
Is This £27,000 Well Spent? An Empirical Study Into The Subjective Well-Being Effect Of Higher Education.

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Abstract

This paper analyses how obtaining a degree affects SWB, and supplements this by discussing whether the specific degree classification has any additional effect. Previous literature on this general topic has failed to reach a definitive conclusion, whilst there has been no specific discussion at all on how degree grades impact SWB. Using data from the 1970 British Cohort Study and measured with a life satisfaction scale from 0-10, this paper finds that obtaining a degree has a significant positive association with SWB- both directly and indirectly through higher income and likelihood of being in a relationship. Additional findings show that this positive association only occurs for those with at least an upper-second class degree. The findings in this paper suggest that higher education benefits SWB both through improved work and personal life conditions alongside an increased sense of achievement.



*Many thanks to Professor Andrew Oswald for extensive guidance and support throughout this project. An additional thanks to Terry Cheng for advice regarding the statistical aspects of this project.

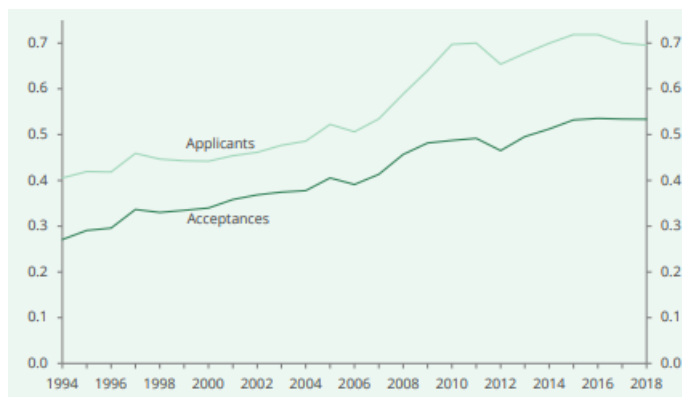
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1 Introduction

Following the repeal of the 1962 Education Act, 1998 saw the introduction of UK university tuition fees, with students being charged £1,000 yearly. Over the past 20 years this fee has increased by over 900% with English university students currently facing fees of up to £9,250 per year. Despite the climate of rising tuition fees, participation rates are at an all-time high with over 700,000 UCAS applicants per year, as shown in Figure 1. Whilst the 'Graduate Premium' in income is a commonly known concept, with the median graduate in 2017 earning £10,000 more than their non-graduate counterparts (Jackson 2018), how they compare with regards to subjective well-being (SWB) is much less certain.

Figure 1: Applicant and Acceptance via UCAS (millions), (Bolton 2018)



Although there is extensive literature on the topic, the evidence on the association between education and SWB is inconclusive (Cuñado & de Gracia 2012) and there is limited literature that specifically focuses on whether those with a degree are happier than those without. Contextualised with rising UK tuition fees and continually increasing demand for higher education (HE), this project used data from the 1970 British Cohort Study to ask whether obtaining a degree leads to higher SWB later in life. Following on from its primary research question, this paper assesses whether obtaining a higher grade impacts SWB above and beyond the impact of obtaining a HE qualification.

Defined as a cognitive and affective evaluation of an individual's life Diener & Lucas (2002), SWB refers to the cognitive general evaluations like satisfaction with life and the affective emotional elements. This paper focuses on the cognitive dimension and so will measure SWB through life satisfaction (LS) based on a scale from 0-10. Findings suggest a strong positive association between having a degree and LS, which is partially mediated with income as the main channel. Ad-

ditional findings suggest that only individuals with higher degree classifications, an upper second or above, have a significant satisfaction premium compared to individuals without a degree.

This paper adds to the current debate through the use of data from the BCS, a data-set which has seen limited analysis with regards to SWB. Additionally, this paper will build on current literature by looking at the relationship between attainment measured through degree class, and SWB. Through the new angles of analysis, this research has the potential to aid clarification surrounding the HE debate and have a significant impact upon individual decisions regarding the necessity and value of acquiring a HE qualification. A greater understanding of the returns on investment in HE and whether the government's current level of HE spending is optimal also creates potential policy implications. As a note for the reader, 'SWB', 'happiness' and 'satisfaction' will be used interchangeably.

2 Literature Review

Previous economic literature has focused on measuring education benefits based on the effect on an individual's wages (Fabra & Camison 2009), majoritively finding a positive relationship. However, measuring education solely based on its impact on income risks under-weighting the total returns of investing in education, by ignoring non-pecuniary effects (Fabra & Camison 2009). In fact, Haveman & Wolfe (1984) estimated 24 outcomes believed to be affected by schooling, including health and marital success. Thus, with growing acceptance of reported well-being as a valid economic measure (Frey & Stutzer 2002), there has been a growth in the literature looking at how education impacts SWB.

As illustrated by Cuñado & de Gracia (2012) and Dolan et al. (2008) in their synopses of the current literature, a definitive conclusion is yet to be reached on the size, direction and significance of education's effect on SWB, evident from widely differing results. Where some studies find the upper level of education has the largest positive effect on SWB (Becchetti et al. 2007), others have found that medium education levels are where SWB peaks (Stutzer 2004). Further confusion comes from studies that suggest increasing levels of education are actually negatively correlated with satisfaction (Powdthavee 2010), whilst others find no significant relationship at all (Nikolaev 2015).

Two main explanations have been offered for the wide variation in these findings. Firstly, if

unobservable heterogeneity that influences both education and SWB (such as ambition) is not controlled for then education's effect will be overestimated. Thus, a fixed effects model is required to avoid biased coefficient estimates. The alternative explanation is that education has significant interrelationships with many other factors that can also affect SWB, such as income (Cuñado & de Gracia 2012), employability and marital success (Oreopoulos & Salvanes 2011). Consequently, including these as controls in single equation models ignores potential indirect channels through which education impacts SWB, and underestimates the total education effect. To fully understand how education affects SWB, the direct and indirect effects need to be examined. Thus, to add a meaningful contribution to the current debate, this paper uses longitudinal data and fixed effects analysis along with decomposition analysis to control for individual heterogeneity and any potential interrelationships between variables. The decomposition analysis I use will be similar to the method outlined by Clark et al. (2018) with initially only the education variable and exogenous controls included, and then, subsequently, the mediator variable is also included. The indirect effect is equal to the difference between the coefficients on education in the two equations.

$$\textit{Life Satisfaction} = a_1\textit{Education} + \textit{controls}$$

$$\textit{Life Satisfaction} = b_1\textit{Education} + b_2\textit{Income} + \textit{controls}$$

The literature looking at the relationship between education and SWB predominantly uses years of schooling as the measure of education, treating it as a continuous variable (Powdthavee & Lekfuangfu 2015). As Cuñado & de Gracia (2012) highlighted, using this or more arbitrary measures (low, medium and high education)(Bode et al. 2001) does not differentiate between specific qualifications. As individuals generally remain in education until they have reached specific milestones like A-levels or a university degree, arbitrary measures are cannot advise students on the marginal benefit of obtaining the next qualification. Whilst some studies go further and analyse SWB by the highest qualification an individual has achieved, generally, the reference category used is no (or very few) qualifications (Nikolaev 2018). Given mandatory schooling laws in the UK require education until age 18, a comparison with a 'no education' category is unrepresentative of the decisions facing current students. As such, this paper adds to the current literature by focusing on the SWB benefits of obtaining a specific level of education, a university degree, comparative to either any lower levels of education or at least A-level qualifications.

