

Commission of Inquiry

The Effects of Adult Learning on Social and Economic Outcomes

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## **Summary**

This review considers research-based evidence on the benefits of adult learning. We focused on both economic and non-economic benefits and quantitative evidence mainly from the UK. We reviewed studies on income, employment, health, civic engagement and attitude change, educational progression and intergenerational transmission of adult education.

We found robust evidence that adult learning can impact upon employability and job prospects, but found that adult education leading to academic qualifications or higher level vocational qualifications can impact upon income and wages. We also found that adult learning can have both sustaining and transforming effects on health and health behaviours and some evidence that adult learning can promote civic engagement and change extremist attitudes in adulthood. Finally, we found evidence that adult learning begets more learning and that there could be important benefits of parental learning for their children developmental outcomes.

However, we believe that the current evidence must be analysed carefully. For all the work is based on sample sizes and on the availability of data. In this sense, most of the evidence around the economic benefits of adult learning relates to individuals at work who reported their income. This may be a more selective group than the whole population of adult learners. Secondly, there is limited information about adult learning and reasons for learning in national surveys, and usually learners are not followed over time. Hence, it has been not possible to establish the causal effects of adult learning on economic and non-economic outcomes.

The future challenge in the area of research-based evidence will be to prove the impact of adult learning on different areas of people's lives. In order to do this, current data collection should move towards an experimental design that allows comparing learners and non-learners both before and after the learning experience and in multiple contexts.

## **Introduction**

Evidence from the UK, US and many other OECD countries has shown that investments in education yield a private positive return to the owner of human capital. It has been estimated that in the UK, individuals born in 1958 who completed some form of higher education received an average wage return in 1991 that was 27% higher than for individuals with achievements in education below higher education. Compared with individuals born in 1958 who left school at age 16 without qualifications, the average wage return to those who completed O-levels by age 33 was 18%, to those who completed A-levels was 24%, and to those who completed higher education was 48% (Blundell, Dearden and Sianesi, 2003).

But the total gain from education is only partially reflected in estimates of labour market returns because they do not include social as well as other benefits of schooling. Consider, for example, the benefits to children of having better educated parents, or the benefits in terms of ones own health from being able to read, write and communicate with health practitioners. Moreover, the entire society may gain from the societal aspects of education, which can be defined as the gains to all citizens

because they live in a better educated society. Many reviews of evidence have pointed out that the non-economic benefits of education are large, perhaps as large as the economic benefits on which the traditional economic studies concentrate (Haveman and Wolfe, 1984; Grossman, 2005; Feinstein, et al. 2006).

There are good theoretical reasons why education could lead to economic and non-economic benefits and sound empirical studies, in particular in the area of economic returns to education. For example, education increases the individual's earnings capacity, the education of one partner can also increase the earning capacity of the other partner, children's cognitive and emotional development is associated with their parents schooling, children whose parents attended further education are more likely to attend further education. Better-educated people tend to be better informed about health and nutrition, are less likely to run health risks, and have better information on where to secure good medical care. Those with more schooling are less likely to smoke, less likely to be heavy drinkers, and are more likely to exercise.

However, there are two main shortcomings in the current empirical literature which form the basis of this review. The empirical evidence has focused on formal educational attainment only, without considering wider definitions of human capital investment encompassing on-the-job training, off-the-job training, experience, informal learning, and learning by doing (Sianesi and Van Reenen, 2000). Most of this learning occurs during adulthood, not only during individuals' working careers but throughout the lifecourse. Hence, the first aim is to review empirical literature on the relative roles of learning at different ages, the ways in which educational provision, in its broadest sense, can support people and communities in having lifetime experiences of learning, and the benefits of those experiences.

Secondly, due to data limitations, the empirical literature has not been able to establish the relative importance of stages of education on the achievement of economic and non-economic outcomes. In other words, it has not been possible to quantify the impact that additional learning has on outcomes over and above the impact of previous knowledge and learning. Will additional learning lead to increased productivity, higher self-esteem, better health, or more effective parenting? If so, what type of learning provision lead to more benefits to learners? Hence, the second aim is to propose an experimental design in data collection in order to address these empirical questions.

## **Review of Empirical Literature on the Benefits of Adult Learning**

This review considers evidence on the wider benefits of adult learning. These benefits can be economic, in that they are related to the labour market outcomes, as well as non-economic, covering areas of health, parenting, civic participation, attitude change, family learning, or educational progression. In this sense, the benefits of education can be divided into economic and non-economic, or simply referred to as wider benefits.

Moreover, these benefits can occur at different levels (for example at individual, family or societal level) and in multiple contexts (for example at the work place, in the family, or at school). For example, a health literacy course may improve the

individual's own health and the health of those whom they care, hence having benefits for the individual and her/his children, the benefits occurring within the family context.

In order to ease the presentation of findings, we structure our review on outcomes of adult learning. Outcomes were selected based on whether there is an important contribution of empirical studies. In particular, we only review evidence on outcomes of adult learning where there have been at least three quantitative studies, preferably published in peer-reviewed academic journals, dealing with adult learning and the outcome of interest. The following outcomes of adult learning were selected: income and wages, employment, health, civic participation, attitude change, educational progression, and intergenerational effects.

## **Income and Wages**

There is a large literature on rates of return to education. In the UK, Blundell, Dearden, Sianesi (2003) investigated the causal effect of education on income and the rate of return to education.<sup>1</sup> Blundell, Dearden, Goodman and Reed (2000) investigated the impact of higher education on wages for men and women and for mature students. Dearden, McIntosh, Myck and Vignoles (2002) and McIntosh (2004) investigated returns to academic and vocational qualifications separately, whereas Blundell, Dearden and Meghir (1996) and Feinstein, Galindo-Rueda and Vignoles (2004) researched economic returns to work-based training.

Blundell, Dearden and Sianesi (2004) provided an excellent overview of the problems faced when estimating the economic returns to education. The most common problem arises from unobserved factors such as ability and motivations, which impact upon the choice of education and also on labour market outcomes. Other problems are the heterogeneity of returns to education, missing information, and selection into employment (in particular for the case of women). Blundell, et al. estimated an average return of about 27% for men who were in employment and reported information on wages, and who completed some form of higher education compared with anything else. Compared with leaving school at age 16 without qualifications, achieving O-level yields a return of 18%, A-level 24% and higher education 48%.

Blundell, Dearden, Goodman and Reed (2000) used a more restricted sample of individuals, comprising of NCDS cohort members who had achieved at least one A-level by 1991, in their estimation of the returns to higher education. They found that returns to higher education were different for men and for women. Compared with men who achieved A-levels, the average return to a non-degree HE was 14%, to a first degree HE was 12% and to a higher degree HE was 8%. For women, these returns were 22%, 34% and 33% for non-degree HE, first degree HE and higher degree HE compared with A-levels, respectively. With regard to starting and not completing HE, the authors found that for men, starting HE but not completing yields a negative return 9% lower than for those who did not start HE. Finally, they also estimated that men who started HE over the age of 21 had 7% lower returns to HE

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<sup>1</sup> The rate of return to education is defined as the extra income earned as a result of attaining one additional year or level of education and discounted to the time of entrance into the labour market.

than men who started HE earlier. However, mature students (both men and women) had positive returns to HE compared with those who achieved only A-levels.

