we use fully-interacted linear matching (FILM) with common support on the treated. (http://www.ifs.org.uk/publications.php?publication_id=2712)

Appendix D: EMA receipt rates

To calculate the actual rates of EMA receipt in pilot LEAs and LEAs affected after 2004, we used total EMA take-up figures provided to us by the LSC. These record the number of people receiving EMA payments by age, payment amount and local authority. For the cohorts analysed in this report, we then calculated the total number of people receiving the EMA at age 16, and the total number receiving it a year later at age 17. For the purposes of our analysis, the PLASC 2001/2002 and PLASC 2002/2003 cohorts were pooled together; therefore we also added together the receipt figures for both cohorts to get the total number of age-16 recipients and total number of age-17 recipients.

Table 14 reports, for each sample analysed, the number of individuals who received EMA payments at age 16 (the year after Year 11) or 17 (two years after).

Table 14. Total number of individuals receiving EMA payments

Analysis type	EMA recipients at age 16	EMA recipients at age 17
Year 1 pilots	22,659	15,699
Year 1 and Year 2 pilots	137,203	103,332

To convert these figures into rates of receipt, we divided them by the size of the relevant base population our data. For the analysis of the Year 1 pilots, this is all 15-year olds in the respective PLASC Year 11 cohort who lived in Year 1 pilot areas, and analogously for the evaluation of Year 1 and Year 2 pilot areas. Table 15 lists these population sizes.

Table 15. Populations of 15-year-olds in each of the samples analysed

Analysis type	Population size
Year 1 pilots	51,338
Year 1 and Year 2 pilots	314,848

The recipient totals calculated in Table 14 were then divided by the population sizes in Table 15 to get estimates of the effective receipt rates at ages 16 and 17:

Table 16. Estimated receipt rates by age and sample

Analysis type	EMA receipt rate at 16	EMA receipt rate at 17
Year 1 pilots	0.441	0.306
Year 1 and Year 2 pilots	0.436	0.328

The figures show that in the Year 1 pilot LEAs, for example, 44 percent of the individuals we have tracked received EMA payments at age 16, while 31 percent of them received EMA payments at age 17.

As was mentioned in the Summary, the estimates produced in this document are essentially the effects of living in an area where the EMA was made available. They represent an average effect across the population of those areas, and will therefore rise (fall) if more (fewer) people receive the EMA. To isolate the effect of the EMA on those who actually did receive it, one must net out the effect of receipt rates. From Table 16, these appear to be around 40 percent at age 16 and 30 percent at age 17 for pupils in the Year 1 or Year 2 pilot areas.

The headline results (presented in Tables 1a and 1b) can therefore be 'grossed up' to give the effect of the EMA on those who received it by dividing the estimated impacts by the proportions above. As a rough rule of thumb, this amounts to multiplying the impacts by the numbers in Table 17, and doing so yields the notional figures that are presented in Table 1 alongside the actual estimated impacts.

Table 17. Approximate grossing-up factors by age and analysis

Analysis type	Multiply impacts at 16 by:	Multiply impacts at 17/18 by:
Year 1 pilots	2½	3
Year 1 and Year 2 pilots	2½	3

The key assumption here is that the EMA had no effect on those who did not take it up or were ineligible. Under this assumption, the average impacts we have presented can be thought of as the effect of the EMA on those who received it, multiplied by the proportion that receivers account for.