Although extensive literature has looked at the impact of education on SWB, very little has discussed how the actual grades achieved at important education levels may affect SWB. Given

the finite number of qualification levels, there is significant clustering at each and so another method, such as the grade achieved, is needed to differentiate between individuals with a common qualification level (Ireland et al. 2009). Split into five categories (first (1st), upper second (2:1), lower second (2:2), third (3rd) and fail), the upper two UK classifications are generally regarded as constituting a 'good' degree (Bratti et al. 2008), consistent with findings that 74.2% of employers in 2014 filtered out job applicants with a degree classification below a 2:1 (AGR 2014). Whilst this author is unaware of any studies that have looked at the impact of degree classification on SWB there has been literature showing a link with labour market outcomes, including income. Using data from a UK graduate survey, Ireland et al. (2009) find that in 1998, income a year after graduation saw a 9.4% (11.2%) premium for men (women) with a 1st compared to those with a 2:2. Similar results were found using the BCS, with a wage premium of 0.20 compared to non-graduates for men obtaining a "good" degree and only 0.11 for any lower degree classes (Bratti et al. 2008). Therefore, this paper looks to extend the aforementioned studies to determine whether degree class impacts SWB in a similar way to income.

3 Methodology

3.1 Data Analysis

This paper uses data from the British Cohort Study (BCS), a nationally representative longitudinal survey, following 17,000 individuals born in the same week in April 1970. These individuals are surveyed at regular life intervals and SWB data from ages: 26, 30, 34 & 42 is used. The number of observations at each age varies between 8,975 and 11,261 with 13,570 unique individuals involved overall. Despite some attrition between waves, there are 5,530 individuals consistent at all four ages. The longitudinal nature of this data-set allows for the control of individual heterogeneity, and provides information on SWB and cognitive ability during teenage years, hence allowing control of some underlying heterogeneity even when performing cross-sectional analysis.

The measure of SWB used in this paper is life satisfaction (LS) which comes from the question: "0" means that you are completely dissatisfied and "10" means that you are completely satisfied. Please tick the box with the number above it which shows how dissatisfied or satisfied you are about the way your life has turned out so far.' (BCS, 1996, p14).



The distribution of responses to this question is shown in Figure 2 below, where it can be seen that nearly 50% of the population reported themselves to be either a 7 or 8 on the LS scale, a common finding in the literature. Notably, the proportion of the population reporting themselves at the higher end of the scale increases with age, with 57.2% of those aged 42 reporting themselves an 8 or above compared to only 50.8% of the age 26 wave. On evaluation this result is not surprising, given LS's reflective nature it is likely to increase with age as individuals gain experiences and achievements.

Although this variable is categorical and so econometric theory suggests an ordinal logit model is most suitable for analysis, to allow for easier interpretation this paper will use a linear regression, hence treating the variable as continuous. This is common practise in the literature (Nikolaev & Rusakov 2016) and has been shown to make little difference to the results in the SWB context (Ferrer-i Carbonell & Frijters 2004). As shown in Appendix 2, the coefficient on degree remains relatively unchanged and significant whether a linear regression or ordered logit model is used.

Figure 2: Life Satisfaction Distribution at Multiple Ages

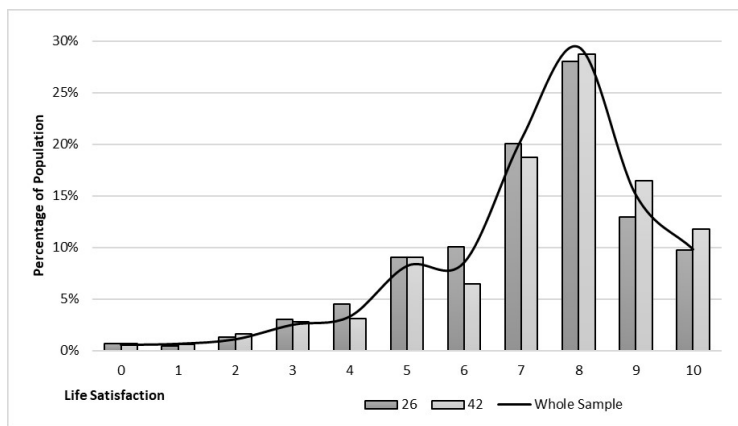
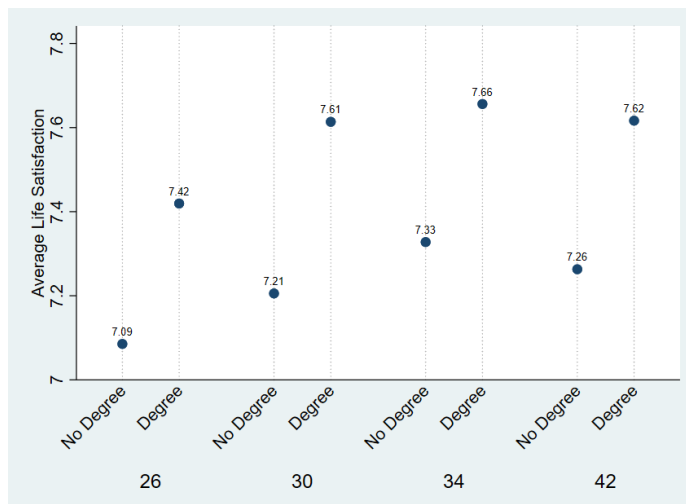


Figure 3 shows the trend in average LS separated for those with and without a degree. The graph shows a general increasing trend in LS with age and higher average LS for those with a degree. This positive association between a degree and higher SWB appears to be a similar magnitude regardless of age, also reflected by the very similar coefficients on degree at ages 26 and 42 in Table 3. This goes against findings by Nikolaev & Rusakov (2016) who found a widening SWB gap with age for those with more than 12 years of education. The slight fall in satisfaction

between 34 and 42 could be indicative of the common finding of minimum happiness at mid-life, as with Blanchflower & Oswald (2008) who found that the probability of depression reached a maximum at 44.6 years. Alternatively, the Great Recession, 4 years previously, significantly influenced job prospects and so may have negatively impacted satisfaction.

