PARIS-JOURDAN SCIENCES ECONOMIQUES
48, BD JOURDAN – E.N.S. – 75014 PARIS
TEL. : 33(0) 1 43 13 63 00 – FAX : 33 (0) 1 43 13 63 10
www.pse.ens.fr

WORKING PAPER N° 2006 - 35

Born to be mild? Cohort effects don't explain why well-being is U-shaped in age

Andrew E. Clark

JEL Codes : C23, I3, J11

Keywords : Well-being, aging, cohort effects, panel analysis

CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE – ÉCOLE DES HAUTES ÉTUDES EN SCIENCES SOCIALES
ÉCOLE NATIONALE DES PONTS ET CHAUSSÉES – ÉCOLE NORMALE SUPÉRIEURE

BORN TO BE MILD? COHORT EFFECTS DON'T EXPLAIN WHY WELL-BEING IS U-SHAPED IN AGE

Andrew E. Clark*
(PSE and IZA)

November 2006

ABSTRACT

The statistical analysis of cross-section data very often reveals a U-shaped relationship between subjective well-being and age. This paper uses fourteen waves of British panel data to distinguish between a pure life-cycle or aging effect, and a fixed cohort effect that depends on year of birth. Panel analysis controlling for fixed effects continues to produce a U-shaped relationship between well-being and age, although this U-shape is flatter for life satisfaction than for the GHQ measure of mental well-being. The pattern of the estimated cohort effects differs between the two well-being measures and, to an extent, by demographic group. In particular, those born earlier report more positive GHQ scores, controlling for their current age; this phenomenon is especially found for women.

JEL Codes: C23, I3, J11.

---

* I am grateful to Dick Easterlin, David Halpern, Felicia Huppert, Orsolya Lelkes, Andrew Oswald, Claudia Senik and Rainer Winkelmann for useful discussions. The BHPS data were made available through the ESRC Data Archive. The data were originally collected by the ESRC Research Centre on Micro-social Change at the University of Essex. Neither the original collectors of the data nor the Archive bear any responsibility for the analyses or interpretations presented here. Paris-Jourdan Sciences Economiques (PSE) is a Joint Research Unit CNRS-EHESS-ENPC-ENS.
Address: PSE, 48 Boulevard Jourdan, 75014 Paris, France. Tel: 33-1-43-13-63-29. E-mail: Andrew.Clark@ens.fr.

BORN TO BE MILD? COHORT EFFECTS DON'T EXPLAIN WHY WELL-BEING IS U-SHAPED IN AGE

Andrew E. Clark*

1. Introduction

Interest in subjective well-being across the social sciences has developed in parallel with both the greater availability of panel data, where the same individuals are followed over time, and the wider use of statistical tools to better model individual fixed effects. These statistical techniques consist of the use of panel data, or cross-section analysis with very careful controls (for example, "twin" studies, where the initial distribution of the genetic pack of cards can be controlled for: see Bouchard *et al.*, 1990, Kohler et al., 2005, and Tellegen *et al.*, 1988). The application of these techniques allows subjective well-being to be split up into a permanent or fixed part, and a transitory component that depends on life events. Recent contributions in this spirit include Lucas *et al.*, (2003 and 2004), Frijters, Haisken-DeNew and Shields (2004), Van Praag and Ferrer-i-Carbonell (2004), and Zimmerman and Easterlin (2006).

This interest in fixed individual characteristics has spilled over into the analysis of the relationship between well-being and age: in an econometric world plagued by accusations of endogeneity, age, sex and ethnicity typically stand out as exogenous variables, and have consequently received a great deal of attention. Early work emphasised that older individuals tended to be happier/more satisfied than younger individuals. More recent analyses have refined this approach by considering non-linear relationships between well-being and age. The results here differ somewhat between economics and psychology.

