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The Relationship between Adult Learning and Wellbeing: Evidence from the 1958 National Child Development Study

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Executive Summary

Background

Previous research shows that lifelong learning yields significant wider benefits for individuals, including their health and wellbeing (Schuller et al., 2002, 2004; Feinstein et al., 2003, Sabates and Feinstein, 2004; Field, 2005; Hammond and Feinstein, 2006; Feinstein et al, 2008). At the same time there remains a need for more robust UK evidence on the extent of participation in lifelong learning, the characteristics of lifelong learning and the benefits of lifelong learning. In this report we explore these issues: first, we examine patterns of participation in different forms of lifelong learning, the characteristics of learners, whether qualifications were gained and at what level. And second we model the effect of participation in different types of lifelong learning on individual wellbeing and health-related outcomes; in particular we look at life-satisfaction, self-efficacy, depression, smoking, alcohol consumption and exercising.

Methods

We draw on the most recent waves of longitudinal data from the 1958 National Child Development Study. The data from this cohort study enable us to estimate effects of lifelong learning on individual wellbeing and health by examining the contribution of learning in one period on outcomes in the next, whilst also controlling for a rich set of background variables and other factors associated with both the likelihood of engaging in learning and with the outcomes considered. By employing a research design which looks at participation in lifelong learning between the ages of 42 and 46 as it relates to changes in health and wellbeing outcomes measured between 46 and 50, we can be more confident that our estimates are effects of adult learning rather than just associations. Furthermore, the four-year time intervals in the most recent waves of the NCDS data collection, compared to previous intervals of nine years, mean estimation of the contribution of adult learning can more easily be identified than in previous studies.

Much of the previous research in this area has taken an undifferentiated view of lifelong learning. In this study, and in order to disentangle the wider benefits of lifelong learning, we focus on three broad types of learning: accredited courses, (courses leading to qualifications), work-related training, and leisure and interest courses. The report also examines how any relationships between learning and wider benefits are moderated by gender and the role of prior education.

Main findings

Our results are consistent with much of the previous literature on the wider benefits of learning:

- Approximately 3% of the cohort gained academic qualifications in their 40s, while 18% gained vocational qualifications and 1% gained both.

- In contrast, a far higher proportion of individuals participated in non-accredited forms of learning such as leisure or interest-related courses or work-related training: 44% between ages 42 and 46 and 36% between 46 and 50.

- Much of the accredited learning that takes place between the ages of 42 and 50 appears to be for the sake of learning than for progression in terms of qualifications: only around a quarter of individuals who actually gained qualifications did so at a higher level than they already held.

- Participation in any type of adult learning in one time period is positively and strongly associated with participation in the next period.

- Females are more likely than men to participate in all forms of adult learning except for work-related training.

- Individuals who are economically inactive and particularly those who are unemployed are more likely than those in employment to gain qualifications.

- Individuals with children at home are more likely to participate in accredited forms of learning than those who do not but are less likely to participate in leisure-related courses.

In terms of the contribution of lifelong learning to wellbeing and health-related outcomes, we find that there is evidence of statistically significant and robust effects of participation in lifelong learning; however, the size, direction and beneficiary of the effects depend on the outcome considered, the type of learning under investigation and the cohort member's gender.

In terms of **accredited learning**:

- there is some evidence of an effect on life satisfaction, but the association is not robust to the inclusion of controls for concurrent adult social and economic status, and it is related to women rather than the full sample.

- there is evidence of an effect of accredited learning on decrease in men's self-efficacy.

In terms of **non-accredited learning**:

Our results suggest that, even after controlling for prior levels of the outcomes considered, participation in non-accredited learning makes a larger contribution to individual wellbeing and a host of family background and individual characteristics, as compared with participation in accredited learning. We find evidence of:

- an effect of leisure or interest-related learning on increased life satisfaction, in relation to women

- an effect of leisure or interest-related learning in decreasing female depression

- a positive effect of leisure or interest-related learning on self-efficacy
- a positive impact of work-related training on life satisfaction
- a positive impact of work-related training on self-efficacy
- a significant unconditional association between work-related training and improvements in depression – although this is reduced once controls are included in the model.

Finally, we note that across all of types of learning considered, our analyses provide no evidence on the effect of accredited or non-accredited learning on health-related outcomes such as smoking, alcohol use or exercising in adulthood.

Conclusions

Consistent with previous literature on the wider benefits of lifelong learning, our findings show that it is those who already have good levels of education who engage in adult education. Much of participation in lifelong learning then is for the sake of learning itself rather than for progression or up-skilling.

Our results are in line with Heckman's view that 'learning begets learning'. However, our findings do indicate that this may depend on the circumstances which motivate participation in the first place. For example, our descriptive results suggest that individuals who are economically inactive and particularly those who are unemployed are more likely than those in employment to gain qualifications at both time points. Similarly, we show evidence that the effects of learning on individual wellbeing are not necessarily linear or straightforward.

While it remains a priority to identify the relationship between learning and individual outcomes, it is also necessary to understand the reasons, motivation and context for participation if we are also to gain an understanding of the mechanisms that connect lifelong learning with its wider benefits.

1. Introduction

There is clear evidence of a relationship between participation in UK adult education programmes and positive labour market outcomes in terms of employment and earnings gains (Comings, et al., 2009; Feinstein, Galindo-Rueda, & Vignoles, 2004; Jenkins, Vignoles, Wolf, & Galindo-Ruenda, 2002; Reder & Bynner, 2009). There is also a smaller but complementary field of research on the wider benefits of learning – that is, the personal, emotional and social benefits of learning. For example, Schuller et al. (2004) found evidence that lifelong learning leads to improved confidence, enhanced social capital, and an improvement in family dynamics. There is also recent evidence from the cohort studies suggesting that investment in further education is associated with political trust and liberal social attitudes (Bynner et al, 2003; Feinstein et al., 2003; Preston & Feinstein, 2004; Deary, Batty, & Gale, 2008; Schoon, et al., 2010).

Other studies have shown positive effects specifically on individual wellbeing and health outcomes, including life-satisfaction, depression, obesity, giving up smoking, increased exercise and the uptake of preventative healthcare (Feinstein, 2002; Feinstein et al, 2003; Sabates and Feinstein, 2004; Hammond and Feinstein, 2006; Feinstein et al, 2008). For example, Feinstein et al., in 2003 using the NCDS data and focusing on changes between the age of 33 and 42, provided evidence of the positive effect of:

- gaining academic accredited qualifications and participating in work related training on increased life-satisfaction for men;
- gaining academic accredited qualifications and participating in work related training on increased exercise;
- gaining vocational accredited qualifications on decrease in alcohol consumption;
- participating in leisure related learning on giving up smoking, increased exercise and decrease in alcohol consumption.

Evidence on the wider benefits of learning is also provided by qualitative large scale studies, including those conducted by Schuller et al (2002) and Field (2005). For example, based on a sample of 145 individuals, Schuller et al (2002) argues that the positive effects of lifelong learning contribute to an individual's life through positive relationships with different forms of 'capital': identity capital (e.g. self-esteem, self-efficacy), human capital (e.g. health, wellbeing[1]) and social capital (e.g. civic participation, friends, networks, family).

While many studies show positive effects of lifelong learning on wellbeing and health outcomes (e.g. Schuller et al, 2002, 2004; Sabates and Feinstein, 2004), there is also some evidence that for some people, in some circumstances, learning can be associated with stress and anxiety, which in turn can have a negative effect on health and wellbeing

[1] Unlike in this case, human capital is normally conceived as comprising knowledge and skills.

(see the discussion in Jenkins 2011). As Aldridge and Lavender 2000 show (see also Barton et al. 2007; Field, 2009), in addition to any benefits individuals can also experience stress, broken relationships and a new dissatisfaction with one's present way of life, and this, in turn, can produce negative changes in wellbeing and health. Feinstein et al. (2003) found that, along with increased exercise and civic activity, participation in work-related learning was associated with a substantial increase in alcohol consumption, and that this may have been related to learning stress and anxiety.

Much of the quantitative research on the wider benefits of adult learning is based on a narrow range of data sources, heavily relying on the 1958 National Child Development Study (NCDS)[2] and the data gathered as part of the age 33 and 42 sweeps, collected in 1991 and 2000 respectively. The main problem with this data is the large nine year interval between time points, making it difficult to identify the impact of adult learning. Since the WBL research summarised in Schuller et al. 2004, data on individuals aged 46 and 50 have become available. The four-year time intervals between these most recent waves of data collection enable attempts more accurately to identify the impact of adult learning in terms of well being and health.

The primary aim of this study is to investigate the impact of lifelong learning on wellbeing and health-related outcomes in adulthood. We use newly available data to estimate whether participation in adult learning between the ages of 42 and 46 is related to changes in health and wellbeing outcomes measured between 46 and 50. By employing a research design which looks at participation in one period as it relates to changes in each outcome in the next, we can be more confident than in the past that our estimates are effects of adult learning rather than merely associations.

Our analysis builds on earlier work in this area in differentiating between different types of learning; namely, accredited courses leading to qualifications, both academic and vocational, work-related training and leisure courses. We also examine the characteristics of individuals participating in lifelong learning and investigate whether the observed benefits of learning vary across groups. We examine how any relationships are moderated by gender, the type of adult learning taken, the outcomes considered and the role of prior education.

In order to investigate the contribution of adult learning to changes in individual wellbeing and health-related outcomes, we first investigate the number of adults who gained any qualifications, first between ages 42 and 46 and then between ages 46 and 50, as well as those who undertook any other types of learning, such as leisure and interest-related courses or work-related training. Our interest lies in understanding:

- The extent of participation in adult learning occurs without any noticeable change in the level of qualifications gained, as distinct from learning that leads to progression in terms of qualification levels?

[2] With some exception such as using BHPS (Sabates & Feinstein, 2004; Sabates et al, 2007) or BCS70 data (Feinstein, 2002; Bynner et al, 2003).

- Which groups of people are more likely to participate in lifelong learning in general, and what are the characteristics of the individuals that represent the trajectories specified above?