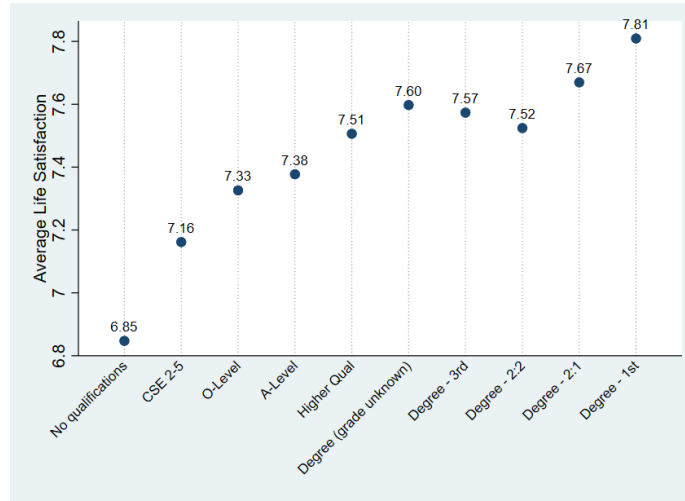
Figure 3: Average Life Satisfaction by Degree and Age



The measure of education level will be a binary variable for whether the individual has a degree (degree). To analyse the sub-question of whether there are any SWB benefits of obtaining a higher class of degree, a categorical variable that measures the highest qualification achieved so far, with those who have a degree further broken down into classification, will be used. This allows for the analysis of degree and degree classification effects at the same time. From Figure 4 average LS appears to be increasing in both qualification and degree grade. There are a number of missing observations for degree classification so these individuals are included in a separate category, this groups satisfaction level appears to be approximately average of the other degree categories suggesting a relatively representative spread of grades for those not reported.

A number of common demographic controls will be used (gender, religion and region), however, these are limited by consistency of questions between the waves used along with ensuring exogenous relationships with education. The possible interrelationships between having a degree and some other common controls (income, relationship status and employability) will be explored further in this paper with previous literature suggesting that these are in fact mediator variables through which education affects SWB indirectly (Powdthavee & Lekfuangfu 2015). As is common practise in the literature, income will be measured through the natural logarithm of weekly pay. Likelihood

Figure 4: Average Life Satisfaction by Qualification, Aged 42



of being unemployed and of being in a relationship will be measured using binary variables. To maintain consistency of sample size dummies for missing values in covariates will be included. For a full list of variables see Appendix 1.

3.2 Models

3.2.1 Does Having a Degree Increase SWB?

As suggested by Dolan et al. (2008), not controlling for unobservable traits in individuals can lead to biased coefficient estimates. This explains some of the variations in the literature findings as results vary widely between cross-sectional and fixed effects model (Ferrer-i Carbonell & Frijters 2004). Individual heterogeneity, such as ambition, could lead to biased coefficient estimates if they are correlated both with having a degree and SWB. If both variables are positively affected by ambition, which is not controlled for, then the coefficient on degree will include ambition's effect on SWB and thus, will be overestimated. Therefore, using longitudinal data in the context of this study allows for the use of fixed effects models and accounts for unobserved heterogeneity.

As mentioned previously, education has been shown to have strong correlations with many common control variables, including income (Cuñado & de Gracia 2012) and non-monetary factors such as marital success (Oreopoulos & Salvanes 2011). As such, including these as control variables risks under-weighting the effect of education on SWB by ignoring any potential indirect effects through these mediator variables. The fixed effects model used, equation (1), will therefore be run

both with and without the potential mediator variables (relationship, income and employability) to gauge the size and direction of education’s direct and indirect effects. The model also includes some other demographic control variables (gender, religion and region) which are either exogenous or have been found to have no significant relationship with having a degree.

$$LS_{it} = \alpha + \beta_1 degree_{it} + \beta_2 female_{it} + \beta_3 religion_{it} + \sum_{k=1}^{11} \delta_k region_{it} + \beta_4 relationship_{it} + \beta_5 \ln(weekpay)_{it} + \beta_6 unemployed_{it} + \epsilon_{it} \quad (1)$$

3.2.2 Investigating Degree Grade

As discussed earlier, the impact of degree classification has been surprisingly under-explored (Bratti et al. 2008) and as of yet no study directly links degree grade with SWB - due to limited data-sets that contain information on degree classification (Ireland et al. 2009). This paper exploits the availability of this information in the BCS to extend the discussion to include the SWB effect of performance in a degree. Given the available data, it is unfeasible to use fixed effects analysis as almost all observations are time-invariant, accordingly, cross-sectional analysis is used. As suggested by Bratti et al. (2008) one way to try and control for any endogeneity bias is to include as many controls as possible, so controls for both underlying SWB (*depress16*)¹ and intelligence (*readage16*) will be included in the model. This limits any bias caused by happier individuals being more likely to obtain HE or more intelligent respondents being more likely to study for longer and to be happier. Both controls are measured at age 16 and so prior to an individual obtaining a degree, as such any influence they may have on SWB should be accounted for in their coefficients, whilst any impact of obtaining a degree or specific degree classification will be in the degree grade coefficient.

$$LS_i = \alpha + \beta_1 gradenqual_i + \beta_2 female_i + \beta_3 religion_i + \sum_{k=1}^{11} \delta_k region_i + \beta_4 depress16_i + \beta_5 readage16_i + \beta_6 relationship_i + \beta_7 \ln(weekpay)_i + \beta_8 unemployed_i + \epsilon_i \quad (2)$$

Other than the variables already mentioned, the model as shown above (2) contains the same variables as equation (1). As previous studies found a significant relationship between degree classification and income (Ireland et al. 2009), this paper expects to find that income will mediate

¹Satisfaction at age 16 was not available

some of the effects of degree classification. As such, relationship, $\ln(\text{weekpay})$ and unemployed will be added gradually in order to separate any direct and indirect effects.