Mroczek and Kolarz (1998) find that positive affect follows an upwardly curved profile with age, while Mroczek and Spiro (2005) suggest that subjective well-being follows an inverted U-shape, peaking at around retirement age. At the same time, a vigorous literature in Economics has introduced terms in age and age-squared into well-being regressions, revealing a strong U-

shaped relationship which tends to bottom out somewhere between the mid-thirties and the early forties. This curve has now been found many times in a wide variety of datasets across different countries.[1]

Two competing interpretations of this U-shaped relationship have been proposed. One is that it reflects individuals passing through different life events; another is that it reflects a cohort effect, so that individuals born in the 1950s, say, have (and always will have) particularly low levels of subjective well-being. This paper uses two measures of well-being in fourteen waves of British panel data to test the hypothesis that the U-shape is a pure cohort phenomenon. Two types of test are presented, the first indirect, although intuitive, and the second direct. The tests are carried out on both unbalanced and balanced panel data.

The first intuitive test is based on the estimated minimum point of the U-shape. If this latter reflects a cohort phenomenon, then the point of lowest well-being should move to the right by one year from data wave *t* to wave *t+1*. The age of minimum well-being in Wave 14 should therefore be thirteen years greater than that in Wave 1. This turns out not to be the case. The conclusion is that there is an "aging phenomenon" in well-being: this is something that we will all (statistically) go through, no matter when we were born.

The second test is direct. Panel well-being regressions are estimated which control for unobserved individual fixed effects. These regressions, which control for all cohort effects, continue to show a U-shaped relationship between age and well-being. It is important to underline that the age effect here is obtained by examining the different levels of well-being of the same individual at different ages. Again, the conclusion is that the U-shaped relationship is at

[1] A non-exhaustive list includes Clark and Oswald (1994), Clark *et al.* (1996), Oswald (1997), Theodossiou (1998), Winkelmann and Winkelmann (1998), Di Tella *et al.* (2001), Frey and Stutzer (2002), Helliwell (2003), Blanchflower and Oswald (2004), Frijters *et al.* (2004), Senik (2004), Van Praag and Ferrer-i-Carbonell (2004), Clark (2005), Graham (2005), Long (2005), Shields and Wheatley Price (2005), Propper *et al.* (2005), Powdthavee (2005), Lelkes (2006) and Uppal (2006).

least partly driven by aging, rather than being a pure cohort effect.

The remainder of the paper is organised as follows. Section 2 describes the two tests of cohort effects, and the data to which they will be applied. Section 3 contains the main results regarding the persistence of the U-shaped relationship between well-being and age. Last, section 4 concludes.

2. Cohort or Life-Cycle?

Empirical work linking age to measures of subjective well-being (such as life satisfaction or happiness) typically finds a U-shaped relationship, minimising somewhere in the mid-thirties to the early forties. As highlighted in Frey and Stutzer (2002), there is less agreement on why this U-shape is so consistently found. One interpretation is that, loosely speaking, the U-shape reflects the different events that occur to individuals over the life cycle, and their reaction to these events. This was suggested by Argyle (1989); more recent discussions are found in Hayo and Seifert (2002) and Blanchflower and Oswald (2004). Alternatively, we might argue that well-being is broadly flat over the life-cycle, and that the U-shape reflects unobserved individual heterogeneity or cohort effects.[2] In this case, with data from the 1990s, the hypothesis is that those in the late 1950s/early 1960s birth cohort report lower well-being scores than do those born earlier or later.

Cross-section data does not allow us to distinguish between the life-cycle and cohort components of well-being. Neither can twin data, as age and year of birth (the cohort effect) are identical across matched subjects. Progress can be made with panel data, however, in which we have repeated observations on individuals of the same birth cohort, over different ages, allowing

[2] This is the conclusion reached by Easterlin and Schaeffer (1999), using twenty years of cohort data from the General Social Survey. Cribier (2005) is an evocative account of the differences in life experience between two cohorts of French workers born only 14 years apart.

the two effects to be identified separately. The increasing availability of long-run panel data has been a huge boon for social science. This is especially the case in terms of the research on aging or the life-cycle. This paper uses fourteen waves of British panel data to distinguish between life-cycle and cohort effects. Two separate tests that the U-shape represents a cohort effect are proposed.

The first, indirect, test relies on the prediction of the "cohort" model that the whole U-shape should move one year to the right at every wave: the unhappy people who were born in 1955 will be unhappy at age 36 in Wave 1 (in 1991), but equally unhappy at age 37 in Wave 2, and so on. One measure of the position of the U-shaped relationship is its minimum. The first test thus consists in seeing whether the point of minimum well-being shifts to the right by one year per wave.