Returns to education have been calculated according to vocational and academic qualifications as well as individual qualifications, for men and women (Dearden, McIntosh, Vignoles and Myck, 2002). In addition, McIntosh (2004) investigated whether qualifications yield a higher return in the private or in the public sector. Dearden, et al. used 3 different datasets, the NCDS, the IALS and the LFS. Their samples include individuals with complete information on wages and qualifications. The use of three datasets has the advantage of comparability of the returns, but care must be taken as the classification of qualification changes between datasets and the controls included in the analysis also differ. Hence, differences between estimates may be due to these methodological issues.

The returns to the key academic qualifications are very similar for men and women. Compared with no qualifications, the return to a first degree ranges from 10 to 28% for men and from 21 to 26% for women; the return to A-level ranges from 15 to 18% for men and from 18 to 23% for women. Finally, the return to O-level ranges from 12 to 21% for men and from 10 to 19% for women. In general, authors found that all academic qualifications have yielded a positive return for men and for women. With respect to vocational qualifications, returns differ according to the type of qualifications typically undertaken by men and women. Thus men earn positive returns to craft-based qualifications, such as Advanced Craft City and Guilds (4 to 7%) and TEC/BTEC higher (6 to 22%), while women earn positive returns to nursing qualifications (16 to 30%) and to teaching qualifications (18 to 28%). The authors did not find differences in the returns to low level vocational qualifications, other business qualifications and apprenticeships without qualifications and the returns to no qualifications.

McIntosh used the LFS to investigate returns to qualifications while individuals are employed in the public sector or in the private sector. He found that for men, the higher academic qualifications yield a higher return in the private sector than in the public sector. For example, holding a degree raised wages by 29% in the private sector and 17% in the public sector. Similarly, other HE qualifications yield a return of 13% in the private sector and of 3% in the public sector. For women, there is little difference in the returns to academic qualifications across sectors. For vocational qualifications, the returns to teaching and nursing qualifications are higher in the public sector than in the private sector. Other higher vocational qualifications yield a higher return in the private sector for both men and women. For example, returns to HNCs/HNDs are 4% and 16% for men in the public and private sector, respectively. For women, these qualifications yield a return of 0% and 14% in the public and private sector, respectively. Although the author did not find differences between sectors for NVQ 1 and NVQ 2 qualifications, these qualifications yield a negative return for both men and women in both private and public sector.

Booth and Bryan (2004) used the Workplace Employee Relations Survey (WERS 98) to investigate the impact of highest educational qualifications on union-covered workers from workplaces with 25 or more employees in the private sector. They subdivide their population according to occupations in terms of manual and non-

manual and by gender. In accordance with other studies, they find positive returns to all academic qualifications for male and female union-covered workers in the private sector. For vocational qualifications, they only found evidence of negative returns to male workers, whereby non-manual male workers with vocational qualifications received 5% fewer returns than non-manual male workers without vocational qualifications, after controlling for academic qualifications achieved.

There are other studies investigating the economic returns to qualifications. Chevalier and Walker (2002) provided in great detail evidence on the returns to education accounting for some of the following factors: years of schooling versus qualifications achieved; impact of family background and previous ability; difference in returns between unionised and non-unionised workers; difference in returns between those working in the private and in the public sector. The authors used several UK datasets including the Family Expenditure Survey, the General Household Survey, the Family Resource Survey, the National Child Development Study, and the British Household Panel Survey. In general the authors found that returns to education are higher for women than for men, for white than for non-white, higher for non-unionised workers than to unionised workers, and that the impact of schooling is lower for low education attainment. Kim and Kim (2003) investigate the returns to higher education in the UK (as well as in Germany). Their main hypothesis tested is that the weak linkage between education and the labour market yields low returns to schooling in the UK, but that field of study is highly associated with occupational position in the UK. Their results demonstrate that British students obtain lower returns to learning than their German counterparts, and that field of study is more highly associated with socio-economic position in the British higher education system than in Germany.

In terms of adult learning, the literature has focused on economic returns to work-based training. (Blundell, Dearden and Meghir, 1996; Feinstein, Galindo-Rueda and Vignoles, 2004). Blundell, et al. (1996) uses the NCDS and a sample of employed men and women in 1991 with complete information on training, wages and qualifications. The authors showed that for the UK, a spell of employer-provided training on-the-job yields a pay-off of around 4% in the wage of men between 1981 and 1991, but not for women's wages. Off-the-job employer-provided training provides an increase of 7% on men's wage between 1981 and 1991 and of 5% for women's wage, but the latter is not statistically significant. Work-related training courses yield a positive increase to wages between 1981 and 1991 for both men and women of around 7%. They further found that only higher vocational qualification training courses, defined to be those that resulted in a recognised vocational qualification of level 4 or above, yield a positive return for men and women, 8% and 10% respectively. However, lower vocational qualification training courses did not yield a significant increase in wage growth from 1981 to 1991.

Blundell, Dearden and Meghir further find that the duration of training matters for the estimated wage increase between 1981 and 1991. For these estimates the authors were only able to estimate returns for men, due to the small number of observations for women. They found that off-the-job training with duration over a month yields a positive increase in wages of 15% whereas returns for on-the-job training with duration less than a week yield a wage increase of only 2%, which was not statistically significant. For off-the-job training, the estimated wage increase was 6%,

13% and 9% for courses with duration of less than 1 week, between 1 week and 1 month and over 1 month, respectively.

Finally, estimated wage increase was also performed for individuals with at least some basic qualifications. For this, the authors estimated the returns to training for individuals who held only O-levels. For men, on-the-job employer-provided training increased wages by 8% (whereas for the whole population the increase was 4%) and the return to higher vocational qualifications was 13% (whereas for the whole population was 8%). For women, returns to work-related training courses increased by 9% (whereas for the whole population it increased by 7%), middle vocational qualifications increased by 12% (whereas for the whole population it increased by 6%) and higher vocational qualifications increased by 14% (whereas for the whole population the increase was 10%). This means that some work-related training can have significant impact on the wage prospects of individuals with intermediate levels of qualifications.

Feinstein, et al. (2004) find that although on average work-related training does give higher wages, this hides the fact that only some workers gain from training. Male workers who undertook work-related training in mid-career (age 33-42) experienced 4 to 5% higher wage growth over the period 1991-2000, as compared to similar workers who did not undertake any training. However, workers who are selected to receive training are not representative of all workers. Rather, firms appear to identify those workers most likely to gain from training. When we took account of this, we found that workers who received training gained substantially (12 % higher wage growth over the period). However, those workers who did not receive training would not have gained higher wages from the training had they done so.