3.2.3 Endogeneity

Previous literature regularly discusses the difficulty in ascertaining the direction of causality between education and SWB due to individuals ultimately choosing whether to remain in later stages of education (Oreopoulos & Salvanes 2011). As such, the estimated effect of a degree may be upwards biased if those who were predestined to be happier also chose to complete more education. IV estimation can be used to correct for any potential endogeneity bias, however, this requires a suitable instrument for degree. The only potential instrument in the data was a binary variable for whether an individual's parents had a degree. However, this can only be used in models that do not control for time-invariant heterogeneity, meaning it cannot be used in a fixed effects model. Therefore, due to the lack of a suitable time varying instrument and so as not to introduce new potential biases through oversimplification of the model, IV estimation was not used. Instead, any potential endogeneity bias is considered when reporting results and where possible heterogeneity was controlled for through `depress16` and `readage16`.

4 Results

4.1 Does Having a Degree Increase SWB?

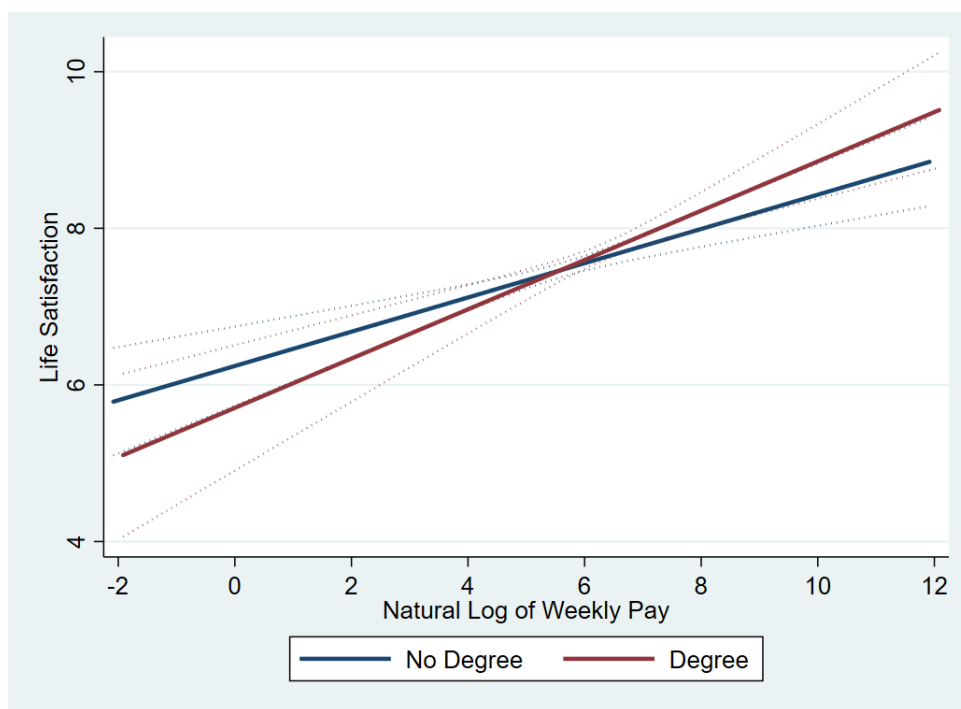
Table 1² reports the results of equation 1 and shows the coefficient on degree to be significant at the 1% level in all models, suggesting an enduring direct positive relationship between obtaining a degree and higher LS. Column (1) includes only the control variables and so the overall relationship appears to be a 0.248 satisfaction premium for those who obtain a degree. Meanwhile, $\ln(\text{weekpay})$ and relationship both appear to have significant positive associations with LS, whilst the respective 0.011 and 0.043 drops in degree's coefficient in columns (2) and (3) suggests they both mediate some of degree's influence on satisfaction. If the relationship were causal then from column (5) it could be concluded that obtaining a degree leads directly to a 0.2 increase in LS, whilst also a 0.044 indirect increase through higher income and likelihood of being in a relationship. It should

²For all tables in this paper, the following applies: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

be noted that whilst the association between income and satisfaction appears to be large, the coefficient of 0.0683 implies that a 1% increase in weekly income is only associated with a 0.0007 increase in LS.

Figure 5 plots average LS over income, for those with and without a degree. Despite a clearly positive association between income and satisfaction, at lower levels of income it is actually those without a degree who have higher average satisfaction. Satisfaction does, however, rise more quickly with income for those with a degree, eventually leading to an increasing degree premium with income. The apparent dissatisfaction at lower income levels provides support for previous findings that income aspirations are increasing in education (Clark & Oswald 1996). Although becoming unemployed has a large negative association with LS, it's relationship with obtaining a degree appears weak, with a negligible fall in degree's coefficient following unemployed's inclusion. As the fixed effects model measures those obtaining a degree later in life this result could be due to short term graduate employment uncertainty, thus initially reducing the correlation between a degree and employment. Care does need to be taken when interpreting the coefficients on relationship and $\ln(\text{weekpay})$ as there appear to be some interrelationships shown by small changes in their coefficients when they are included in the same model, (5).

Figure 5: Predictive Plot of Life Satisfaction by Income, Aged 42³



³See Appendix 5 for output behind figure

Table 1: Regression Output Using Degree⁴

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
degree	0.248***	0.237***	0.205***	0.247***	0.204***	0.236***
relationship	-	0.632***	-	-	0.655***	0.624***
ln(weekpay)	-	-	0.0804***	-	0.0683***	-
unemployed	-	-	-	-0.576***	-	-0.527***
Observations	39,300	39,300	28,346	39,300	28,346	39,300
Number of Groups	13,476	13,476	11,540	13,476	11,540	13,476

4.2 Investigating Degree Grade

Table 2 presents the results of equation (2), showing that obtaining a 2:1 or 1st has a significant positive association with LS when compared to having A-levels. Meanwhile, neither a 2:2 nor 3rd class degree show any significant association with LS. It could be assumed that this is solely due to better employment opportunities for higher performing graduates as employers generally prefer graduates that have achieved a 2:1 as a minimum. However, comparing the coefficients in column (1) those with a 1st have a much larger LS premium than those with a 2:1 and in fact looking at columns (2) and (4), as the mediator variables are included into the model the coefficient on 2:1 becomes significant only at the 5% level. Thus, whilst some of the association between higher grades and LS likely comes from better employment opportunities, as those with a 1st are more satisfied still than those with a 2:1, there may also be an added benefit of a sense of achievement, picked up by LS's reflective nature.