Heckman has famously argued that 'learning begets learning' (Cuhna & Heckman, 2007), and that skills produced at one stage raise both the likelihood and productivity of investment in knowledge and skills at subsequent stages. On this view the process of learning over the lifecourse includes 'complementarities': skills acquired earlier compliment and support the process of skills acquired later, and those with more skills from an early phase in the lifecourse are more likely to acquire new skills at a subsequent phase. This report finds some evidence in support of these hypotheses.

2. Method

2.1 Data and sample

Data for the current study derive from the 1958 National Child Development Study, an ongoing longitudinal study following into adulthood all the individuals born in the UK in one week in March, 1958 (Shepherd, 1985). A total of 17,414 mothers were interviewed, representing 98% of all births that week. Since the birth survey there have been eight other major data collection sweeps aimed at monitoring these children's health, education, social and economic circumstances, carried out at ages 7, 11, 16, 23, 33, 42, 46 and most recently at 50 (see www.cls.ioe.ac.uk for full details of the study's design and coverage).

Sample loss due to attrition is a common problem in longitudinal research. Feinstein and colleagues, for example, note that if attrition rates are highest among those who have the lowest rates of participation in adult learning and come from the lowest socio-economic backgrounds, this may lead to an underestimation of any association between learning and social capital or health (Feinstein et al. 2003, 87–8). Analysis of response bias in the NCDS, however, showed that the achieved samples did not differ from their target samples across a number of critical variables, such as social class, parental education, and gender, despite a slight under-representation of the most disadvantaged groups (Plewis, Calderwood, Hawkes and Nathan, 2004). Bias due to attrition of the sample during childhood has also been shown to be minimal.

Our analysis is based on the cohort members with complete data for the key variables of interest, namely health and wellbeing outcomes both at age 46 and 50, as well as participation in lifelong learning between the age of 42 and 46. Of the 9,534 cohort members who completed the survey at age 46 and 9,790 cohort members who did so at age 50, more than 7,940 cohort members participated at both time points and provided information on their health and wellbeing outcomes as well as lifelong learning. The sample size varied by the outcome and type of lifelong learning, ranging between 7,948 and 8,316.

On missing data relating to our control variables: our strategy was to replace missing observations with the mean value if the variable was continuous, and to include an additional dummy variable to indicate missingness. For binary and categorical predictors we also used indicator variables to take missingness into account. This means that the coefficients on the dummy variables indicating missingness can tell us whether individuals with missing data have significantly higher or lower outcomes than individuals with complete data. This helps to determine who has missing data, to reduce the bias on the other variables included in the model, and to retain as many observations as possible in the analysis. This approach also reduces standard errors (see Allison, 2002, for further description) and is frequently used in economic analysis (see Duncan et al., 2007; Gregg, Janke and Propper, 2008, for use of the same methods).

2.2 Measures

Outcome variables: Wellbeing and health status in adulthood

Our analysis uses a set of indicators of wellbeing and health-related measures in adulthood, choosing those that were available at both the age 46 and 50 waves, and were measured in the same or a very similar way.

- *Life satisfaction* was measured at ages 46 and 50 as a single item rating 'satisfaction or dissatisfaction about the way life has turned out so far' and indicated by respondents on a scale of 0 to 10, with 0 representing completely dissatisfied and 10 completely satisfied.

- *The Malaise Inventory* (Rutter, Tizard & Whitmore, 1970) was used to assess mental health and depression. The NCDS survey uses nine of the original 24 items score at both the age 42 and age 50 waves of data collection. Items include "whether the cohort member feels tired most of the time"; "whether the cohort member often feels miserable and depressed"; and "whether the cohort member is constantly keyed up and jittery". A positive response for four or more symptoms, from the nine item list is seen as of high risk of depression.

- *Self-efficacy* was measured by three dichotomous items asking the cohort member whether they feel "they get what he/she wants out of life"; "has control of his/her life"; and "feels can run life as he/she wants". The items are summed to create an overall index in which a high score indicates a greater level of perceived efficacy.

- *Alcohol* use was measured as a frequency of having an alcoholic drink of any kind ranging from never to on most days.

- *Smoking* was measured as the number of cigarettes a day a cohort member usually smokes.

- *Physical exercise* was indicated by the frequency of taking part in any physical activities.[3]

Lifelong learning and participation in adult education

The measure of adult learning is a self-report of any qualifications gained (accredited learning) since the last survey, including details of the type and level of qualification gained, as well as participation in any leisure or interest-related learning and work-related training (non-accredited learning).[4]

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[3] Physical exercise was defined as any of the following: take part in competitive sport of any kind; go to 'keep fit' or aerobics classes; go running or jogging; go swimming; go cycling; go for walks; take part in water sports; take part in outdoor sports; go dancing; take part in any other sport of leisure activity which involves physical exercise.

[4] Details concerning the intensity of either accredited or non-accredited learning or precisely when the learning took place over the previous four year period were not asked. Moreover, individuals are asked about

Control variables: Adult circumstances and social situation at 46

- *Economic activity*. Cohort member's main economic activity at 46 was included to take into account concurrent employment characteristics and is coded as: in employment; unemployed; not in economic activity, i.e. in full-time education, looking after home or family, sick/disabled, or wholly retired.

- *Highest qualifications* are measured on a six-point scale ranging from no qualifications to Level 5 qualifications, i.e. post-graduate degree and equivalent vocational and/or professional qualifications.

- *Health status*. A general measure of health was derived from responses to the question 'How would you describe you health generally? ' on a five-point scale.[5]

- *Marital status* was measured by a binary variable indicating whether the cohort member is married or cohabiting versus being single, separated, divorced or widowed.

Control variables: Family background and individual characteristics

A number of further control variables were included in the analysis to reduce bias due to omitted variables:

- *Family background and household climate*
    - Birth weight
    - Mothers' age at cohort member's birth
    - Whether the cohort member was born to a single parent
    - Father's social class in childhood
    - Number of siblings in childhood
    - Parent' education
    - Whether parents read to cohort member in childhood

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all episodes of learning during the intervening period and we are unable to separate out any sequential ordering of when courses were taken.

[5] The responses to this question were changed slightly between the waves: The scale has been slightly changed. A five-point scale was used in both waves, but at 46 starts from very poor, poor, fair, good and goes up to excellent, and at 50 starts from poor, fair, good, very good and goes up to excellent. Sensitivity analysis revealed that these differences influenced the overall integrity of the measure and as such, it was not modelled as a health outcome but used as a control for adult circumstances at age 46.

- Parents' interest in child's education

- *Individual characteristics in childhood and adolescence*
  - Gender
  - Achievement in maths and reading at age 11
  - Whether cohort member attended a private school
  - Whether cohort member was bullied at school and whether they truanted frequently
  - Psychosocial adjustment in childhood
  - Teacher-ratings of child personality and characteristics in adolescence including whether they are impulsive, aggressive, sociable and hardworking
  - School motivation

2.3 Analytic strategy

The central aim of this report is to examine the association between participation in adult learning and wellbeing and health outcomes. There are two stages in our analysis. We begin by presenting descriptive statistics on overall levels of participation in adult learning, and separate out key types of lifelong learning: namely, participation leading to both academic and vocational qualifications (i.e. accredited learning); participation in leisure or interest-related courses; and work-related training (non-accredited learning). We are further interested in whether the relationship between adult learning and wellbeing and health outcomes differs according to individual characteristics such as educational background or gender, and we separate these summary analyses across relevant groups.

In the second stage of our analysis, we attempt to estimate the impact of qualifications acquired in adulthood or participation in other types of learning on individuals' wellbeing and health. Using data gathered across three separate time points in adulthood - ages 42, 46 and 50 - we are able to investigate whether participation adult learning in one period, age 42 to 46, is associated with changes in adult wellbeing and health-related outcomes in the next period, i.e. between 46 and 50. This approach allows for causal statements and a more robust data analysis, however it also had its downsides. We are potentially measuring the outcomes too long after episode of learning, for example, if learning took place at 42 and the change in life -satisfaction happened around the age of 50. Nevertheless we cannot overcome this problem since we do not have more precise data on the specific time of learning and change in well-being related outcomes.

The first step in this regression analysis estimates the raw relationship between participation and change in a given outcome (model 1). In models 2 and 3, we include additional controls to examine whether this relationship remains significant after taking into account other factors known to influence wellbeing and health outcomes, as well as the likelihood of engaging in adult learning. Specifically model 2 includes family background

and individual characteristics measured in childhood and adolescence, while model 3 includes measures of concurrent adult circumstances and social status. In the final model we also check for any changes in economic activity, marital status or general health between the age of 42 and 46. All models control for the outcome variable measured at age 46.

In summary, the modelling strategy for each outcome consists of:

Model 1:

$$y_i^{50} - y_i^{46} = \beta_0 + \beta_1 y_i^{46} + \beta_2 \Delta learning_i^{46-42}$$

Model 2:

$$y_i^{50} - y_i^{46} = \beta_0 + \beta_1 y_i^{46} + \beta_2 \Delta learning^{46-42} + \beta_3 childhood + \beta_4 parental$$

Model 3:

$$y_i^{50} - y_i^{46} = \beta_0 + \beta_1 y_i^{46} + \beta_2 \Delta learning^{46-42} + \beta_3 childhood + \beta_4 parental + \beta_5 adult$$

Model 4:

$$y_i^{50} - y_i^{46} = \beta_0 + \beta_1 y_i^{46} + \beta_2 \Delta learning^{46-42} + \beta_3 childhood + \beta_4 parental + \beta_5 adult + \beta_6 \Delta adult^{46-42}$$

This estimation approach is designed to overcome the problem of endogeneity or selection bias, as a response to the possibility that individuals who undertake lifelong learning are not a random subset of the population and may receive differential benefits. For example, individuals who engage in adult learning may be more able as well as more motivated, happier and healthier individuals. Equally, certain forms of lifelong learning may be largely undertaken by those who missed out on adequate schooling earlier in life or who find themselves out of the labour force in adulthood and need to retrain, which may also have a negative effect on individual wellbeing. Thus a key challenge in our analysis is ensuring that we have accounted for the possibility of omitted variable bias, which is likely to arise if unobserved family or child characteristics are correlated both with participation in adult learning and their later wellbeing. Our principal strategy for securing unbiased estimation of adult learning effects is by adopting the change-on-change or first difference model, and then to explore whether any effect found is robust to the inclusion of a wide range of prior measures of relevant individual and family characteristics.