Furthermore, Booth, Francesconi and Zoega (2003) found that unionised workers received more days of training than their counterpart non-unionised workers and that unionised workers experienced a higher wage growth and greater return to training than non-unionised workers. They used data from the BHPS and a sample of full-time employed men with complete participation in the survey between 1991 and 1996. Training is self-reported and indicates whether training to improve skills was taken up in the previous 12 months. Duration of training is measured as number of days. Their results showed that union workers who receive training earn almost 10% more than workers who receive training but are not union-covered. A higher number of training days increases union workers' wages by 1% and this is only statistically significant at 10% level. Although unionised workers showed a higher wage growth, this was mainly as the result of on-the-job training activities.

For basic skills, Dearden, McIntosh and Vignoles (2001) used the NCDS to investigate the economic returns to improvements on basic skills. They tested a number of different measures of skill improvement, including whether respondents had taken a basic literacy or numeracy course, whether respondents believed that their skills had improved and whether there had been real changes in respondents' literacy and numeracy test scores between the ages of 16 and 37. They found that individuals who reported that their skills had improved generally earned more than those who did not believe that there was an improvement in their skill levels. Most of the other skill improvement measures were insignificant in the model. Males who improved their

literacy skills between the age of 16 and 37 (particularly those who started with higher level literacy skills) did subsequently earn more.

DeCoulon, Marcenaro-Guitierrez and Vignoles (2007) also investigated the economic returns to basic skills using data from the BCS70, which contains an objective measure of adult literacy and numeracy levels for the whole sample. Results using the OLS estimate with a rich set of controls, indicated that men who move from the median of the literacy (and numeracy) distribution to the 84th percentile will increase their hourly wage by 14% (and 11%). For women, these estimates are 15% and 13% for literacy and numeracy respectively. Using IV methods, they further found that the impact of basic skills on wages remains significant and its impact increases, which is consistent with an estimate of the local average treatment effect.

Estimation on the return to achieving any qualification has been calculated by Battistin and Sianesi (2006), when educational attainment is potentially misreported. The authors used data from the UK National Child Development Survey and estimated that returns to any qualification can vary between 28% and 68% depending on the misclassification of educational attainments by individuals. As a control for measurement error in reported schooling, Bonjour et al. (2002) used a sample of UK female identical twins to estimate private economic returns to education. The authors measured education as years of schooling and these were calculated from the highest qualifications reported by the twins. They found that for the females in the sample, the return to an additional year of schooling was about 7.8%, controlling for previous background factors and measurement error.

### *Summary*

There is a vast literature on the economic returns to education, in particular to educational qualifications achieved. Most of this evidence points to important wage returns for most academic qualifications, to higher level vocational qualifications, teaching and nursing, as well as other professional qualifications. We reach the following conclusions and raise the following issues:

- The causal effect of education on earnings, measured as highest qualifications achieved, is well established. Individuals who achieve academic qualifications and most of those who achieve vocational qualifications will benefit from higher earnings than those who leave schooling with none.
- Most of the evidence on the economic return to educational qualifications applies to individuals in employment, who reported earnings in national surveys.
- Therefore, these results are not generalised to individuals not in employment or those who have not reported earnings. It is likely, though, that these individuals hold very low-grade qualifications, if any at all.
- Statistical significance depends on sample sizes. When subdividing economic returns by gender, age and sector of employment, it is possible that sample sizes become relatively small. Hence, returns to some qualifications may be positive or negative but statistically insignificant due to the small sample size.

There is less evidence on the economic returns to adult learning. We found evidence of positive returns to mature HE students, to undertaking work-based learning, to employer provided on-the-job and off-the-job training and the duration of training. The following points are worth highlighting:

- The causal effect of adult learning is not well established. This is because of lack of experimental or quasi-experimental data collection on adult learning.
- Current longitudinal studies have been used to assess the impact of work-based training on wages for individuals in employment. For those not in employment, the impact of adult learning on earnings remains empirically unexplored.
- The review of studies indicates that some work-related training can have significant impact on the wage prospects of individuals in employment with intermediate levels of qualifications. However, these individuals are also less likely to receive training.
- Training leading to lower or middle vocational qualifications appears not to increase earnings for those individuals already in employment.
- It is not clear whether other forms of adult learning lead to wage benefits, or which forms of adult learning, from the wide provision that exists, lead to economic benefits.
- There is evidence that basic skills during adulthood have important economic returns and that improvements in basic skills during adulthood improve earnings potential.
- For many subgroups of the population, for example migrants, women from ethnic minorities and people on welfare benefits, individuals are less likely to be in employment but may benefit both economically and socially from their participation in adult education.

## **Employment**

The effect of adult learning on the likelihood of employment has been investigated by Blundell, Dearden, Goodman and Reed (2000), McIntosh (2003), Jenkins et al. (2003), and Jenkins (2006), whereas the effects of basic skills on employment probabilities was investigated by DeCoulon, Marcenaro-Gutierrez and Vignoles (2007).

Blundell et al. (2000) used the NCDS and a sample of men and women who by 1991 had achieved at least 1 or more A-levels. This sample is very different to the rest of the NCDS in that individuals with at least one A-level were more likely to have achieved high test scores during childhood, they were more likely to come from a family with higher levels of education, to have faced less financial difficulties, have a mother figure present in the household at age 16 and to have attended grammar or private school at age 16. But for this sample, men who achieved HE were equally likely to be in employment, whereas women who achieved HE were more likely to be employed (78%) than women who had only A-levels (69%).

McIntosh (2004) focused on employment-related benefits for the acquisition of vocational qualifications during adulthood using information from the UK Labour Force Survey. Data used by the author is not a panel in the sense that the same individuals were re-interviewed in consecutive years, but a pseudo-panel that assumes that the representative population of 15 year olds sampled in 1999 would be the population of 17 year olds sampled in 2001. Results show first that very few individuals who left school without qualifications at age 16 acquired high level qualifications. However, vocational qualifications at all levels were associated with increase in the probability of employment for those individuals who left schooling without qualifications. In particular, men who left school without qualifications and acquired vocational qualifications at level 1 during adulthood were 4 percentage points more likely to be employed in 2002 than men who left school without qualifications and did not acquire any further qualifications. Equivalent estimates of 10 percentage points and 12 percentage points were found for men who acquire vocational qualifications at level 2 and 3, respectively. For women, compared with women who left without qualifications and did not acquire any further qualifications, those who achieved level 1, 2 and 3 vocational qualifications were 16, 19 and 19 percentage points more likely to be employed in 2002.

According to Jenkins et al. (2003), NCDS cohort members who were engaged in learning leading to qualifications between 1991 and 2000 had a higher probability of being in employment in 2000. In particular, males who were not in employment in 1991 and who undertook occupational courses were 22 percentage points more likely to be in employment in 2000 than men who did not participate in adult learning. Women who were not in work in 1991 and who took vocational qualifications or occupational training were 19 and 12 percentage points respectively more likely to be in employment in 2000, than women who were not involved in adult learning.