Going on to look at potential mediation, including relationship or employment status causes similar magnitude reductions in the coefficient on a 1st; suggesting that if there were a causal relationship then having a 1st class degree leads to an approximate 0.02 increase in LS at age 42 through either increased likelihood of being in a relationship or decreased likelihood of being unemployed. Column (3) shows that including income causes the largest fall in the coefficients on 2:1 and 1st. Looking at the change in coefficients between columns (1) and (3) suggests that, comparative to A-Levels, a 2:1 is associated with a 0.28 increase in LS, whilst a 1st is associated with a 0.42 increase in LS, with 15-20% of these relationships mediated through higher income.

⁴Full output reported in Appendix 3

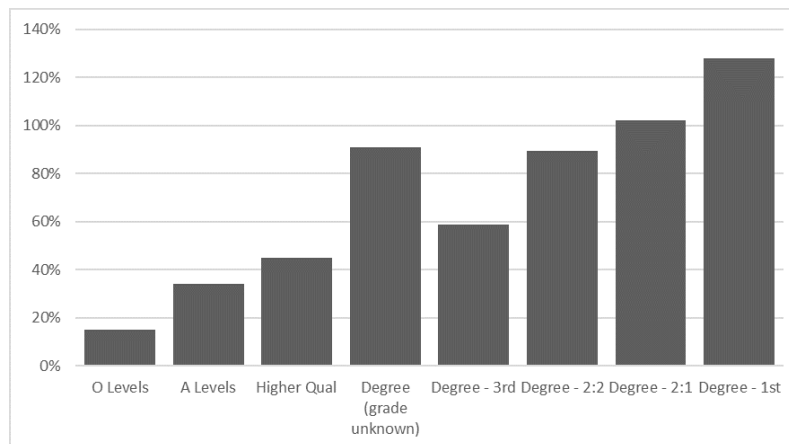
Table 2: Regression Output Using Degree Classification, Aged 42⁵

VARIABLES	(1)	(2)	(3)	(4)
(gradenqual)				
No qualifications	-0.409***	-0.245**	-0.0587	-0.263***
CSE 2-5	-0.156	-0.0796	0.0468	-0.109
O-Levels	-0.0254	-0.00679	0.0896	-0.0230
Higher Qual	0.138	0.130	0.169*	0.119
Degree (grade unknown)	0.249***	0.241***	0.135	0.210**
Degree - 3rd	0.201	0.245	0.265	0.224
Degree - 2:2	0.152	0.167*	0.136	0.134
Degree - 2:1	0.278***	0.228**	0.228**	0.238**
Degree - 1st	0.422***	0.405***	0.340**	0.404***
depress16	-0.731***	-0.681***	-0.516***	-0.710***
readage16	-0.00171	-0.0149	-0.0551	0.00254
relationship	-	1.538***	-	-
ln(weekpay)	-	-	0.268***	-
unemployed	-	-	-	-1.310***
Observations	9,696	9,696	6,588	9,696

Reference category for gradenqual is A-Levels

This relationship is also demonstrated in Figure 6 as those with a 2:1 or 1st appear to have over double the income of peers with no qualifications.

Figure 6: Percentage Change in Weekly Pay by Qualification

⁵Full output reported in Appendix 4

5 Evaluation

5.1 Robustness: Degree Grade Observations

One issue that has previously been highlighted with the BCS is the limited number of degree class observations (Bratti et al. 2008), therefore, the analysis of degree classification was repeated using similarly defined categories (Ibid). This variable classifies a 1st or 2:1 as a "good" degree whilst a "lower" degree is any other classification (degclass). The reference category of at least 2 A-levels, ensures a comparison against individuals who feasibly could have attended university so as to be more applicable to students deciding whether to obtain a degree. The results of this analysis are reported in Appendix 6 and it can be seen that, compared to A-levels or Higher Qualifications, lower quality degrees again do not have any significant associations with higher LS. This suggests that the results of a positive relationship between higher degree grade and LS discussed in the previous section are robust despite the low number of observations.

5.2 Limitations

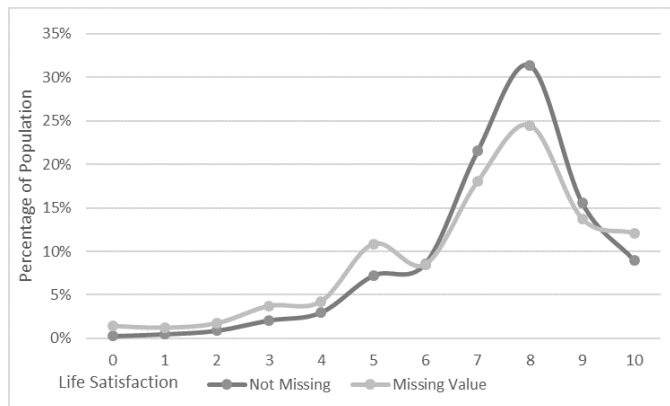
5.2.1 Hourly Wage vs Weekly Wage

Although $\ln(\text{weekpay})$ is not a completely accurate representation of an individual's wage as it also depends on hours worked per week, hourly wage has less than half as many observations. Appendix 7⁶ shows the regression output using both income measures and the replacement of hourly wage with weekly wage has very little effect on the coefficients at age 26 despite a similar number of observations. Therefore, this author deemed it more suitable to use the weekly pay measure as loss of sample size outweighed the benefits of using a more precise measure. As $\ln(\text{weekpay})$ does also include the effect of working longer hours, care will be taken when interpreting the variable as it appears to be very slightly underestimating the income effect.

However, $\ln(\text{weekpay})$ still suffers from quite a large level of non-response, shown by observations dropping by about a third when it's included in Tables 1 and 2. Due to the large change in sample size caution needs to be taken when comparing models with and without the income variable, as results could be influenced by a change in the composition of the sample. As shown in Figure 7, this is in fact the case as the population with missing values appears to have significantly

⁶An explanation for the model used for comparison is also included

Figure 7: Bias From Missing Income Values



lower SWB, with an average LS of 7.04 as compared to 7.4. This means that the models including $\ln(\text{weekpay})$ are underestimating the proportion of the sample with low SWB and so the coefficient estimates are likely upwards biased.

5.2.2 Endogeneity and Causality

It could be argued that the relationship between degree classification and SWB is likely causal, at least more so than with degree alone, as individuals are unable to choose their grade. Additionally, this paper attempts to minimise endogeneity biases by controlling for heterogeneity in underlying SWB and intelligence. However, there may still be unobservable factors that affect both classification and SWB, as it has not been possible to control for all unobserved heterogeneity in the scope of this project. As such, it is important to note that none of the results in this paper can be confirmed as causal and at most a conclusion of *potential* causality can be reached. Extending the analysis in this paper to identify causality would require either IV estimation or data covering an exogenous shock to an individual's university decisions, such as changing university fee laws. The data in this paper does not contain information which makes either of these methods possible and so further analysis, potentially with more recent data-sets would be required to confirm causality.