Our models also include the value of the outcome variable measured at age 46 (the dependent variable lagged, for example, previous life-satisfaction as a determinant of subsequent changes in life-satisfaction) to deal with regression to the mean. The regression to the mean is exhibited when unusually large or small measurements tend to be followed by measurements that are closer to the mean. Often it can make natural variation in repeated data look like real change. Finally, we allow for heterogeneity in our analytic strategy by extending the basic ordinary least squares (OLS) model to allow for differences based on a person's characteristics in their participation in lifelong learning. In particular, we investigate whether the wider benefits of lifelong learning vary according to

an individual's initial level of education. Previous work has suggested that these interactions are likely to be particularly important; Dearden et al., (2000) for example, find that certain vocational qualifications have a higher pay-off for lower ability individuals. We also run subsample analysis by gender to explore whether males and females are differentially affected by the forms of adult education we consider.

3. Descriptive results

Looking first at the outcome variables, Table 1 reports the descriptive statistics across all six wellbeing and health indicators, and across the two time points.

Table 1: Mean and standard deviations of wellbeing and health outcomes at 46 and 50

	Age 46*			Age 50	
	Mean	Std. Dev.	*ttest diff*	Mean	Std. Dev.
Wellbeing outcomes:					
Life satisfaction (*scale: 0 to 10*)	7.6	(1.46)	***	7.3	(1.85)
Malaise (*9 items*)	1.5	(1.75)	*ns*	1.5	(1.94)
Self-efficacy (*scale: 3 to 6*)	5.7	(.64)	***	5.6	(.76)
Health-related outcomes:					
Alcohol use (*frequency of drinking scale: 0 to 5*)	3.3	(1.50)	***	3.4	(1.53)
Smoking (*no. cigarettes per day*)	3.5	(7.87)	***	3.2	(7.46)
Exercise frequency (*scale: 0 to 6*)	2.4	(2.29)	***	3.3	(2.18)

Note: * Malaise, i.e. depression, is measured at ages 42 and 50
† p ≤ .1; * p ≤ .05; ** p ≤ .01; *** p ≤ .001

Life satisfaction and self-efficacy both show a significant decline between 46 and 50, while the overall malaise remains the same - below the level considered to indicate a risk of clinical depression. In terms of health outcomes, there is a slight increase in the frequency of drinking but a significant decline in the number of cigarettes smoked per day and the amount of exercise taken.

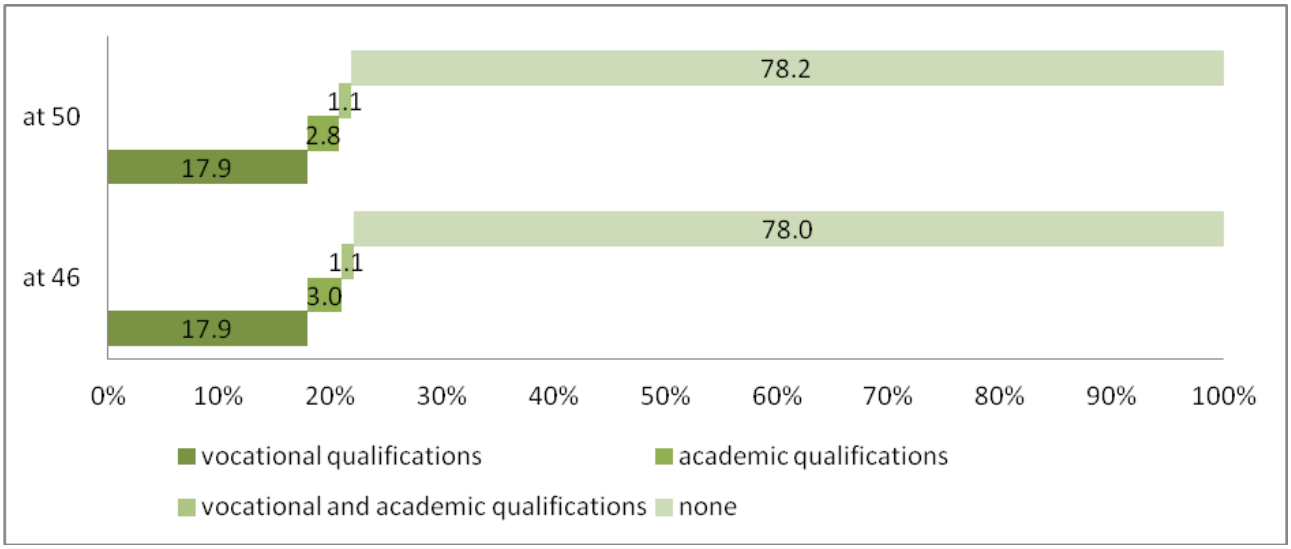
Appendix Table 1 shows these descriptive results by gender and shows that at age 46 women have higher life satisfaction than men and a greater decline to age 50, at which point the gender differences are no longer significant. The gendered descriptives also indicate that while women have, on average, a higher overall malaise than men, as in the full sample they show no change across the two waves of data collection. Finally, women drink and smoke less frequently than men at both 46 and 50, but show no difference in terms of the frequency with which they exercise.

3.1 Participation in lifelong learning: Gaining academic and vocational qualifications

Turning to the descriptive results summarising participation in lifelong learning, Figure 1 shows the distribution of qualifications gained at ages 46 and 50 since the previous sweep (i.e. ages 42 and 46 respectively) and reveals an almost identical pattern: approximately 3% of the cohort gained academic qualifications only, 18% gained vocational qualifications only and 1% gained both. Overall, the majority (78%) of NCDS study members did not gain any additional qualifications in their 40s. This result is consistent with previous research, indicating that around 18% of individuals gained vocational qualifications between 33 and 42 (see for example, Feinstein et al, 2003; Jenkins, Vignoles, Wolf, &

Galindo-Ruenda, 2002), whilst a slightly higher proportion gained some academic qualifications (9%).

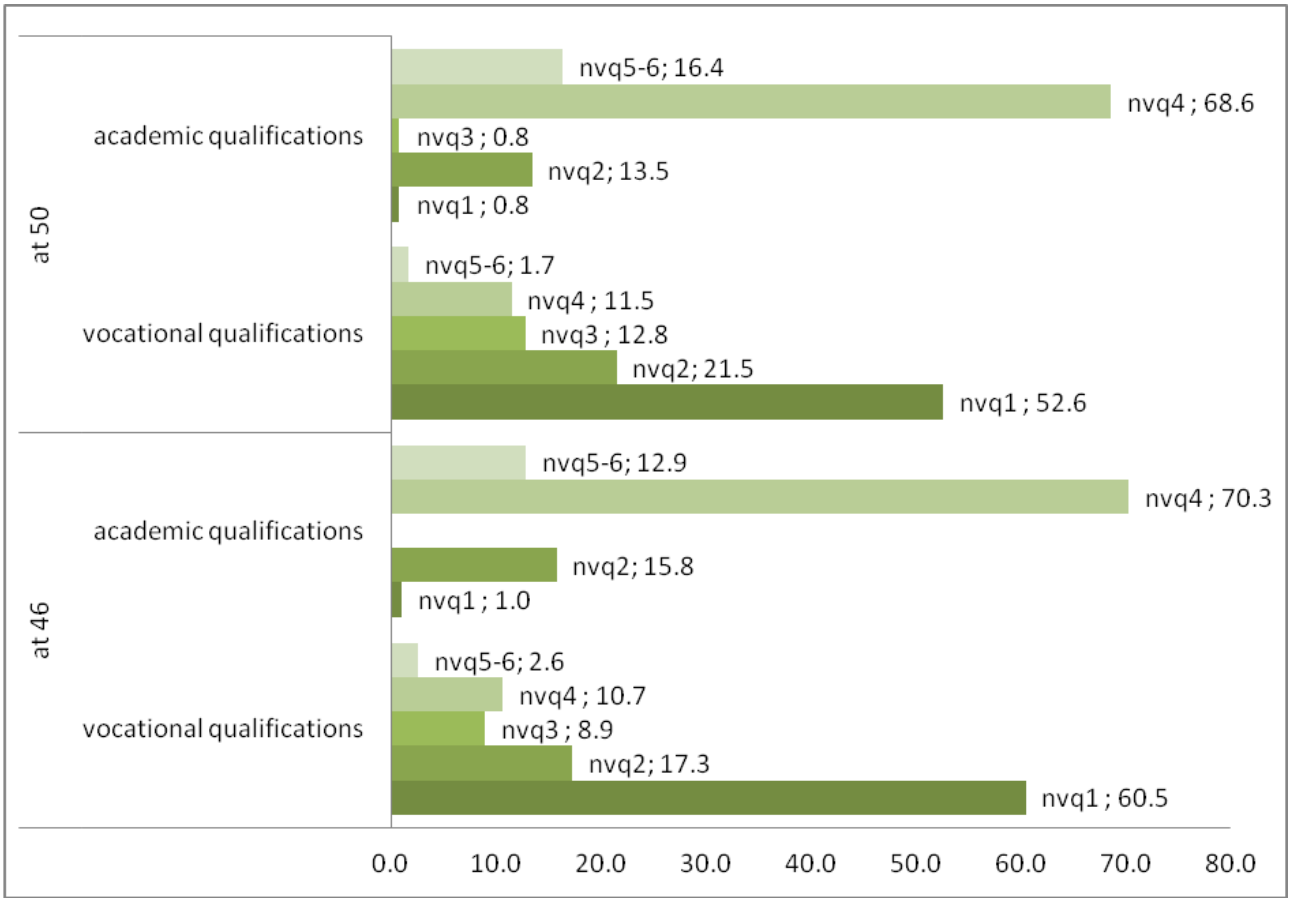
Figure 1: Qualifications gained since the previous sweep at 46 & 50



Note: NCDS age 46 N=9,530; NCDS age 50 N=9,761

Figure 2 shows the levels of qualifications gained by those participating in adult learning. While the small proportion of individuals gaining academic qualifications tend to do so at a high level (around 70 per cent of those gaining academic qualifications achieved level 4 academic qualifications), more than half of those undertaking vocational courses achieve qualifications at Level 1.