Jenkins (2006) investigated the benefits of adult learning for women members of the 1958 British cohort study, who were out of work in 1991 and who subsequently made the transition into work in 2000. His measure of adult learning was the achievement of qualifications between the ages of 33 and 42 and his models allowed for the timing of the learning episode. His main finding was that learning leading to qualifications strongly influences women's transitions into employment between 1991 and 2000.

DeCoulon, Marcenaro-Guitierrez and Vignoles (2007) also investigated the employment impacts of basic skills for men and women using data from the BCS70. Results including a rich set of controls indicate that an increase in literacy basic skills is associated with a 3.5 percentage points higher probability of being in employment by age 34 for women. This is not the case for an increase in numeracy skills. For men, the opposite associations were found. An increase in men's numeracy skills is associated with a 2 percentage points higher probability of being in employment by age 34.

### *Summary*

- There are consistent results about the benefits of adult learning in terms of remaining in employment or getting a job. There is also evidence that an increase in basic skills is associated with higher probability of being in employment.

- In particular, vocational qualifications are associated with increase in the probability of employment for those individuals who left schooling without qualifications.
- For men not in employment in 1991, occupational training was associated with an increase in the probability of having a job in 2000, whereas for women not in employment in 1991, both vocational qualifications and occupational training were associated with an increased probability of being employed in 2000.

## **Health**

Health and health behaviours are important outcomes of adult learning. Feinstein and Hammond (2004) used the 1958 cohort to examine the contribution of adult learning to a wide range of health and health behaviours. Analysis was in terms of changes between the ages of 33 and 42 years in life outcomes for adults, controlling for their development and context up to age 33. This method is robust to a time-invariant confounding bias, although changes in the individual or context between the ages of 33 and 42 may bias the outcomes. Their results showed that participation in adult learning had positive effects on changes in smoking, exercise taken, and life satisfaction. Effect sizes are small in absolute terms. However, there is little change in behaviours during mid-adulthood, and relative to this baseline, participation in adult learning is an important driver for change. In addition, the effects of adult learning reflect changes in large numbers of people.

Hammond (2004) carried out a fieldwork study to investigate the impacts of adult learning upon health. She conducted in-depth biographical interviews with 145 adults about the effects of learning throughout their lives and 12 group interviews with practitioners about their perceptions of the effects of learning upon their students. She finds that participation in adult learning had effects upon a range of health outcomes; well-being, protection and recovery from mental health difficulties, and the capacity to cope with potentially stress-inducing circumstances including the onset and progression of chronic illness and disability. These effects were mediated by relatively immediate impacts of learning upon psychosocial qualities: self-esteem, self-efficacy, a sense of purpose and hope, competences, and social integration. However, not all educational experiences had positive effects upon health outcomes. Provision that generated positive health outcomes matched the interests, strengths and needs of the learner.

Further work on the area of adult learning by Hammond and Feinstein (2006) demonstrated that those who participate in adult learning have positive transformations in well-being, optimism, efficacy (perceived control over important factors) and self-rated health. This research made the link between childhood experiences of learning and development, and adult health outcomes. It then investigates how adult learning changed these earlier patterns.

The first element of the study investigated what features of school outcomes at age 16 were related to adult health, conditioning on educational attainment during childhood. Adult health outcomes investigated at age 33 were low self-efficacy (a low sense of being able to achieve what the individual is set out to achieve), self-rated health being

poor, and smoking as an indicator of health behaviour. The population was grouped according to those young adults who achieved O-levels at age 16 (roughly 50% of the 1958 British Cohort). The rest of the sample was divided into those who did not achieve O-levels but were engaged in learning and those who were not engaged in learning. Their findings showed that most negative adult health outcomes were related to disengagement from school in adolescence.

For example, results for smoking for females showed an odds ratio for those women who did not get O-levels and were disengaged from school, of 3.47. In other words, the odds of smoking for the group without qualifications who were disengaged from school during childhood were 347% higher than the odds for the group that got qualifications. Furthermore, the odds for those women who did not get qualifications but were engaged in school was not statistically different from one, which indicates a similar smoking behaviour to those who got O-level qualifications. This means that the distinction for adult health outcomes is not about who got qualifications and who did not, but who was engaged in schooling and who was not.

Hammond and Feinstein also investigated whether adult learning could transform health patterns between the ages of 33 and 42. First, they found that those disengaged from school were less likely to do adult learning. Then, the probability of having a positive transformation on health conditions or behaviours between the ages of 33 and 42 was higher for those who did adult learning compared to those who did not. The magnitudes of the associations are not very large, but they are important nevertheless. The adjusted odds for transformed well-being are between 1.2 and 1.3 times greater for those who took courses than they are for those who did not.

The impact of education on depression, as measured by highest qualifications achieved by age 33, has been investigated by Chevalier and Feinstein (2006). They used information from the NCDS to condition out long-term impacts of measures of mental health during childhood. They also compared the impact of education for individuals with similar background characteristics but that differ in their achievement of educational qualifications. They consistently found that achieving qualifications significantly reduced the risks of adult depression. They estimated that individuals with at least O-levels reduced their risk of adult depression by 6 percentage points and that the effect was similar for men and women.

It is important to highlight that part of the educational effect estimated by Chevalier and Feinstein is attributed to adult education. This is because their measure of education, highest qualifications at age 33, contains the achievement of qualifications from age 16 onwards. A considerable number of cohort members obtained qualifications between the ages of 23 and 33, in other words during adulthood. For example, the proportion of cohort members without qualifications was reduced from 30.5% at age 23 to 11.8% at age 33; the proportion with Level 2 qualifications increased from 18.2% at age 23 to 31.7% at age 33 and the proportion with Level 5 qualifications increased from 1.1% at age 23 to 10.5% at age 33.

Sabates and Feinstein (2006) investigated the effects of adult learning on the uptake of cervical screening for British women. Their results showed that adult learning was statistically associated with an increase in the uptake of screening. The marginal effect indicated that participation in adult learning was associated with an increase in

the probability of having a smear test. Adult learning leading to qualifications led to increase of between 4.3 and 4.4 percentage points whereas for general training the increment is between 1.5 and 1.7 percentage points.

Hammond and Feinstein (2005) used both quantitative and qualitative methods to investigate the links between participation in adult learning and self-efficacy, particularly for the subgroup of adults who had low levels of achievement at school. The focus was on self-efficacy as an outcome because, as an element of identity capital, it translates into a range of wider benefits (Bandura, 1997; Schuller et al., 2002), and because it may afford protection from depression and other forms of social exclusion. Quantitative analyses of data from the National Child Development Study (NCDS), found an association between taking courses and transformations from low to good levels of self-efficacy between ages 33 and 42 for all cohort members. The association is greatest for those who had low achievement levels at school. In order to investigate the validity of this relationship, that is that education is the driving change of self-efficacy, qualitative interviews were carried out on selected cohort members. Results suggested that participation in adult education can have positive impacts on well-being and this may translate into healthier lifestyles and better mental health (e.g., James, 2004; Hammond, 2004). Furthermore, our evidence suggested that if appropriate provision is available at the right time, it might play an important role in promoting identity capital with important benefits in terms of healthy lifestyles, well-being and mental health.