5.3 Extensions

The cohort analysed in this paper were born in 1970 and so almost all of the individuals that obtained a degree had done so prior to the introduction of tuition fees in 1998. Furthermore, recent years have seen a massive increase in the graduate cohort size which may have altered the

composition of students now attending university (Ireland et al. 2009). If so the marginal benefit of a degree has likely changed, and so a possible extension to this literature could be the analysis of variations in the SWB effect of obtaining a degree between different birth cohorts to identify any influence of rising costs and participation rates. Potential data-sets to use could be the 1989 Next Steps Study or the 2001 Millennium Cohort Study.

This paper analyses the cognitive dimension of SWB, however, this means that the conclusions found may not be representative of HEs effect on all measures of SWB. Therefore, another possible avenue for exploration could be understanding the relationship between university education and alternative dimensions of SWB. One potential measure for future analysis could be the Malaise Inventory, an index based on 24 questions that measure emotional and physical symptoms of distress such as headaches or anxiety⁷. Some analysis with this measure was undertaken and interestingly was suggestive of a positive relationship between probability of depression and having a degree. However, given the scope of this project further reporting of findings is not possible and so additional analysis of this or similar variables could be compared to the findings in this paper.

6 Conclusion

In conclusion, this paper finds a strong association between having a degree and LS, with approximately 20% of this relationship mediated through higher income. It also appears that having a degree raises individual's income aspirations, as at lower levels of income it is in fact those without a degree who are more satisfied. HE also appears to positively influence the likelihood of being in a relationship, which in turn has a positive association with SWB, thus suggesting an additional mediating channel of education. Whilst unemployment is only found to have a negligible impact on the direct association between degree and satisfaction, this could, in fact, be due to short term graduate uncertainty.

This paper also finds that only degrees commonly considered to be a good grade, a 2:1 or 1st, lead to significantly higher levels of SWB. This is a common cut-off used by employers when judging job candidates based on grades, thus, the role degree grade has on job market outcomes such as employability likely drives a large proportion of the SWB benefits associated with a degree. This is further supported by both income and unemployment acting as significant mediators of

⁷See Appendix 8 for a full list of questions included

the association between degree, degree grade and SWB. Above and beyond this there does appear to be a satisfaction premium for gaining a 1st comparative to a 2:1 suggesting that a sense of achievement boosts the association between a degree and SWB.

This paper finds positive direct and indirect correlations between HE and SWB, along with some evidence of diverging satisfaction levels with increasing income. The indirect channels and positive effect of a "good" degree on SWB suggests that a university education may benefit people through improved work and personal life conditions. Whilst the persisting significant direct correlation along with the premium gained by individuals with a 1st suggests that there may be benefits to HE above and beyond the ones mentioned above. As LS is a reflective measure, the benefits of a degree may be emphasised by feelings of regret regarding education experienced by less educated individuals later in life (Jokisaari 2004). Therefore, this paper coincides with findings such as (Nikolaev & Rusakov 2016), that whilst obtaining a degree may require short term sacrifices, such as debt and prolonged career uncertainty, overall those with a degree appear to have higher SWB than their peers.

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7 Appendices

Appendix 1: Main Variables

Variable Name	Description	Dummy?	How is it Measured?	Ages Available
LS	Satisfaction with how life has turned out so far	No	Completely Dissatisfied (0) to Completely Satisfied (10)	26, 30, 34, 42
degree	Does the individual have a degree, taken from response to highest qualification	Yes	1: Has a Degree 0: Doesn't have a Degree	26, 30, 34, 42
gradenqual	Combined highest qualification obtained and degree class achieved (if applicable)	No	e.g. No Qualifications, ..., Degree - 3rd, etc.	42
degclass	Categorical variable for "good" degrees (1st/2:1) and "lower" degrees (2:2/3rd)	No	Reference category is 2+ A-Levels	42
pardeg	Do their parents have a degree	Yes	1: Has a Degree 0: Doesn't have a Degree	26, 30, 34, 42
relationship	Is the individual in a relationship, based on various relationship questions	Yes	1: In a Relationship 0: Single	26, 30, 34, 42
religion	Does the individual follow any religion	Yes	1: Religious 0: No Religion	26, 30, 34, 42
female	Is the individual female	Yes	1: Female 0: Male	26, 30, 34, 42
ln(weekpay)	Natural log of individuals weekly pay, found from net pay and net pay period	No	£	26, 30, 34, 42
ln(hourpay)	Natural log of individuals hourly pay, weekly pay divided by hours worked	No	£	26, 30, 34, 42
unemployed	Is the individual unemployed, based on economic activity variable	Yes	1: Unemployed 0: Not Unemployed	26, 30, 34, 42
region	What region does the individual live in	No	North England, East Anglia, East Midlands etc.	26, 30, 34, 42
depress16	Was the individual depressed at age 16, based off Malaise Inventory	Yes	1: Depressed aged 16 0: Not Depressed aged 16	16
readage16	Individuals reading age at 16, was it above or below 16	Yes	1: 16 or Above 0: Below 16	16

Appendix 2: Suitable Model for Life Satisfaction

$$LS_i = \alpha + \beta_1 degree_i + \beta_2 female_i + \beta_3 religion_i + \sum_{k=1}^{11} \delta_k region_i + \beta_4 depress16_i + \beta_5 readage16_i + \epsilon_i$$

Table 3: Comparison Between Linear and Ordered Logit Regressions, Aged 26 and 42

VARIABLES	(Aged 26)		(Aged 42)	
	LS	LS	LS	LS
degree	0.291***	0.231***	0.305***	0.265***
depress16	-0.851***	-0.738***	-0.746***	-0.625***
female	0.282***	0.254***	0.119***	0.128***
religion	0.125***	0.153***	0.152***	0.173***
readage16	-0.0395	-0.0477	0.0107	-0.0564
Observations	8,916	8,916	9,696	9,696

Regional dummies included but not reported

The coefficient on degree only changes by a small amount when switching between a linear and ordered logistic regression, regardless of the age. The coefficient also remains significant at the 1% significance level with either model. These results show that the overall impact of treating the dependant variable LS as continuous as opposed to categorical is very limited. Meanwhile, the interpretation of an ordered logit is more complex than that with a linear regression, especially given the LS variable has 11 categories.