Figure 2: Levels of qualifications gained at 46 & 50, NCDS data



Note: NCDS age 46 N=9,530; NCDS age 50 N=9,761

The most frequent types of mainstream qualifications gained were NVQ related (17% of those gaining qualifications achieved NVQs) and City and Guilds (7.6%), with more than four in ten (44.8%) achieving 'other' types of qualifications.

Participation by prior level of education

Table 2 summarises the qualifications gained by prior education level and shows for each level of education the percentage gaining academic or vocational qualifications at each sweep. For example, 2.6% of individuals with no qualifications gained an academic qualification between the ages of 42 and 46, and, therefore, 97.4% of those without qualifications did not.

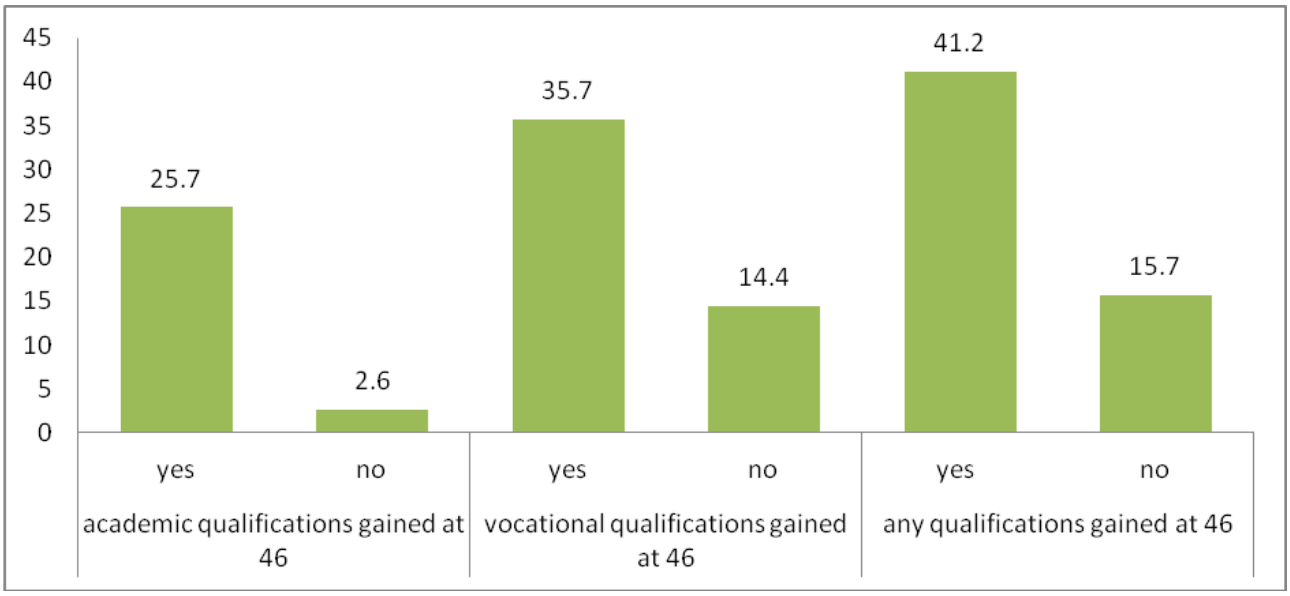
Table 2: Percentage of cohort members engaged gaining qualifications, by prior level of education

	Academic qualifications gained				Vocational qualifications gained			
Prior highest qualification	Between 42 & 46		Between 46 & 50		Between 42 & 46		Between 46 & 50	
	N	%	N	%	N	%	N	%
None	175	2.6	14	1	871	15	365	12.5
NVQ1 level	2	1.6	11	0.9	327	25.8	327	20.9
NVQ2 level	39	6.7	84	2.8	112	26.2	200	22.2
NVQ3 level	6	10.7	40	5.5	164	30.6	310	24.1
NVQ4 level	111	12.9	131	7.6	106	30.1	327	19.7
NVQ5-6 level	21	14.9	24	8.6	5	45.5	19	36.5
TOTAL	*354*	*4.2*	*304*	*3.6*	*1,586*	*18.9*	*1,548*	*18.4*

Table 2 shows that it is individuals who already have high levels of education who are most likely to participate in adult education and gain additional qualifications. These results are consistent with prior empirical studies (Jenkins et al, 2002; Sabates et al, 2007), demonstrating that it is by and large more educated people who are undertaking lifelong learning, rather than those who have no prior qualifications. This is particularly the case for academic qualifications where there is a linear relationship between the highest level of existing qualifications and gaining additional academic qualifications. These findings are further evidence of the cumulative and multiplier effects of learning, and lend support to Heckman's hypothesis that 'skills beget skills' (Cunha & Heckman, 2007).

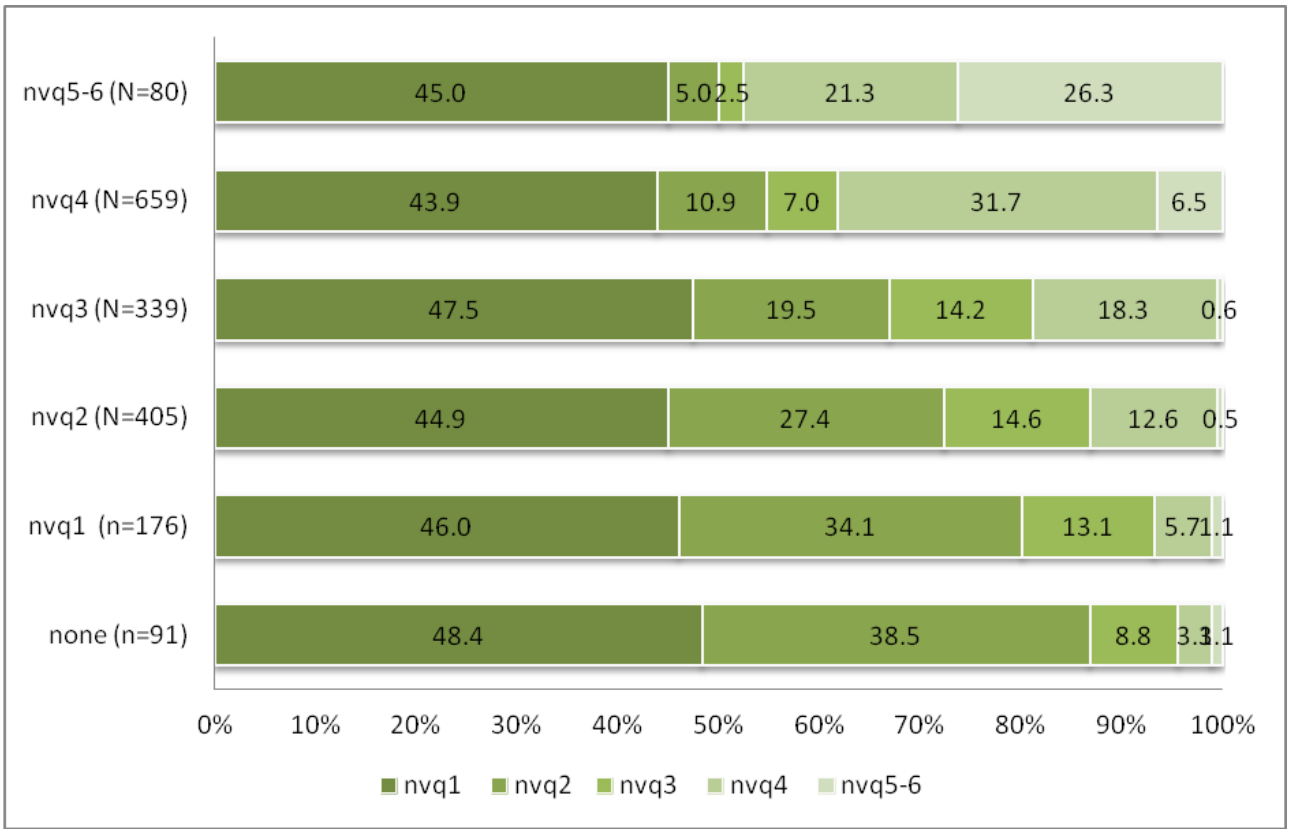
This is also evident when looking at continuity in adult learning, i.e. individuals who participated in learning between ages 42 and 46 and again between 46 and 50 (Figure 3). For example, 41% of those who gained a qualification between 42 and 46 also gained a qualification by the age of 50 compared to only 16% of those who had not gained a qualification by 46. This suggests that for the NCDS cohort much of their participation in adult learning is for the sake of learning and the experience that learning provides, rather than aiming to progress from one level to another.

Figure 3: Percent gaining qualifications between 46 and 50, by participation in adult learning in the previous period



A more detailed account of the qualifications gained by prior highest qualifications is summarised in Figure 4 and shows that the most common level of qualifications gained is at Level 1.