### *Summary*

Quantitative evidence on the health benefits of adult learning has demonstrated an important link between individuals' participation in learning during adulthood and their subsequent changes in health and health behaviours. There are good theoretical reasons for adult learning to impact upon individuals' health outcomes and robust empirical studies demonstrating that this association is significant. The following conclusions can be reached:

- There is evidence that adult learning is associated with individuals' health (for instance those who undertake adult learning report better health) and with changes in health (those who undertake learning have positive changes in health outcomes and health behaviours).
- Tom Schuller suggested that adult learning can have both transforming and sustaining effects. Transforming effects are when adult learning changes health behaviours, say from smoking to non-smoking. Sustaining effects are when health outcomes do not change, but there is no need for change (for example, non-smokers remain as non-smokers).
- Empirical evidence has found that adult learning can have both transforming and sustaining effects on health. In particular, adult learning can transform well-being, optimism, efficacy and self-rated health. It can maintain health behaviours, for example the likelihood of remaining a non-smoker.
- It remains relatively unexplored what kind of learning can make the most impact on individuals' health outcomes.

## **Civic Engagement and Attitude Change**

The impact of learning on civic participation and attitude change has been investigated by Preston (2003), Feinstein and Hammond (2004), and Preston and Feinstein (2004). Preston (2003) examined the relationship between adult learning and civic participation using 120 biographical interviews of adults who were enrolled in learning. Preston found a complex interaction between education and learning that is mediated not only by gender, class and ethnicity, but also by aspirations and individual relations. His main point is that for education to have an impact on civic participation there has to be a configuration of education and personal characteristics. Adult learning acts as a resource and a setting for individuals to change their social networks, and this produces new forms of civic participation.

Feinstein and Hammond (2004) used the 1958 cohort to examine the contribution of adult learning to social capital outcomes. Using the methodology employed for health outcomes highlighted above, their results showed that participation in adult learning had positive effects on race tolerance, authoritarian attitudes, political cynicism, political interest, number of memberships, and voting behaviour. Again, effect sizes were small, but given that there is little change in attitudes in mid-adulthood, finding an effect could be interpreted as a substantial finding. Feinstein and Hammond used four indicators of adult learning: courses taken leading to qualifications, courses taken not leading to qualifications, work-based learning and leisure courses. They found that there are benefits for all four types of courses analysed, with the possible exception of vocational courses leading to accreditation. Academic courses appear to be particularly important in relation to changing social and political attitudes, but taking leisure and work-related training courses has effects on a much broader range of outcomes than taking either vocational or academic courses leading to accreditation.

Preston and Feinstein (2004) investigate the role of adult learning on changing attitudes for adult in the NCDS. The authors constructed seven attitude scales – racism, political cynicism, environmentalism, willingness to work, collectivism-markets, authoritarianism and traditional family values – and investigated whether adult education can impact on individual's changing attitudes between age 33 and 42. Their results showed that adult education was implicated in a movement towards more 'open-minded' perspectives on race and authority. In particular, adult learning was associated with reduced racism and political cynicism.

Subsequent work on race tolerance combined with authoritarianism by Preston, Feinstein and Anderson (2005) found that although there is evidence that adult education may be important in sustaining non-extremist views, it does not appear to be associated with the transformation away from extremist positions. To reach this conclusion, Preston, et al., used the NCDS and principal component analysis to derive measures of extremism at two points in time, age 33 and age 42. Then, they associated adult education between the ages of 33 and 42 to changes in the position of those individuals who held extremist views at age 33 and to the prevention from adopting extremist views between 33 and 42.

### *Summary*

- Empirical evidence has shown that adult learning is associated with civic engagement (political interest, memberships to organisations and voting behaviour) and attitudes (race tolerance, authoritarian attitudes, and political cynicism).
- The evidence has further shown that adult learning is also associated with attitude change. In particular, adult education was implicated in a movement towards more ‘open-minded’ perspectives on race and authority.
- The sustaining and transforming effects of adult learning have also been investigated. Adult education seems to be important in sustaining non-extremist views, but it does not appear to be associated with the transformation away from extremist positions.
- More evidence is needed to understand the mechanisms for adult learning to impact upon individuals’ attitudes and social outcomes.

### **Educational Progression**

Many studies have established that participation in courses leading to qualifications varies by age, gender, ethnicity, and region of residence. Other important factors that predict progression are family background characteristics, staying in education after compulsory schooling and socio-economic circumstances in adulthood. Here, we describe evidence that relates to the impact of adult education and training on further progression.

A study of effective teaching and learning in reading by Brooks, et al. (2007) found that, of 339 learners, 87% continued after their first course. Of this group, data were available on 265. Out of this number, 62% (163) had achieved a qualification. Out of the 265 returns for which data are available, 65% (171) had either returned to continue the same course or had started a new one. According to the study’s authors: ‘At first sight, the finding on accreditations achieved is remarkably positive – but... it may be that the accreditations achieved were actually certifying where learners already were, rather than attesting to progress.’ Also using longitudinal data, Morrell, Chowdhury and McHugh (2005) found that of 1,900 learners in courses run by LEAs, over an 18-month period, 73% of the sample had engaged in some learning since their first interview, with 32% staying within their subject and progressing to a higher level. Fifty-nine per cent were studying different courses, and 28% had gained or expect to gain a qualification.

A recent study by Bynner and Parsons (2006) showed that improvements in basic skills during adulthood in the 1970 British Cohort were associated with attainment of qualifications, as well as with other positive outcomes in adulthood such as mental health, well-being and civic participation. Men who improved their literacy and numeracy between the age of 21 and 34 were more likely to have gained some kind of formal qualification by the age of 34. This result suggests that factors that occur previous to the attainment of qualifications, such as the learning experience that resulted in improving basic skills, may be fundamental in explaining progression in education.

Sabates, Feinstein and Skaliotis (2007) investigated educational progression during adulthood for the 1958 British Cohort. Their key finding was that progression to level

2 and beyond during adulthood for those who did not obtain level 2 between 16 and 23 was strongly associated with relative success in school and other earlier forms of educational participation. In particular, adults who gained a level 2 qualification between the ages of 23 and 33, were likely to be characterised by early school achievements (at age 7), improved school attainments between the ages of 7 and 16, staying on in education at age 16, receiving training between age 16-23, and being enrolled in courses leading and not leading to qualifications between 16-23 (adult learning). Those who achieved level 2 by age 42 were characterised by early school achievements (at age 7), improved school attainments between 7 and 16, taking courses not leading to qualifications between 23 and 33, receiving training lasting three or more days between 23-33, and improving maths skills between 23-33. This last result is similar to the one found Bynner and Parsons (2006) using the 1970 British Cohort.