Appendix 3: Full Regression Output, Equation (1)

$$LS_{it} = \alpha + \beta_1 degree_{it} + \beta_2 female_{it} + \beta_3 religion_{it} + \sum_{k=1}^{11} \delta_k region_{it} + \beta_4 relationship_{it} + \beta_5 \ln(weekpay)_{it} + \beta_6 unemployed_{it} + \epsilon_{it}$$

Table 4: Full Fixed Effects Regression Output Using Degree

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
degree	0.248***	0.237***	0.205***	0.247***	0.204***	0.236***
controls						
female	0.781*	0.773*	0.652	0.676	0.666	0.677
religion	-0.0131	0.000582	0.0163	-0.0112	0.0303	0.00214
(region)						
Yorks & Humberside	0.0613	0.0953	0.135	0.0498	0.155	0.0844
East Midlands	-0.307**	-0.280**	-0.211	-0.310**	-0.192	-0.282**
East Anglia	-0.0770	-0.0345	0.0607	-0.0781	0.0904	-0.0361
South East	-0.143	-0.128	-0.0581	-0.150	-0.0459	-0.134
South West	-0.243*	-0.211	-0.219	-0.253*	-0.188	-0.221*
West Midlands	-0.209*	-0.156	-0.157	-0.221*	-0.117	-0.168
North West	-0.323**	-0.268**	-0.265*	-0.332**	-0.217	-0.278**
Wales	-0.167	-0.158	-0.0655	-0.168	-0.0539	-0.159
Scotland	-0.207	-0.163	-0.129	-0.210	-0.0956	-0.167
Northern Ireland	-	-	-	-	-	-
mediators						
relationship	-	0.632***	-	-	0.655***	0.624***
ln(weekpay)	-	-	0.0804***	-	0.0683***	-
unemployed	-	-	-	-0.576***	-	-0.527***
Observations	39,300	39,300	28,346	39,300	28,346	39,300
Number of Groups	13,476	13,476	11,540	13,476	11,540	13,476

Reference category for regional variable is North England.

Just to note there are no observations for the Northern Ireland region due to the variable not having any time variation. In addition, despite generally being a time-invariant variable, the gender dummy, female, shows up in the regression as a small number of individuals undergo gender reassignment during the data.

Appendix 4: Full Regression Output, Equation (2)

$$LS_i = \alpha + \beta_1 \text{gradenqual}_i + \beta_2 \text{female}_i + \beta_3 \text{religion}_i + \sum_{k=1}^{11} \delta_k \text{region}_i + \beta_4 \text{depress16}_i \\ + \beta_5 \text{readage16}_i + \beta_6 \text{relationship}_i + \beta_7 \ln(\text{weekpay})_i + \beta_8 \text{unemployed}_i + \epsilon_i$$

Table 5: Full Regression Output Using Degree Classification, Aged 42

VARIABLES	(1)	(2)	(3)	(4)
(gradenqual)				
No qualifications	-0.409***	-0.245**	-0.0587	-0.263***
CSE 2-5	-0.156	-0.0796	0.0468	-0.109
O-Levels	-0.0254	-0.00679	0.0896	-0.0230
Higher Qual	0.138	0.130	0.169*	0.119
Degree (grade unknown)	0.249***	0.241***	0.135	0.210**
Degree - 3rd	0.201	0.245	0.265	0.224
Degree - 2:2	0.152	0.167*	0.136	0.134
Degree- 2:1	0.278***	0.228**	0.228**	0.238**
Degree - 1st	0.422***	0.405***	0.340**	0.404***
controls				
female	0.103**	0.140***	0.230***	0.170***
religion	0.135***	0.102**	0.0859*	0.145***
(region)				
Yorks & Humberside	0.0355	-0.000743	-0.0362	0.00387
East Midlands	-0.0507	-0.0877	-0.116	-0.0687
East Anglia	0.173	0.109	0.102	0.151
South East	-0.0905	-0.119	-0.229**	-0.0974
South West	-0.118	-0.154	-0.167	-0.138
West Midlands	-0.199*	-0.233**	-0.268**	-0.221**
North West	-0.165	-0.166	-0.190*	-0.169
Wales	-0.0826	-0.127	-0.0350	-0.0777
Scotland	0.00165	-0.0398	-0.00991	-0.0300
depress16	-0.731***	-0.681***	-0.516***	-0.710***
readage16	-0.00171	-0.0149	-0.0551	0.00254
mediators				
relationship	-	1.538***	-	-
ln(weekpay)	-	-	0.268***	-
unemployed	-	-	-	-1.310***
Observations	9,696	9,696	6,588	9,696

Reference category for regional variable is North England.

Just to note that there are no observations for Northern Ireland as this regression was performed at age 42 and there were no Northern Ireland respondents in the wave.

Appendix 5: Producing Predictive Plot of Life Satisfaction

$$LS_i = \alpha^1 + \beta_1^1 female_i + \beta_2^1 religion_i + \sum_{k=1}^{11} \delta_k^1 region_i + \beta_3^1 depress16_i + \beta_4^1 readage16_i + \epsilon_i^1$$

$$LS_i = \alpha^2 + \beta_1^2 female_i + \beta_2^2 religion_i + \sum_{k=1}^{11} \delta_k^2 region_i + \beta_3^2 depress16_i + \beta_4^2 readage16_i + \epsilon_i^2$$

Table 6: Marginal Effects of ln(weekpay) on Life Satisfaction, Aged 42

VARIABLES	No Degree	Degree	VARIABLES	No Degree	Degree
ln(weekpay)			ln(weekpay)		
-2	5.786***	5.139***	5	7.317***	7.313***
-1.5	5.896***	5.294***	5.5	7.427***	7.468***
-1	6.005***	5.449***	6	7.536***	7.623***
-0.5	6.114***	5.605***	6.5	7.645***	7.779***
0	6.224***	5.760***	7	7.755***	7.934***
0.5	6.333***	5.915***	7.5	7.864***	8.089***
1	6.442***	6.070***	8	7.974***	8.245***
1.5	6.552***	6.226***	8.5	8.083***	8.400***
2	6.661***	6.381***	9	8.192***	8.555***
2.5	6.770***	6.536***	9.5	8.302***	8.710***
3	6.880***	6.692***	10	8.411***	8.866***
3.5	6.989***	6.847***	10.5	8.520***	9.021***
4	7.099***	7.002***	11	8.630***	9.176***
4.5	7.208***	7.158***	11.5	8.739***	9.332***
			12	8.848***	9.487***

Observations are 1,324 for No Degree and 782 for Degree, all other covariates are held at mean value with dummies accounted for.