The second, direct, test involves controlling explicitly for fixed effects in panel well-being regressions. These fixed effects will include by definition the individual's year of birth: her cohort. Any effect of age variables in well-being regressions must then reflect life-cycle or aging effects: systematic changes in well-being that happen to the same individual as they age.

Data

The data come from the first fourteen waves of the British Household Panel Survey (BHPS), a general survey initially covering a random sample of approximately 10 000 individuals in 5 500 British households. The Wave 14 sample consists of around 15 000 individuals in 9 000 households.[3] The BHPS includes a wide range of information about individual and household demographics, employment, income and health. More information on

[3] The wave 1 panel was drawn from 250 areas of Great Britain. Additional samples of 1,500 households in each of Scotland and Wales were added to the main sample in 1999, and in 2001 a sample of 2,000 households was added in Northern Ireland.

this survey is available at http://iserwww.essex.ac.uk/ulsc/bhps/. There is both entry into and exit from the panel, leading to unbalanced data. The BHPS is a household panel: all adults in the same household are interviewed separately. The wave 1 data were collected in late 1991 - early 1992, the wave 2 data were collected in late 1992 - early 1993, and so on. The analysis in this paper refers to individuals aged between 16 and 64, and will be carried out on both unbalanced and balanced panel data.

The central question addressed here is whether individual well-being changes systematically over the life cycle.[4] Two measures of subjective well-being are considered: the General Health Questionnaire (GHQ), which appears in all waves of the BHPS, and overall life satisfaction, which appears in Waves 6-10, and then 12-14. There are 2 836 individuals who provided a GHQ score at every wave of the BHPS, so that the balanced panel analysis can be carried out on a maximum of 39 704 observations. Equally, 4015 individuals provided eight separate life satisfaction scores, for a maximum balanced sample of 32 120 observations. In practice, the balanced regression analysis will be based on slightly fewer observations due to missing values on some of the explanatory variables.

The GHQ-12 (see Goldberg, 1972) reflects overall mental well-being. It is constructed from the responses to twelve questions (administered via a self-completion questionnaire) covering feelings of strain, depression, inability to cope, anxiety-based insomnia, and lack of confidence, amongst others (see Appendix A). Responses are made on a four-point scale of frequency of a feeling in relation to a person's usual state: "Not at all", "No more than usual", "Rather more than usual", and "Much more than usual".[5] The GHQ is widely used in medical,

[4] More precisely: whether subjective well-being changes systematically in a way that cannot be explained by the standard set of explanatory variables (covering income, employment, health, demographics etc.).

[5] A first reaction might be that the GHQ is singularly unsuitable for this kind of analysis, as its constituent parts are explicitly phrased in terms of comparisons to usual. It is worth noting that the empirical literature on GHQ scores treat them unambiguously as indicators of the level of well-being, and it was for this purpose that the instrument was

psychological and sociological research, and is considered to be a robust indicator of the individual's psychological state. The between-item validity of the GHQ-12 is high in this sample of the BHPS, with a Cronbach's alpha score of 0.90.

This paper uses the Caseness GHQ score, which counts the number of questions for which the response is in one of the two "low well-being" categories. This count is then reversed so that higher scores indicate higher levels of well-being, running from 0 (all twelve responses indicating poor psychological health) to 12 (no responses indicating poor psychological health).[6] The distribution of this well-being index in the BHPS sample is shown in Appendix B. The median and mode of this distribution is 12: no responses indicating poor psychological health. However, there is a long tail: one-third of the sample have a score of 10 or less, and thirteen per cent have a score of 6 or less.

The second measure is satisfaction with life, which appears in Waves 6-10 and 12-14 of the BHPS. Respondents are asked "*How dissatisfied or satisfied are you with your life overall*", with responses measured on a scale of one (not satisfied at all) to seven (completely satisfied). The distribution of replies is shown in the second panel of Appendix B. The median score is five, with a mode of six and a mean of 5.2.

The following section considers how both of these well-being measures are related to age, both with and without controls for cohort effects.