Earlier work by Jenkins, et al. (2003) also showed that learning leads to more learning. Using data from the NCDS, the authors found that those who left school with O-level qualifications were much more likely to acquire a qualification between the ages of 33 and 42 than those without O-level qualifications. This effect was important for both men and women, but particularly more important for women. They also found that acquiring a qualification between the age of 33 and 42 was associated with the likelihood of being a learner at age 42, whereby acquiring a qualification was associated with an increase of 10 to 11 percentage points in the probability of being a learner at age 42.

### *Summary*

- There is clear evidence that engagement in learning is associated with further learning and in most cases with the acquisition of qualifications.
- Therefore, a successful episode of learning has the potential to provide individuals with the incentive for further learning and to generate a culture of learning.
- There is, however, an important limitation, which is unequal rates of participation in learning among adults. Those with higher levels of education tend to participate more in learning.
- It still remains an empirical challenge to investigate the most deprived and excluded adults, how to engage them in learning and how to make learning a successful experience that will aid them in achieving their potential.

### **Intergenerational**

An important set of empirical studies have investigated whether investments in schooling for one generation will lead to increasing schooling of the next generation. One strand of the empirical literature has utilised information from non-biological children, either adopted or in care, and their non-biological parents to investigate the role of parental schooling. The aim of these studies is to condition out the role that nature plays in the intergenerational transmission of educational success. This is, the possibility that children inherit ability from their parents and therefore children of more able parents are likely to be more able themselves and to achieve high levels of education.

By using information on non-biological children these studies isolate this problem. Evidence from the UK has shown that parental education has a significant impact on the school achievement of their adopted children, although, in general, adopted children achieve lower levels of education than biological children. Dearden, Machin and Reed (1997) show that the impact of fathers' schooling on adopted sons' schooling is almost as large as the impact of fathers' schooling on their own children's schooling. Sacerdote (2000) uses data from the National Child Development Study (NCDS) in the UK and finds that family education has large effects on children's university attendance for both biological and non-biological children.

Another strand of the empirical literature has used a statistical method called instrumental variables to estimate the causal effect of parental education on the education of their children. The most important feature of an instrumental variable method, and the most difficult to achieve, is to find a source of exogenous variation in the school achievement of parents that is not associated with the school achievement of their children. A common source of variation to estimate educational effects has been the change in compulsory education. Three studies in the UK using this method find effects of parental education, although it is unclear whether the effect of maternal or paternal education is the one that dominates and whether the impact of parental education could be channelled by income.

Chevalier (2004) uses data from the British Family Resource Survey and the change in compulsory education in Britain in 1957 to investigate the impact of parental education. For individuals mostly affected by the policy reform he finds mainly effects for mothers' education on her biological children's school attainment and small or even insignificant effects for fathers' education. Galindo-Rueda (2003) uses the change in compulsory school leaving age of 1947 to identify schooling effects. This reform increased the minimum school leaving age from age 14 to 15. Using data from the National Child Development Survey (NCDS), results show a positive effect of fathers' schooling on school attainment as measured by test scores of their sons, but no effects for maternal schooling. Only one study by Chevalier, Harmon, O'Sullivan and Walker (2005), using data from the UK Labour Force Survey, concludes that the effects of parental education disappear when permanent income is included in the model.

There is, however, an important gap in the UK literature, namely the lack of empirical evidence on the intergenerational effects of adult learning. The evidence reviewed above suggest important effects of parental education, but there is no distinction as to whether this education is achieved as part of continuing educational progression or by achievement of education in adulthood. To our knowledge only two studies in the US have taken advantage of the fact that young mothers sometimes return to formal education after the birth of a child or between the births of their first and subsequent children. Both studies use an extension of the National Longitudinal Survey of Youth (NLSY) which surveys the children born to women in that cohort.

Kaestner and Corman (1995) associate young children's improvements on tests of reading and mathematics, two years apart, with increases in their mother's formal education over this period. They control for other changes in the children's lives over

this period which might have affected their test results, such as their health status, mother's labour force participation, family structure and family income. Factors which did not change over this time, such as the children's ability or their mother's innate parenting ability, were common to both points in time and therefore implicitly controlled for in the model. Kaestner and Corman find no effect of increased maternal education on children's achievement scores.

Rosenzweig and Wolpin (1994) look at differences in test scores between earlier-born and later-born pairs of siblings, relating these differences to increases in their mother's formal education over the intervening period. A quarter of the sample had continued their education after the birth of their first child. Rosenzweig and Wolpin control for a number of factors which might vary between the earlier- and later-born children, and which might affect cognitive development, such as the use of prenatal care, birth-weight, mother's smoking and drinking, home teaching, television watching and frequency of reading to the child. Family and parental factors were common to both children and therefore implicitly controlled for in the model (although the children, not being identical twins, might have differed in other unobservable ways). Rosenzweig and Wolpin find that an additional year of maternal education has a modestly positive and marginally significant effect on their children's achievement in reading and mathematics tests, although not on a measure of verbal IQ. Each additional year of education obtained by the mother prior to the birth of a child increases achievement test scores by 2.4%.

Both of these studies have reasonable sample sizes to work with, but both consist of relatively young women and their children. The oldest respondent in Kaestner and Corman's study at the time of the second assessment was only 34 years old, with a child aged between 7 and 9. Rosenzweig and Wolpin's sample was made up of women who had had at least two children by age 25 (for the maths and reading sample) or by age 27 (for the vocal IQ test). Half of these mothers had first given birth between the ages of 17 and 19, which explains their high rates of school continuation. The samples are therefore not representative of all families with children and cannot be generalised to the whole population.

### *Summary*

- Overall, there is robust empirical evidence to suggest that parental education has a causal impact on measures of children's educational attainment (highest qualifications or school test scores).
- What is not clear is whether the effect of parental education is driven by the education of the fathers or mothers.
- Similar conclusions were reached by Holmlund, Lindahl and Plug (2006) based on a recent review of empirical studies from the USA and Europe. They concluded that education of parents has a causal impact on the education of their children and that the size of this impact is smaller than the associational evidence previously estimated using cross-sectional data.
- There is a lack of empirical quantitative evidence in the UK about the intergenerational benefits of adult learning.

## Implications for Future Research

In the preceding sections, we described findings for the wider benefits of adult education using research based on the UK. Overall, results showed that adult education has important relationship with health, civic participation and employment. There is some evidence of wage gains from adult learning, but this evidence is shown for learning leading to academic qualifications or higher vocational qualifications. If we take into consideration the monetary returns of these wider outcomes of learning, there could potentially be very high returns to adult learning.

However, an evaluation and quantification of the benefits of adult learning is only possible with the development of a new longitudinal design of data collection. This is because there are some limitations with the existing longitudinal studies that make it impossible to assess, with a higher degree of certainty, the benefits of adult learning. In this section, we set out the main barriers that a new longitudinal study must overcome.