Figure 4: Levels of any qualifications gained at age 50, by the highest prior qualification at age 46

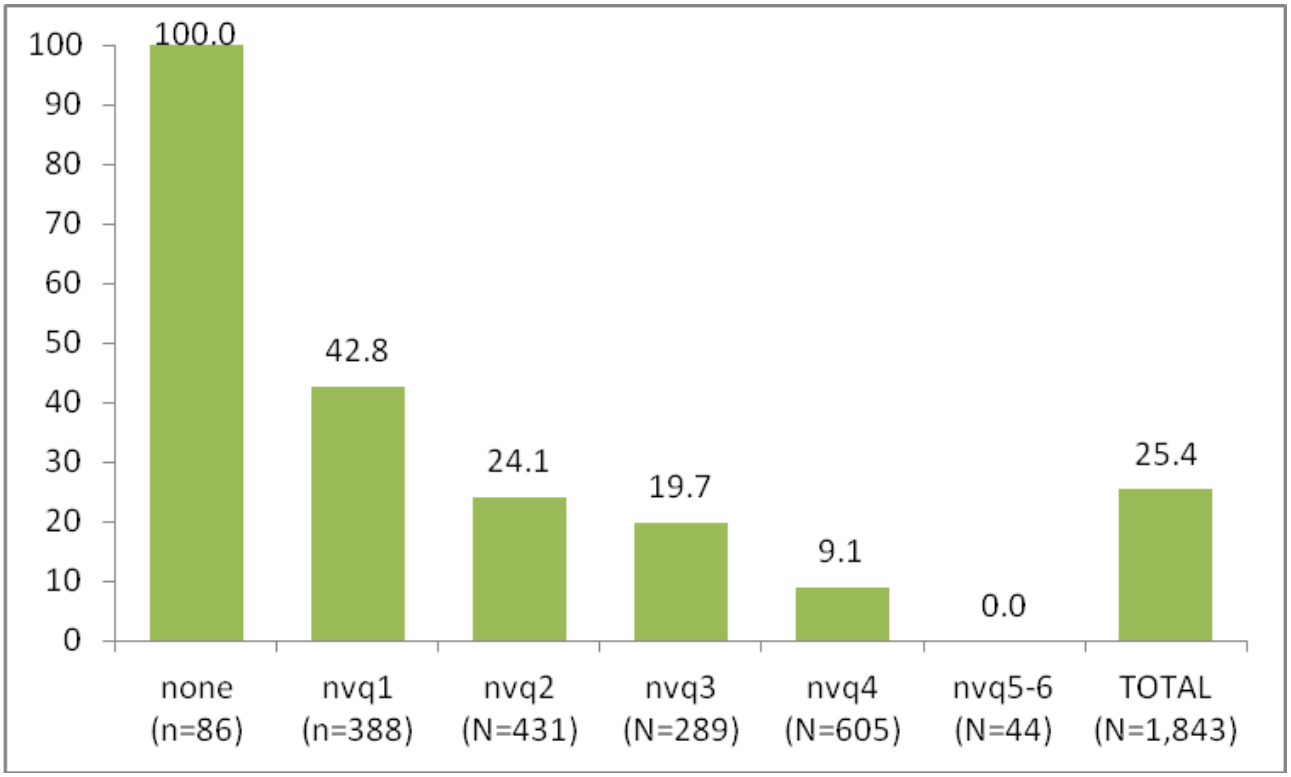


NOTE: Data is based only on those who gained a qualification.

Progression

Concerning progression to a higher level qualification, the data suggest that individuals with low levels of prior qualifications are more likely to gain their qualifications at a higher level than the level of qualifications they already possess Figure 5). However, overall only a quarter of those who gained an academic or vocational qualification actually experienced any form of progression.

Figure 5: Progression based on the highest level of qualification prior to 42 and proportion of those who gained a higher level qualification between 42 and 46



NOTE: Data is based only on those who gained a qualification. Progression is calculated as moving up at least one NVQ level. Therefore, those who start with no qualifications have a 100% progression rate and those with the level 5 or above have a 0% progression rate.

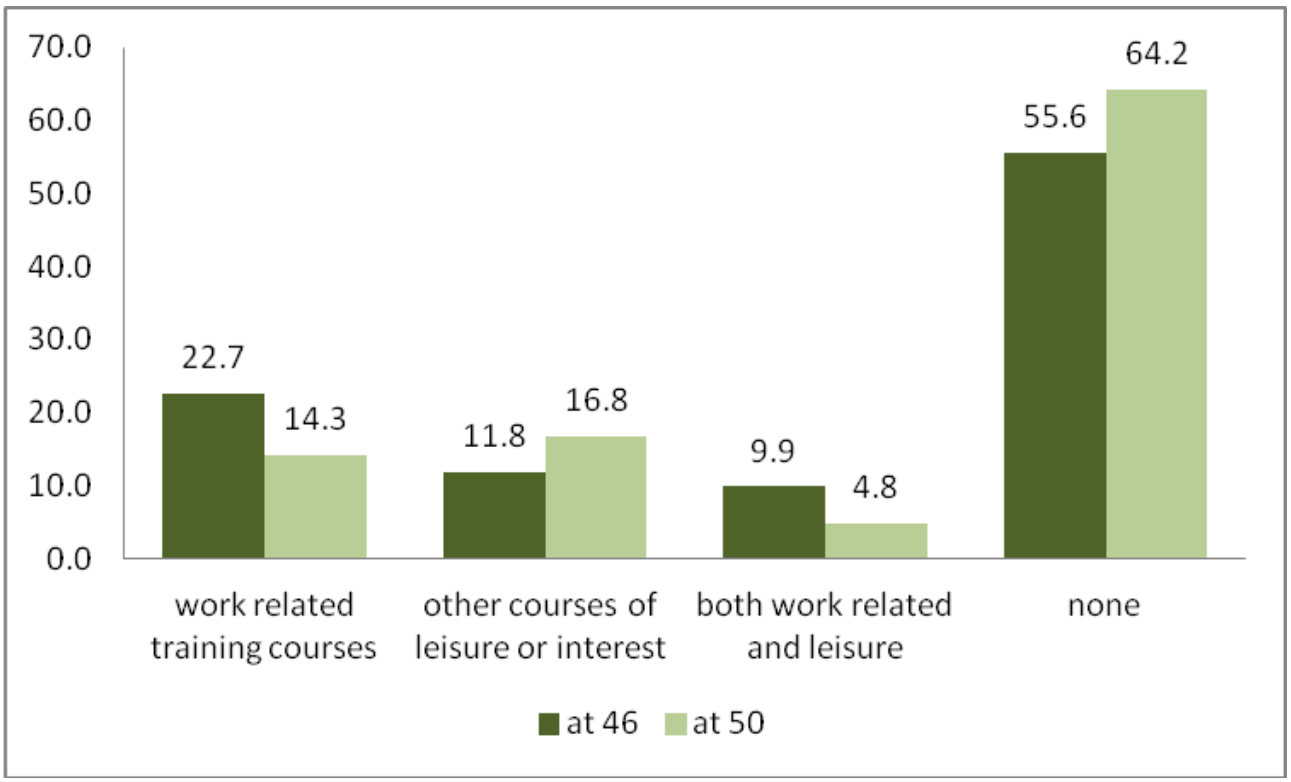
Clearly these results are bound by floor and ceiling effects, whereby individuals who previously had no qualifications can only show progression whereas those who already level 5-6 qualifications are much less likely to demonstrate progression. Of the remaining groups, those with level 1 qualifications show the greatest amount of progression. Results are similar for qualifications gained between 46 and 50.

3.2 Participating in non-accredited leisure or work-related learning

In addition to accredited courses where individuals can gain academic or vocational qualifications, cohort members were also asked about other work or leisure related training and courses they engaged in since the previous sweep (see Figure 6). In contrast to accredited courses, far more of the NCDS cohort has participated in non-accredited courses: just over four in ten between the ages of 42 and 46 (44%) and over a third between the ages of 46 and 50 (36%). The lower proportion at the later age bracket may

be partially explained by there being a lower proportion of cohort members in workforce at the age of 50.

Figure 6: Work related training courses and other leisure or interest related courses attended at age 46 and at age 50



The results in Figure 6 are slightly lower than those from earlier sweeps of the NCDS which indicate that between the ages of 33 and 42, 31% of individuals participated in unaccredited work related training while 24% of individuals took leisure courses. As for accredited learning, participation in non-accredited courses is greater amongst those who engaged in learning in the previous period. Moreover, those who take accredited courses are also more likely to participate in non-accredited learning, further supporting arguments that learning begets learning (Table 3).

Table 3: Percentage of cohort members engaged in non-accredited courses and qualification gained in the same time period

Engagement in non-accredited courses	Gained a qualification between 42 and 46		Gained a qualification between 46 and 50	
	Yes	No	Yes	No
Work-related training courses	30.8	20.5	16.6	13.6
Other courses of leisure or interest	14.2	11.1	18.6	16.3
Both work related and leisure	15.9	8.2	7.2	4.1
None	39.2	60.3	57.6	66.0
Total N	***2,081***	***7,418***	***2,126***	***7,619***

3.3 Characteristics of those who participate in lifelong learning

Table 4 shows the results of descriptive analysis of those who gained vocational or academic qualifications between 42 and 46, and 46 and 50.

Table 4: Percentage of cohort members participating in accredited learning at 46 and 50

	Qualifications gained	
	At 46	At 50
GENDER		
Male	17.7	19.0
Female	26.0	24.6
MARITAL STATUS		
Single/separated, divorced/widowed	20.6	22.0
Married/cohabiting	21.6	21.8
CHILDREN in household		
Yes	22.0	21.8
No	19.7	19.5
CM's EMPLOYMENT STATUS		
Employed	20.8	21.6
Unemployed	30.7	25.2
Economically Inactive	24.9	16.5
CM's SOCIAL CLASS		
High (Professional / Managerial)	23.0	22.8
Medium (Intermediate occupations)	18.3	19.8
Low (Routine skilled & unskilled)	21.6	22.7
AGE 16 QUALIFICATIONS		
CSE 1 or O levels	23.8	22.4
CSE 2 to 5	21.2	24.0
None	20.0	18.9
FATHER'S SOCIAL CLASS (CM age 7)		

	Qualifications gained	
	At 46	At 50
High (RGSC I & II)	23.0	21.4
Medium (RGSC IIIm & IIInm)	21.4	21.7
Low (RGSC IV & V)	22.8	22.4

Overall, our results are consistent with previous research on participation in lifelong learning (Jenkins et al, 2002; Sabates et al, 2007). Female cohort members are more likely to gain qualifications, but gender differences appear to become smaller with age, reducing from almost 10 percentage points for qualifications gained between 42 and 46 to just 5 percentage points for those gained between 46 and 50. The data also suggest that while there is no association between lifelong learning and marital status, those individuals who have children in their household are slightly more likely to gain qualifications than those from households without children.