The regressions shown above are estimated separately for those with and without a degree, this means each coefficient is being estimated for the two separate populations. For example, β_1^1 corresponds to the effect of being female compared to male for those without a degree whilst β_1^2 is the same gender effect but instead for those with a degree. Subsequently, the marginal effect of ln(weekpay) was calculated for each regression, given it's continuous nature this was done at 0.5 intervals of the logged variable. All other variables were held at their mean values.

Table 6 reports all the marginal effects of ln(weekpay) for those with and without a degree. It is interesting to note that those with a degree have lower predicted satisfaction at the lower levels of ln(weekpay). Those with a degree only appear to become more satisfied at approximately 5.5 which corresponds to £245 per week. Subsequently, however, it can be seen that the satisfaction levels diverge and at the top levels of income those with a degree have a significant satisfaction premium.

Appendix 6: Combined Degree Classification Categories

$$LS_i = \alpha + \beta_1 degclass_i + \beta_2 female_i + \beta_3 religion_i + \sum_{k=1}^{11} \delta_k region_i + \beta_4 depress16_i + \beta_5 readage16_i + \beta_6 relationship_i + \beta_7 \ln(weekpay)_i + \beta_8 unemployed_i + \epsilon_i$$

Table 7: Observations for Both Degree Classification Variables, Aged 42

Category	Observations	Category	Observations
No qualifications	1,270	At Least 2 A-levels	1,956
CSE 2-5	889	Lower Degree	719
O-Levels	3,106	Good Degree	974
A-Levels	731		
Higher Qual	1,225		
Degree (grade unknown)	927		
Degree - 3rd	75		
Degree - 2:2	644		
Degree - 2:1	800		
Degree - 1st	174		

(a) gradenqual

(b) degclass

Table 8: Life Satisfaction Using Combined Degree Classifications, Aged 42

VARIABLES	(1)	(2)	(3)	(4)
(degclass)				
Lower Degree	0.0588	0.0848	0.0354	0.0599
Good Degree	0.205***	0.169**	0.130	0.182***
depress16	-0.743***	-0.687***	-0.521***	-0.716***
readage16	0.0375	0.0172	-0.0537	0.0341
relationship	-	1.559***	-	-
ln(weekpay)	-	-	0.283***	-
unemployed	-	-	-	-1.366***
Observations	9,696	9,696	6,588	9,696

Female, religion and regional dummies included but not reported.

Tables 7a and 7b show the number of observations in each category for both the variables gradenqual and degclass. The use of degclass is to confirm that the results observed in Table 2 are not due to the very low number of individuals in the highest and lowest degree grade categories. The degree classification categories in degclass now contain 7-10% of the population. The higher number of observations mean the results in Table 8 are more robust than those in Table 2. However, as they both reflect similar results it provides some assurance that the strong positive effect of a 1st and insignificant effect of a 3rd are not due to lack of observations.

Appendix 7: Assessing $\ln(\text{weekpay})$ and $\ln(\text{hourpay})$

$$LS_i = \alpha + \beta_1 \text{degree}_i + \beta_2 \text{female}_i + \beta_3 \text{religion}_i + \sum_{k=1}^{11} \delta_k \text{region}_i + \beta_4 \text{depress16}_i \\ + \beta_5 \text{readage16}_i + \beta_6 \ln(\text{weekpay})_i + \beta_7 \ln(\text{hourpay})_i + \epsilon_i$$

Table 9: Observations and Regression Output for $\ln(\text{hourpay})$ and $\ln(\text{weekpay})$

		(1)	(2)
VARIABLES		LS	LS
degree		0.190***	0.192***
female		0.232***	0.184***
religion		0.145***	0.155***
depress16		-0.757***	-0.750***
readage16		-0.0503	-0.0290
$\ln(\text{weekpay})$		0.183***	-
$\ln(\text{hourpay})$		-	0.161***
Observations		6,865	6,762

Regional dummies included but not reported.

Age	Observations	
	$\ln(\text{weekpay})$	$\ln(\text{hourpay})$
26	6,891	6,787
30	8,124	3,113
34	6,860	3,043
42	6,628	2,900

(a) Observations, All Ages

(b) Regression Output, Aged 26

Table 9a shows that at all ages apart from 26, there are less than half the number of observations of $\ln(\text{hourpay})$ as opposed to $\ln(\text{weekpay})$. Meanwhile, Table 9b which contains the regression output when using $\ln(\text{weekpay})$ or $\ln(\text{hourpay})$ shows that the coefficient on degree changes by a very minimal amount when varying the income measure. The comparison was completed at age 26 so as to minimise the effect of loss of observations and instead focus on the effect of switching between the two income measures. As the size and significance of the coefficients on $\ln(\text{weekpay})$ and $\ln(\text{hourpay})$ are similar it suggests that hours worked only has a very small, potentially insignificant impact on SWB. It is for these reasons that the income variable used in this paper is the log of weekly pay rather than hourly pay, so as to avoid any bias caused by large sample attrition.

The slight increase in the size of the coefficient on degree from the inclusion of hourly wage suggests that using weekly wage has a small negative bias on the coefficient in the depression regression and a small positive bias in the LS regression. So the weekly pay variable is larger as it accounts for both the income and hours effect.

Appendix 8: List of Malaise Inventory Questions

1. Do you often have backache?
2. Do you feel tired most of the time?
3. Do you often feel miserable or depressed?
4. Do you often have bad headaches?
5. Do you often get worried about things?
6. Do you usually have great difficulty in falling or staying asleep?
7. Do you usually wake unnecessarily early in the morning?
8. Do you wear yourself out worrying about your health?
9. Do you often get into a violent rage?
10. Do people often annoy and irritate you?
11. Have you at times had twitching of the face, head or shoulders?
12. Do you often suddenly become scared for no good reason?
13. Are you scared to be alone when there are no friends near you?
14. Are you easily upset or irritated?
15. Are you frightened of going out alone or of meeting people?
16. Are you constantly keyed up and jittery?
17. Do you suffer from indigestion?
18. Do you suffer from an upset stomach?
19. Is your appetite poor?
20. Does every little thing get on your nerves and wear you out?
21. Does your heart often race like mad?
22. Do you often have bad pains in your eyes?
23. Are you troubled with rheumatism or fibrositis?
24. Have you ever had a nervous breakdown?