Firstly, an experimental design is needed in which information exists on reasons for learning and also on individuals' social and economic situations before, during and after learning for both learners and non-learners. Knowledge about reasons for learning is important to evaluate expected and unexpected consequences of the learning experience. For example, a mother's motivation for learning may be to assist with her children's school work. But it could be the case that as a result of the learning experience, this mother starts her own business as tutor for other children. In this respect, a direct evaluation of the benefits of learning will be on the impact of learning on the mother's own children's educational attainments. Other benefits of learning may be an increase in the mother's self-esteem, increase in economic situation for the household and improved learning for the children who receive tutorial lessons.

Current datasets available in the UK, which contain information on learning and outcomes, do not contain detailed information about reasons for learning. Without this information, it is impossible to differentiate between expected and unexpected consequences of learning. This issue is less of a problem for work-based learning and its link to economic outcomes. One could assume that the motivations behind work-based learning are to increase skills, productivity and hence wages. Hence, one could investigate the links between work-based learning and wages. But this is not necessarily the case for other types of learning where there are broader motivations for learning.

The timing of events with information on outcomes before, during and after learning takes place is key to evaluating the benefits of learning. What is needed with an experimental design is to gather information on learners and non-learners and to follow them over time. It is important to collect base line information about the situation of learners and non-learners before the learning experience takes place. Then, learners and non-learners must be followed periodically to capture the main changes in individuals' lives during and after the learning experience.

Some existing longitudinal studies, such as the Cohort Studies and the British Household Panel Survey, contain information about timing of events, but do not link

directly learning events with outcomes. With these studies, it is possible to recreate a baseline for the socio-economic circumstances of individuals interviewed in these studies, but the learning experience could have happened long after the time of the baseline and/or the time span between baseline socio-economic circumstances and possible outcomes of learning is (for example up to 10 years in the NCDS or BCS70).

Even when the time span between sweeps of data collection is short, for instance 1 year with the BHPS, information on adult learning and outcomes of learning is rather limited. This is because current longitudinal studies contain generic information about the life of individuals. Hence, it is usually that information on motivations for learning is missing or that repeated measures of possible outcomes of learning, such as self-esteem and parenting skills, are not collected. Furthermore, the BHPS contains only information on work-based training and whether this training lead to qualifications. It does not contain information on other forms of learning, both formal and informal, which may have important benefits for individuals.

Finally, an experimental design requires a proper control group. The main problem with estimating causal effects of adult learning on outcomes is that learners tend to self-select themselves into learning and for this reason, learners differ from non-learners. It may be the case that learners have higher motivations than non-learners and these motivations are having important economic benefits. So what the researcher captures to be an effect of adult learning is actually an effect of motivations.

The best way to carry out an evaluation of the benefits of adult learning is with a randomised controlled trial (RCT). In a RCT, individuals are randomly assigned, or not, to a learning experience. Information on outcomes is collected before, during and after learning. In this way, there is repeated information on outcomes and we can investigate changes in outcomes between learners and non-learners before and after learning. Under this kind of randomisation, differences in outcomes are likely to be the result of learning.

However, to assign individuals to learning randomly may be problematic both socially and politically. Hence, the experimental design may require other forms of randomisation. It could be that a control group of non-learners is found, based on similar characteristics of the self-selected group of learners. Randomisation can be used to assign learners to different types of learning. Again, information is needed before, during and after the learning experience. With this design, one could utilise different statistical methods to capture the differences in outcomes between learners and non-learners and also, one could investigate whether these differences arise from the different learning experiences (which were allocated randomly).

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Blundell, Dearden & Sianesi	NCDS	Men aged 33 in 1991 with information on wages	OLS & Matching	Higher education (HE) vs. anything below HE	ATT = <b>27%</b>
				HE vs. no qualifications	ATE = <b>48%</b>
				A-Level vs. no qualifications	ATE = <b>24%</b>
				O-Level vs. no qualifications	ATE = <b>18%</b>
				A-Level vs. O-Level	ATE = <b>6%</b>
				HE vs. A-Level	ATE = <b>24%</b>
				HE vs. O-Level	ATE = <b>30%</b>
Blundell, Dearden, Goodman & Reed	NCDS	Individuals with at least one or more A-level passes by 1991 with complete information on wages	Matching	Non-degree HE qualification vs. A-Level	Men ATT = <b>14%</b> Women ATT = <b>22%</b>
				First degree vs. A-Level	Men ATT = <b>12%</b> Women ATT = <b>34%</b>
				Higher degree vs. A-Level	Men ATT = <b>8%</b> Women ATT = <b>32%</b>
				Starting HE but not completing vs. A-level	Men ATT = <b>-9%</b> Women ATT = <b>-1% (ns)</b>
				Mature students (started HE at age 21 or older) vs. starting HE earlier	Men ATT = <b>-7%</b> Women ATT = <b>0.6% (ns)</b>
Dearden	NCDS	Men and women with at least O-level	OLS	A-Level vs. O-Level	Men ATT = <b>6.5%</b> Women ATT = <b>5.8%</b>
				HE vs. O-Level	Men ATT = <b>6%</b> Women ATT = <b>12%</b>

Dearden, McIntosh, Myck & Vignoles	NCDS IALS LFS	<p>NCDS: Men and women aged 33 in 1991 with complete information on wages, qualifications and test scores.</p> <p>IALS: Working age adults in 1995 with complete information on wages and qualifications.</p> <p>LFS: Working age adults in 1998 with complete information on wages and qualifications</p>	Matching	O-Level vs. no qualifications	Men ATT = <b>12-21%</b> Women ATT = <b>10-19%</b>
				A-Level vs. no qualifications	Men ATT = <b>15-18%</b> Women ATT = <b>18-23%</b>
				Sub-degree vs. no qualifications	Men ATT = <b>8-26%</b> Women ATT = <b>16-18%</b>
				Degree vs. no qualifications	Men ATT = <b>10-28%</b> Women ATT = <b>21-26%</b>
				City & Guilds Higher vs. no qualifications	Men ATT = <b>4-7%</b> Women ATT = -1% (ns)
				City & Guilds Lower vs. no qualifications	Men ATT = 0% (ns) Women ATT = -5% (ns)
				ONC, TEC/BEC vs. no qualifications	Men ATT = <b>7-12%</b> Women ATT = 8% (ns)
				HNC, TEC/BEC higher vs. no qualifications	Men ATT = <b>6-22%</b> Women ATT = 3-18% (ns)
				Professional qual. vs. no qualifications	Men ATT = <b>15-35%</b> Women ATT = <b>20-40%</b>
				Nursing qual. vs. no qualifications	Men ATT = 12-13% (ns) Women ATT = <b>16-30%</b>
No differences for men or women with respect to RSA level 1, RSA level 2&3, other business qualifications and apprenticeship without qualifications and no qualifications. Care must be taken when comparing results across datasets due to classifications of qualifications.					