Individuals who are economically inactive and particularly those who are unemployed are more likely than those in employment to gain qualifications at both time points.[6] This finding is likely to reflect the fact that those out of work but seeking employment are attempting to up-skill in order to improve their prospects in the labour market; those who are inactive, however, i.e. in full-time education[7], looking after home or family, sick/disabled, or wholly retired, may be engaged in adult learning for pleasure or interest.

Contrary to some previous research (Beinart and Smith, 1998; Sargant et al, 1997), an individual's own social class or that of their father's in childhood does not show a clear relationship with the likelihood of gaining qualifications in these data. Those from the highest social class groups are marginally more likely to gain qualifications at both time points in adulthood. However, in support of Heckman's 'learning begets learning' thesis, cohort member's school qualifications at 16 show a clear positive linear association with subsequent participation in lifelong learning.

Turning to the characteristics of non-accredited learning, Table 5 shows the results of descriptive analysis of those who have participated in leisure related learning and work related training after the age of 42; that is between 42 and 46.

[6] Note, however, that the proportion of the whole sample unemployed is less than 2 percent at either time point reflecting both the period when these questions were asked – 2004 and 2008 – and the age of the cohort, 46 and 50 years old.

[7] Note that at both time points, those in full-time education are less than 20 percent of the economically inactive group while those looking after family make up approximately half.

Table 5: Percentage of cohort members participating in leisure and work-related non-accredited learning between 42 and 46

	Leisure or interest related learning at 46	Work-related training at 46
GENDER		
Male	19.3	36.6
Female	24.2	28.6
MARITAL STATUS		
Single/separated, divorced/widowed	22.6	31.1
Married/cohabiting	21.1	31.9
CHILDREN in household		
Yes	20.7	31.4
No	23.6	32.8
CM's EMPLOYMENT STATUS		
Employed	21.5	33.7
Unemployed	11.0	29.9
Economically Inactive	21.6	17.3
CM's SOCIAL CLASS		
High (Professional / Managerial)	27.4	42.2
Medium (Intermediate occupations)	17.3	29.4
Low (Routine skilled & unskilled)	18.5	19.6
AGE 16 QUALIFICATIONS		
CSE 1 or O levels	27.1	34.8
CSE 2 to 5	16.0	30.6
None	17.2	28.5
FATHER'S SOCIAL CLASS (CM age 7)		
High (RGSC I & II)	26.0	32.0
Medium (RGSC IIIm & IIInm)	21.1	33.0
Low (RGSC IV & V)	19.4	30.9

Again, the results are in line with other empirical findings in the area (Jenkins et al, 2002; Feinstein et al, 2003; Sabates et al, 2007). Female cohort members are more likely to participate in leisure-related learning (19% compared to 24%), but are less likely to take up work-related training (29% compared to 37%). These gender differences might be explained by a higher proportion of men being economically active between the ages of 42 and 46, as well as by the different types of jobs that men and women are typically involved in. As with accredited learning, the data again show no evidence of a relationship between lifelong learning and marital status. Contrary to the results in Table 4, however, those with children at home are slightly less likely to participate in both leisure and work-related learning than those from households without children.

Unsurprisingly, those in employment are most likely to have participated in work-related training. However, in line with the results above, those who are unemployed are also engaging in work-related training but are fairly unlikely to participate in leisure or interest-related learning; around a third of these individuals are attempting to retrain or up-skill to improve their job opportunities. There is also a strong relationship between the cohort member's current social class and their participation in non-accredited learning, with those in higher social class occupations more likely to participate in both leisure and work related learning and training.

In terms of family background, father's social class at age 7 appears to have a linear relationship with participation in leisure or interest-related learning in adulthood (those from the most advantaged background are more likely to engage) but not with work-related training. And again, as in Table 4, those with higher qualifications at age 16 participate more in both types of non-accredited learning than those with lower or no qualifications at the end of compulsory schooling.

4. Multivariate analysis: The contribution of adult learning to wellbeing and health related outcomes

4.1 The contribution of accredited learning in adulthood

Turning to the results of our multivariate analysis, we first examine the relationship between participation in accredited learning and adult wellbeing. Given the small number of individuals completing academic qualifications compared with those completing vocational courses, we create a single binary indicator to indicate whether or not cohort members participated in any form of accredited learning leading to a qualification.

As noted above, we estimate change models. That is we estimate whether participation in adult learning in one period, namely age 42 to 46, is associated with changes in different indicators of adult wellbeing and health-related outcomes in the next period, i.e. between 46 and 50, whilst controlling for a rich set of family background and individual level controls. In this way, our analytic approach deals with issues of selection and omitted variable bias, and our estimates are a best effort at establishing causal associations between lifelong learning and adult wellbeing and health-related outcomes. Each separate regression reports the results from three models: model 1 gives the unconditional estimate of the effect of participation in adult learning and, for example, life satisfaction; model 2 adds in controls for family background and individual characteristics in childhood and adolescence; model 3 includes concurrent indicators of adult social and economic circumstances. The estimates presented in Tables 6, 7, and 8 are standardised beta coefficients, and reflect the magnitude of the relationship between participation in accredited learning and each measure of adult wellbeing, conditional on the full set of covariates detailed in the Methods section above.

Table 6 shows the contribution of participation in accredited learning between the ages of 42 and 46 on changes (that is, improvements) in life satisfaction and separately on changes (that is, any reduction) in depression between 46 and 50.

Table 6: Estimated effects (standardised betas) of having gained qualifications in accredited forms of adult learning between the age of 42 and 46

	Model:	(1)		(2)		(3)	
Outcome:		β		B		β	
Change in life satisfaction	Combined sample	.02	*	.02	†	.01	
	Male	.02		.01		.01	
	Female	.03	*	.03	†	.02	
Change in depression score	Combined sample	-.01		-.02		.00	
	Male	-.01		-.01		.00	
	Female	-.02		-.02		.00	
Change in self-efficacy	Combined sample	.00		.00		-.01	
	Male	-.03	†	-.03	†	-.04	*
	Female	.02		.01		.00	

† p ≤ .1; * p ≤ .05; ** p ≤ .01; *** p ≤ .001

Our results show a significant positive effect of gaining qualifications on change in life satisfaction. This result is robust to the inclusion of controls for family background and individual characteristics up to age 16 (model 2). However, when adult controls for marital status, current socioeconomic position and highest educational qualifications are included (model 3) in the model, the coefficient decreases in size and becomes non-significant. The improvement in life satisfaction can then be explained by the characteristics of those engaging in accredited learning, rather than qualification gain as such. Sub-sample analysis by gender further indicates that this result is only significant for males where the effect size is more than twice that of the male group.

We have also estimated Model 4[8] controlling for change in economic activity, marital status and general health, but it did not have any effect on the coefficient or significance level of the participation in accredited learning for all three outcomes.

Contrary to previous research (Feinstein et al., 2003), our findings did not include a significant relationship between gaining qualifications and a reduction in depression. We find a small negative effect of accredited learning on self-efficacy for males only. The descriptive statistics in Appendix Table 1 suggest a general decline in self-efficacy between ages 46 and 50 for both men and women, but it appears that participation in accredited learning does carry some potential negative effects. This result could suggest that men undertaking accredited learning do so following job loss which may continue to affect their self-efficacy in the following period. Despite controlling for economic status at age 46 and any changes between 42 and 46, this result may also reflect circumstances measured at age 50 which correlate with the self-efficacy outcome. We discuss the possible negative effects of adult learning in our final section. Finally, our analyses provide no evidence on the effect of accredited adult learning on health-related outcomes such as smoking, alcohol use or exercising.

[8] This is not presented in the table to simplify the presentation of the results.

4.2 The contribution of leisure or interest-related learning in adulthood

Table 7 examines the contribution of leisure or interest-related learning in adulthood on our health and wellbeing outcomes, using the same analytic strategy and estimation models as in section 4.1 above.

Table 7: Estimated effects (standardised betas) of having participated in leisure or interest-related forms of adult learning between the age of 42 and 46

	Model:	(1)		(2)		(3)	
Outcome:		β		B		β	
Change in life satisfaction	All	.03	**	.02	†	.02	†
	Male	.01		.00		.00	
	Female	.05	**	.04	†	.04	†
Change in depression score	All	-.02	*	-.02	†	-.02	
	Male	-.01		.00		.00	
	Female	-.04	**	-.03	*	-.03	*
Change in self-efficacy	All	.03	***	.02	*	.02	*
	Male	.02		.00		.00	
	Female	.05	***	.04	**	.04	**

† p ≤ .1; * p ≤ .05; ** p ≤ .01; *** p ≤ .001

For accredited learning there is a positive effect of leisure-related learning on later life-satisfaction, indicating that participation in this form of adult education between 42 and 46 leads to improvements in life satisfaction between 46 and 50. The inclusion of family background controls and individual characteristics during childhood and adolescence reduces the size of the estimated effect, but the association remains significant at the 10 percent level. However, when we split our sample by gender and run separate analysis, we again see that this positive effect only holds for women.

For depression, there is a significant effect of participation in leisure-related learning, i.e. a reduction in depression, though in the full sample the size of this effect is reduced, becoming non-significant in model 3 when controls for adult circumstances and social standing are included in the estimation. For women, however, the estimated effect is robust to the inclusion of the full set of covariates.

The final panel in Table 7 shows the relationship between participation in leisure-related learning and self-efficacy. The full sample analysis shows a significant effect of engagement in this type of adult learning and an increase self-efficacy, robust to the inclusion of the full set of covariates in our analyses. As with the other outcomes, in the gendered analyses, this effect is only found for females and is twice the size of the effect observed for all cohort members. Again, our analyses provides no evidence of a relationship between participation in adult learning and the health-related outcomes considered.

We have also estimated Model 4 controlling for change in economic activity, marital status and general health, but it did not have any effect on the coefficient or significance level of

the participation in leisure-related learning for all three outcomes and both the full sample and split by gender.

4.3 The contribution of work-related training in adulthood

Finally, Table 8 shows the contribution of work-related training between the ages of 42 and 46 on the same wellbeing outcomes between ages 46 and 50, again using the same analytic strategy and estimated models as in section 4.1 above.

Table 8: Estimated effects (standardised betas) of having participated in work-related training between the age of 42 and 46

	Model:	(1)		(2)		(3)	
Outcome:		β		B		β	
Change in life satisfaction	All	.03	***	.03	*	.02	†
	Male	.04	**	.03	**	.02	
	Female	.03	†	.02		.02	
Change in depression score	All	-.04	***	-.03	*	-.01	
	Male	-.04	**	-.03	*	-.02	
	Female	-.03	†	-.02		-.01	
Change in self-efficacy	All	.04	***	.03	**	.02	*
	Male	.04	**	.03	*	.02	
	Female	.04	*	.03	*	.03	†

† p ≤ .1; * p ≤ .05; ** p ≤ .01; *** p ≤ .001

Our results show evidence of a positive effect of participation in work-related training and improved life satisfaction. In model 2 and particularly model 3, the inclusion of control variables reduces the size of this effect, decreasing the significance level to just 10 percent. This finding suggests that while there is a small contribution of work-related training to improvements in the life-satisfaction of individuals, much of this association is mediated by the fact that concurrent factors such as employment, occupational and marital status are directly linked to participation in work-related training. As noted in the descriptive analysis in Table 5, this effect is driven by male cohort members.

The results with respect to depression are very similar to those observed for life-satisfaction. The data show some evidence of a positive effect of participation in work-related training on the reduction of depression in cohort members, but the effect only holds for males, and becomes statistically insignificant when age 46 covariates are included in the model.

As for leisure-related learning above (Table 7), we also find evidence of a positive effect of engagement in work-related training and improvements in self-efficacy that is robust to the inclusion of all covariates. Moreover, this association is fairly similar for both men and women, although it becomes non-significant in model 3 for males. It is interesting that it is not accredited qualifications that increase self-efficacy, but rather participation in leisure or work-related learning and training. Again, our analyses find no impact of work-related training on health-related outcomes. We discuss these and all other key findings in our discussion section below.

We have also estimated Model 4 controlling for change in economic activity, marital status and general health, but it did not have any effect on the coefficient or significance level of the participation in work-related training for all three outcomes and both the full sample and split by gender.

5. Discussion

The main aim of this research was to investigate the contribution of adult learning to wellbeing and health-related outcomes. The study builds on previous work on the wider, non-pecuniary benefits of lifelong learning which reports positive associations between participation in lifelong learning and outcomes such as depression, the uptake of preventative healthcare and obesity (Feinstein, 2002; Feinstein, et al., 2003; Sabates & Feinstein, 2004), by using the most recently available data and employing analytic techniques that move beyond bivariate associations and move towards causal effects.

Overall, our results are consistent with much of the previous literature on the wider benefits of lifelong learning. Females are more likely than men to participate in all forms of adult learning except for work-related training which probably reflects the fact that fewer women are economically active. The findings presented here also show that once in their 40s, members of the 1958 NCDS are more likely to gain vocational qualifications than academic qualifications. Detailed examination of the level of courses taken further suggest that much of the accredited learning that takes place between the ages of 42 and 50 is more for the sake of learning than for progression. Only around a quarter of individuals who actually gained qualifications did so at a higher level than those they already held. Moreover, in contrast to the more formal, accredited forms of adult education, an even higher proportion of individuals participate in non-accredited forms of learning such as leisure or interest-related courses or work-related training.

Participation in any type of adult learning in one time period, i.e. between 42 and 46, is positively and strongly associated with participation in the next period, between 46 and 50. Our results are thus consistent with Heckman's view that 'learning begets learning', as well as other empirical findings which highlight that conditional on a host of key factors, the strongest predictor of adult learning is engagement earlier in the life course (see, for example, Jenkins, et al., 2003). Our findings clearly illustrate that it is those who already have good levels of education and the more able who are undertaking lifelong learning, rather than those who missed out on school qualifications the first time around and who are attempting to boost their skills (see also Beinart and Smith, 1998; Green, 1999; Jenkins et al, 2002; Sabates et al, 2007; Sargant et al, 1997). However, the notion that learning begets learning may depend on the circumstances which motivate participation in the first place. For example, our descriptive results suggest that individuals who are economically inactive and particularly those who are unemployed are more likely than those in employment to gain qualifications at both time points. For those out of work but seeking employment, this might reflect a need to retrain or up-skill in order to improve their prospects in the labour market, while for those who are out of the labour force engagement in adult learning may be purely for pleasure or interest's sake.

Similarly, we find that individuals with children at home are more likely to participate in accredited forms of learning than those who do not, while at the same time, those without children are less likely than those with children to participate in leisure-related courses. This finding again may reflect differences in the underlying motivation to pursue adult education. For example, parents' education and the educational investments families make in their children is a key mechanism highlighted in research on the intergenerational transmission of advantage (for reviews, see Ermisch, Jäntti & Smeeding, 2012; Feinstein, Duckworth & Sabates, 2008). De Coulon, Meschi and Vignoles (2008) showed, for

example, a positive and significant relationship between parents' skills in literacy and numeracy and their children's cognitive development over and above the impact of highest qualifications achieved by parents. They further found that this positive relationship was stronger for parents with low levels of qualifications, indicating the importance of parental cognitive capabilities in adulthood for children who might be at risk of not doing so well in school. Parents may then choose to participate in accredited learning with the specific objective of helping their children and improving their outcomes. Clearly it is necessary to understand the relationship between learning and individual outcomes, but equally it is important to understand the reasons and motivation for participation in learning. An improved understanding of the relation between participation, learning, and outcomes will enable a more detailed and elaborate analysis of how the wider benefits of lifelong learning are realised.

In terms of the contribution of adult education to wellbeing and health-related outcomes, we find that there is evidence of statistically significant and robust effects of participation in lifelong learning, but the size, direction and beneficiary of the effects depend on the outcome considered, the type of learning under investigation and the cohort member's gender. In terms of accredited forms of adult learning, we initially find evidence of an effect on life satisfaction. However, this association is not robust to the inclusion of controls for concurrent adult social and economic status and is related to women rather than to the full sample.

We also show evidence of an effect of accredited learning on changes in men's self-efficacy. Interestingly however, this relationship is negative: conditional on a broad range of family background, individual characteristics and earlier self-efficacy, men who gain qualifications between 42 and 46 show a decline in self-efficacy between ages 46 and 50. This decline is in addition to the general decline in self-efficacy observed for the sample as a whole and suggests that while lifelong learning is, on the whole, positively linked to wellbeing, such associations are not always linear or straightforward. Using data from the 1970 British Cohort Study, Feinstein and Vignoles (2008), for example, find risks to the mental health of individuals who attend Higher Education against the odds. Their results show that on the basis of development during childhood (early ability etc.) and in relation to the context factors they experienced before age 16, women who were predicted not to go to HE but who nevertheless did participate had a higher risk of mental health problems than individuals from similar backgrounds who did not go on to HE.

The authors highlight the complex set of factors that may impact on an individuals' equality of opportunity and/or life outcomes and the heterogeneity inherent in both individual learners and their outcomes. The negative results we observe between accredited learning and self-efficacy could reflect the fact that men undertaking accredited learning do so following job loss, which may continue to affect their self-efficacy in the following period. Despite controlling for economic status at age 46 and changes between 42 and 46, this result may also reflect circumstances measured at age 50 which correlate with the self-efficacy outcome. While our analysis attempted to take into account such biases, we cannot rule out that the possibility that changes in economic or personal circumstances, like the benefits of learning, do not have sleeper effects that persist over time.

Our results suggest that participation in non-accredited learning has a stronger contribution to individual wellbeing, even after controlling for prior levels of the outcomes considered, and a host of family background and individual characteristics, than does

participation in accredited learning. For example, we find evidence of an effect of leisure or interest-related learning on increased life satisfaction, driven by the relationship for females, as well as improvements for female depression and self-efficacy for the full sample and females. This latter finding is particularly noteworthy, given the previous discussion about participation in accredited learning having a negative impact on men's self-efficacy, and again highlights both the complexity in the relationship between learning and its benefits, and the heterogeneous benefits realised.

Participation in work-related courses also has a small, but significant effect on the wellbeing outcomes considered. In particular, we find evidence of a positive impact of work-related training on both life satisfaction and self-efficacy. The significant unconditional association between work-related training and improvements in depression is reduced once controls are included in the model. That non-accredited learning influences wellbeing outcomes more than accredited adult education is a new and interesting result. As noted above, this finding might be explained by different motivations for participating in different types of lifelong learning and also requires further investigation.

Finally, we note that across all of the types of learning considered, our analyses provide no evidence on the effect of accredited or non-accredited learning on health-related outcomes such as smoking, alcohol use or exercising in adulthood.

5.1 Limitations of the study

In interpreting the findings of our study, it is important to acknowledge some of its limitations. Throughout this report, we have distinguished between types of lifelong learning, but as noted in our methods section, we have been unable to account for variations in the time elapsed since a specific episode of learning. For example, we cannot differentiate between an individual who completed a degree or finished an NVQ level 1 at the age of 43 and someone who did so at 45. The returns to qualifications estimated are therefore averages over the period between the ages of 42 and 46. Not taking account of the time elapsed since participating in lifelong learning may bias our results. For example, some of the benefits of lifelong learning that are short term might be detected only when measured close to the end of a period of learning, while some others might take years to develop and be measurable. Our approach, like those of others (Jenkins at el, 2002; Feinstein et al, 2003), is a convenient simplification, given the data currently available, but the timing of learning is an issue that would benefit from further research.

Our analytic approach attempts to overcome problems of selection and omitted variable bias by using a change-on-change estimation that also controls for prior levels of the outcome concerned, concurrent adult social and economic circumstances and a wide range of family background and individual characteristics measured in childhood and adolescence. To the extent that this approach allows us to account for unobservable characteristics that stay constant over time, the estimates produced can be considered as the impact of adult learning on wellbeing outcomes. However, this approach cannot account for those factors that are not measured, but do change over time, for example individual level of ambition (Feinstein et al, 2003).