McIntosh	LFS	Men and women of working age with complete information on wages from 1993 to 2001	OLS	Academic first degree vs. no qualifications in private and public sectors	Private Men = <b>29%</b> Public Men = <b>17%</b> Private Women = <b>30%</b> Public Women = <b>25%</b>
				Other HE vs. no qualifications in private and public sectors	Private Men = <b>13%</b> Public Men = <b>3%</b> Private Women = <b>15%</b> Public Women = <b>10%</b>
				2 or more A-levels vs. no qualifications in private and public sectors	Private Men = <b>18%</b> Public Men = <b>12%</b> Private Women = <b>16%</b> Public Women = <b>15%</b>
				5 good GCSE vs. no qualifications in private and public sectors	Private Men = <b>26%</b> Public Men = <b>28%</b> Private Women = <b>27%</b> Public Women = <b>17%</b>
				Teaching qualifications vs. no qualifications in private and public sectors	Private Men = (ns) Public Men = <b>12%</b> Private Women = (ns) Public Women = <b>32%</b>
				Nursing qualifications vs. no qualifications in private and public sectors	Private Men = (ns) Public Men = <b>10%</b> Private Women = <b>13%</b> Public Women = <b>19%</b>
				HNC/HNDs vs. no qualifications in private and public sectors	Private Men = <b>14%</b> Public Men = <b>4%</b> Private Women = <b>14%</b> Public Women = (ns)

McIntosh (cont.)				ONC/ONDs vs. no qualifications in private and public sectors	Private Men = <b>11%</b> Public Men = <b>7%</b> Private Women = <b>6%</b> Public Women = <b>6%</b>
				City and Guilds Advanced vs. no qualifications in private and public sectors	Private Men = <b>6%</b> Public Men = (ns) Private Women = (ns) Public Women = (ns)
				NVQ 2 vs. no qualifications in private and public sectors	Private Men = <b>-7%</b> Public Men = <b>-10%</b> Private Women = <b>-7%</b> Public Women = <b>-8%</b>
				NVQ 1 vs. no qualifications in private and public sectors	Private Men = <b>-10%</b> Public Men = (ns) Private Women = <b>-9%</b> Public Women = <b>-13%</b>
				RSA lower vs. no qualifications in private and public sectors	Private Men = (ns) Public Men = (ns) Private Women = <b>5%</b> Public Women = <b>-6%</b>
				Returns to low academic qualifications (GCSE D & F) declined to zero for both male and female in both the private and public sectors. No returns to craft-based City and Guilds, BTEC diploma, apprenticeship, for men and women in both the public and public sectors.	

Blundell, Dearden and Meghir	NCDS	Men and women who were employed in 1991 with complete information on wages, training and qualifications	Quasi-difference equation	On the job, employer provided training vs. no training	Men = <b>4%</b> Women = 0% (ns)
				Off the job, employer provided training vs. no training	Men = <b>7%</b> Women = 5% (ns)
				Training leading to vocational qualifications (lower) vs. no training	Men = -2.4% (ns) Women = 1.1% (ns)
				Training leading to vocational qualifications (middle) vs. no training	Men = 4.2% (ns) Women = 6.4% (ns)
				Training leading to vocational qualifications (higher) vs. no training	Men = <b>8%</b> Women = <b>10%</b>
				Other work-related training vs. no training	Men = <b>7%</b> Women = <b>7%</b>
			Duration (only for men)	On the job training < 1 week	Men = 2.1% (ns)
				On the job training: 1 week-1 month	Men = <b>4.6%</b>
				On the job training > 1 month	Men = <b>15%</b>
				Off the job training < 1 week	Men = <b>6%</b>
				Off the job training: 1 week-1 month	Men = <b>13%</b>
				Off the job training > 1 month	Men = <b>9%</b>
			Individuals with O-Levels	& on the job training	Men = <b>8%</b>
				& higher vocational qualifications	Men = <b>13%</b> Women = <b>14%</b>
				& work-related training	Women = <b>9%</b>
				& middle vocational qualifications	Women = <b>12%</b>
Feinstein, Galindo-Rueda & Vignoles	NCDS	Men. Complete information on wages at 33 & 42 and training spells of more than 3 days duration	First difference equation estimated by OLS & IV	Work-related training of more than 3 days vs. no training	ATE = <b>5%</b>
				Workers selected to receive training from the employer vs. no training	ATT = <b>12%</b>
				Impact of training for male workers not selected to receive training	ATNT = -3% (ns)

Booth, Francesconi & Zoega	BHPS 1991 - 1996	Men born after 1936 with complete information & full-time employment	Wage growth equations	Union workers who receive training <i>vs.</i> non-union workers who receive training	<b>10%</b>
				Duration of training, union workers <i>vs.</i> non-union workers	<b>1%</b>
				Received work-related training <i>vs.</i> no training	<b>2%</b>
				Interaction training and entry into a union-covered job	<b>11%</b>
				Interaction training and exit from union-covered job	<b>-12%</b>
Booth & Brian	WERS 1998	Men and women in private sector employment, who are union-covered in work-places with at least 25 employees & complete information	2 stage estimation	Manual occupation & O-Level <i>vs.</i> manual & below O-Level	Men = <b>4.6%</b> Women = <b>7.9%</b>
				Manual occupation & A-Level <i>vs.</i> manual & below O-Level	Men = <b>6.4%</b> Women = <b>8.6%</b>
				Manual occupation & HE <i>vs.</i> manual & below O-Level	Men = <b>13%</b> Women = 10% (ns)
				Manual occupation & vocational quals <i>vs.</i> manual & no vocational quals.	Men = 3.5% (ns) Women = 0% (ns)
				Non-manual occupation & O-Level <i>vs.</i> non-manual & below O-Level	Men = <b>10%</b> Women = <b>9%</b>
				Non-manual occupation & A-Level <i>vs.</i> non-manual & below O-Level	Men = <b>15%</b> Women = <b>16%</b>
				Non-manual occupation & HE <i>vs.</i> non- manual & below O-Level	Men = <b>24%</b> Women = <b>30%</b>
				Non-manual occupation & vocational quals. <i>vs.</i> non-manual & no vocational qualification	Men = <b>-5.1%</b> (ns) Women = -2.6% (ns)

DeCoulon, Marcenaro- Gutierrez & Vignoles	BCS70	Men and Women with information on wages and basic skills	OLS, IV	From median literacy to 84% percentile	Men = <b>14%</b> increase in hourly wages Women = <b>15%</b>
				From median numeracy to 84% percentile	Men = <b>11%</b> increase in hourly wages Women = <b>13%</b>
				From median literacy to 84% percentile using IV	LATE = 32-45%
				From median numeracy to 84% percentile using IV	LATE = 28-31%

Notes: ATT stands for Average Treatment on Treated individual (the average impact of education for those who participated in education); ATE stands for Average Treatment Effect (expected effect of education on a randomly drawn individual from the population); ATNT stands for Average Treatment on Non-Treated (expected effect of education for those who were not selected into education); LATE stands for Local Average Treatment Effect (expected effect to those individuals most likely to be affected by the instrument).  
(ns) stands for not significant estimate