Additionally, the change on change modelling allows for causal statements and a more robust data analysis, however we are potentially measuring the outcomes too long after

episode of learning, for example, if learning took place at 42 and the change in life - satisfaction happened around the age of 50. Nevertheless we cannot overcome this problem since we do not have more precise data on the specific time of learning and change in well-being related outcomes.

Finally, related to the arguments above, although we can estimate the overall impact of lifelong learning on well-being we cannot isolate the impact of separate incidents of learning and the effect also includes a degree of continuity. Thus, the effect of adult learning between 42 and 46 includes some effect from the continuing learning that takes place concurrently with the change in well-being between 46 and 50. This is important to acknowledge, especially when there is a high degree of overlap between those individuals who did learning in the two time periods.

5.2 Conclusions

Consistent with previous literature on the wider benefits of lifelong learning, our findings show that it is those who already have good levels of education who engage in adult education. Much participation in lifelong learning is for the sake of learning itself rather than for progression or up-skilling.

Our results are in line with Heckman's view that 'learning begets learning'. However, our findings do indicate that engagement in and patterns of learning may depend on the circumstances which motivate participation in the first place. For example, our descriptive results suggest that individuals who are economically inactive and particularly those who are unemployed are more likely than those in employment to gain qualifications at both time points. Similarly, we show evidence that the effects of learning on individual wellbeing are not necessarily linear or straightforward.

While it remains a priority to identify the relationship between learning and individual outcomes, it is also necessary to understand the reasons, motivation and context for participation if we are also to gain an understanding of the mechanisms that connect lifelong learning with its wider benefits.

References

Aldridge, F., and Lavender, P. (2000). *The impact of learning on health*. Leicester: National Institute of Adult Continuing Education.

Allison, P. (2002). Missing data: Quantitative applications in the social sciences. Thousand Oaks, California: Sage Publications, Inc.

Barton, D., Ivanicˇ, R., Appleby, Y., Hodge, R. and Tusting, K. (2007). *Literacy, lives and learning*. London: Routledge.

Beinart, S. and Smith, P. (1998). *National Adult Learning Survey 1997*. London: DfEE Research Report 49.

Burgess,S., Propper,C. and Rigg,J. (2004). The Impact of Low Income on Child Health: Evidence from a Birth Cohort Study. CASEpaper 85, *Centre for Analysis of Social Exclusion, LSE.*

Bynner, J., Woods, L. and Butler, N. (2002). *Youth factors and labour market experience in job satisfaction*. Working Paper 3. CLS Cohort Studies.

Bynner, J., Schuller, T. and Feinstein, L. (2003). Wider benefits of education: skills, education and civic engagement. Zeitschrift fur Padagogik 49 (3), 341-361.

Comings, J. P. (2009). Student Persistence in Adult Literacy and Numeracy Programmes. In S. Reder and J. Bynner (eds) *Tracking Adult Literacy and Numeracy Skills*. Routledge, New York.

Cunha, F. & Heckman, J. (2007). The technology of skill formation. *American Economic Review*, 97 (2) (2007), pp. 31–47

De Coulon, A., Meschi, E. and Vignoles, A. (2008). *Parents' basic skills and their children's test scores: Results from the BCS70, 2004 parents and children assessments*. NRDC research report, London: National Research and Development Centre for adult literacy and numeracy.

Deary, I. J., Batty, G. D., and Gale, C. R. (2008). Childhood Intelligence Predicts Voter Turnout, Voting Preferences, and Political Involvement in Adulthood: The 1970 British Cohort Study. *Intelligence*, 36 (6), pp. 548-555.

Duncan, G. J., Dowsett, C. J., Claessens, A., Magnuson, K., Huston, A. C., Klebanov, P., Pagani, L. S., Feinstein, L., Engel, M., Brooks-Gunn, J., Sexton, H., Duckworth, K. and Japel, C. (2007). School Readiness and Later Achievement. Developmental Psychology, 43(6), 1428-1446.

Ermisch , M. Jäntti, & T. Smeeding (2012). *From Parents to Children: The Intergenerational Transmission of Advantage*. Russell Sage Foundation: New York.

Feinstein, L. (2002). *Quantitative Estimates of the Social Benefits of Learning, 2: Health (Depression and Obesity)*. Report No.6, Centre for Research on the Wider Benefits of Learning, Institute of Education

Feinstein, L. F., Galindo-Rueda, F. and Vignoles, A. (2004). The Labour Market Impact of Adult Education and Training: a Cohort Analysis. *Scottish Journal of Political Economy*, pp. 266-280.

Feinstein, L., Hammond, C., Woods, L., Preston, J. and Bynner, J. (2003). *The Contribution of Adult Learning to Health and Social Capital*. Report No.8. Centre for Research on the Wider Benefits of Learning, Institute of Education

Feinstein, L.F. and Vignoles, A. (2008). Individual differences in the pathways into and beyond Higher Education in the UK: A lifecourse approach. Journal of Social Issues, 64(1), 115-133.

Field J. (2005). *Social Capital and Life-long Learning*. Policy Press, Bristol.

Field, J. (2009). Learning transitions in the adult life course: Agency, identity and social capital. In *Learning to change? The role of identity and learning careers in adult education*, ed. B. Merrill, 17–31. Frankfurt-am-Main: Peter Lang.

Frijters, P., Johnston, D.W. and Shields, M.A. (2011). Life Satisfaction Dynamics with Quarterly Life Event Data, *Scand. J. of Economics* 113(1), 190–211,

Green, F. (1999). Training the Workers. In P. Gregg, and J. Wadsworth, *The State of Working Britain*, Manchester University Press.

Gregg, P., Janke, K., and Propper, C. (2008). Handedness and Child Development (Working Paper No. 08/198). Bristol: CMPO, University of Bristol.

Jenkins, A. (2011). Participation in learning and wellbeing among older adults. *International Journal of Lifelong Education*, 30(3), 403–20.

Jenkins, A., Vignoles, A., Wolf, A., and Galindo-Ruenda, F. (2002). *The Determinants and Effects of Lifelong Learning*. Centre for the Economics of Education.

Plewis, I., Calderwood, L., Hawkes, D., & Nathan, G. (2004). *National Child Development Study and 1970 British Cohort Study. Technical report: Changes in the NCDS and BCS70 populations and samples over time.* London: Institute of Education, Centre for Longitudinal Studies

Poulton,R., Caspi,A., Milne,B.J., Thomson,W.M., Taylor,A., Sears,M.R. and Moffitt,T.E. (2002). Association between children's experience of socioeconomic disadvantage and adult health: a life-course study. *Lancet*, 360 (9346), pp. 1640-1645.

Preston, J. and Feinstein, L. (2004). *Adult Education and Attitude Change*. Report No.11. Centre for Research on the Wider Benefits of Learning, Institute of Education.

Reder, S. and Bynner, J. (2009) (eds) *Tracking Adult Literacy and Numeracy Skills: Findings from Longitudinal Research*. London, New York.

Rutter,M., Tizard,J., & Graham,P. (1976). Isle of Wight Studies: 1964-1974. *Psychological Medicine*, 16, 689-700.

Sabates, R. and Feinstein, L. (2004). *Education, Training and the Take-up of Preventive Health Care.* Report No.12, Centre for Research on the Wider Benefits of Learning, Institute of Education

Sabates, R., Feinstein, L. and Skaliotis, E. (2007). *Determinants and Pathways of Progression to Level2 Qualifications: Evidence from the NCDS and BHPS*. Report No.21. Centre for Research on the Wider Benefits of Learning, Institute of Education

Sargant, N., Field J., Francis, H., Schuller, T. and Tuckett, A. (1997). *The Learning Divide: A Study of Participation in Adult Learning in the United Kingd*om, NIACE.

Schoon, I., Cheng, H., Gale, C. R., Batty, G. D., and Deary, I. J. (2010) Social Status, Cognitive Ability and Educational Attainment as Predictors of Liberal Social Attitudes and Political Trust. *Intelligence*, 38, pp. 144-150

Schoon,I., Sacker,A. and Bartley,M. (2003). Socio-economic adversity and psychosocial adjustment: a developmental-contextual perspective. *Soc.Sci.Med*., 57(6), 1001-1015.

Schuller, T., Preston, J., Hammond, C., Brassett-Grundy, A. and Bynner, J. (2004). *The Benefits of Learning: The impact of educational on health, family life and social capital.* London: Routledge

Shepherd, P. (1985). *The National Child Development Study: an introduction to the origins of the Study and the methods of data collection*. NCDS User Support Group Working Paper 1. London: SSRU, City University.

Singh-Manoux,A., Ferrie,J.E., Chandola,T., & Marmot,M. (2004). Socioeconomic trajectories across the life course and health outcomes in midlife: evidence for the accumulation hypothesis? *Int.J.Epidemiol*., 33(5), pp. 1072-1079.

6. Appendix

Appendix Table 1: Mean and standard deviations of wellbeing and health outcomes at 46 and 50, by gender

	Age 46*				Age 50			
	MALE		FEMALE		MALE		FEMALE	
Wellbeing outcomes:	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Life satisfaction (*scale: 0 to 10*)	7.5	(1.43)	7.7	(1.49)	7.3	(1.76)	7.3	(1.92)
Malaise (*9 items*)	1.2	(1.63)	1.7	(1.82)	1.2	(1.74)	1.8	(2.08)
Self-efficacy (*scale: 3 to 6*)	5.7	(.64)	5.7	(.63)	5.6	(.72)	5.6	(.79)
Health-related outcomes:								
Alcohol use (*frequency of drinking scale: 0 to 5*)	3.6	(1.39)	3.1	(1.56)	3.6	(1.42)	3.2	(1.61)
Smoking (*no. cigarettes per day*)	3.6	(8.20)	3.4	(7.55)	3.3	(7.93)	3.0	(6.98)
Exercise frequency (*scale: 0 to 6*)	2.4	(2.23)	2.4	(2.35)	3.3	(2.13)	3.3	(2.24)

Note: * Malaise, i.e. depression, is measured at ages 42 and 50

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