---

designed. On a practical level, the employed's GHQ is more strongly correlated with job satisfaction levels in the BHPS data than with job satisfaction changes. Last, with fourteen years of balanced panel data, a relatively direct test of the usefulness of the GHQ score in this respect can be envisaged. If events become more "usual" as an individual ages then the standard deviation of GHQ scores (and of its individual components) will fall with age. There is no evidence of this phenomenon in balanced BHPS panel data.

[6] Alternatively, the responses to the GHQ-12 questions can be used to construct what is known as a Likert measure. This is the simple sum of the responses to the twelve questions, coded so that the response with the lowest well-being value scores 3 and that with the highest well-being value scores 0. This count is then reversed, so that higher scores indicate higher levels of well-being. The measure thus runs from 0 (all twelve responses indicating the worst psychological health) to 36 (no responses indicating poor psychological health). Practically, the results are very similar between the Caseness and Likert measures.

3. Well-Being and Age: Pooled and Panel Results

Well-Being and Age in Pooled Data

Table 1 sets the scene by presenting the results from "standard" well-being equations estimated on pooled data. All of the regressions in this paper are estimated using linear techniques. The pooled analysis in Table 1 comes from OLS estimation; the panel results below come from "within" regressions. It can, of course, be objected that the assumption of cardinality required for OLS is unlikely for well-being measures (is someone with a life satisfaction score of six exactly twice as happy as someone with a life satisfaction score of three?). However, Ferrer-i-Carbonell and Frijters (2004) have shown that, practically, the difference between the ordinal and cardinal estimation of subjective well-being is small compared to the difference between pooled and panel results. More pragmatically, all of the results presented in this paper can be reproduced using appropriate ordinal estimation methods (ordered probit for the pooled analysis, and conditional fixed effect logits for the panel regressions).

Column 1 of Table 1 shows the results from pooled cross-section regressions of GHQ scores, while column 2 refers to life satisfaction. The regressions include age and age-squared as explanatory variables, as well as a number of other controls. The very significant coefficients on age (negative) and age-squared (positive) reveal that, *ceteris paribus*, well-being is U-shaped in age. Some simple algebra shows that the age of minimum well-being is 39 for GHQ and 42 for life satisfaction.

The estimated coefficients on the other right-hand side variables are all fairly standard in the empirical literature on well-being. Unemployment, marital status and health have large impacts on both measures of well-being in the expected direction. Three variables have opposing

effects on GHQ and life satisfaction. Both income[7] and self-employment are associated with higher life satisfaction scores, but greater mental stress. On the contrary, men report lower life satisfaction scores, but less mental stress.[8] It is, in particular, contentious to include health as a right-hand side variable[9], although this is widespread in the literature. The implication here is that we are comparing individuals of working age, but with the same level of health. All of the main results below can be reproduced in analyses which do not include health as an explanatory variable.

Test 1: Does the U-shape move to the right by one year per wave?

If the U-shape in age is a cohort phenomenon, then the whole distribution of well-being should shift to the right by one year per wave. This hypothesis is tested by re-running Table 1's regressions separately for each of the fourteen waves of the BHPS, and calculating the estimated age of minimum well-being in each wave.[10]

The results are summarised in the top panel of Figure 1. If the U-shape reflects only cohort effects, then the estimated age of minimum well-being should increase by one year per wave, tracing out a 45-degree line. Figure 1 shows little evidence of this. Although the estimated minimum of GHQ does rise a little at the very beginning of the sample period, there is no strong trend thereafter.

The BHPS is an unbalanced panel. It is therefore theoretically possible that the pattern of well-being amongst those who enter and exit the data has disguised the true relationship between

[7] Income is measured in real terms, having been deflated by the CPI.

[8] Nolen-Hoeksema and Rusting (1999) conclude in their survey article that women show higher rates for almost all of the mood and anxiety disorders, but in general report higher levels of happiness.

[9] Blanchflower and Oswald (2004) explicitly do not control for health in their statistical analysis.

[10] Alternatively, interaction terms between age and wave can be introduced into Table 1's regressions; these give qualitatively very similar results.

well-being and age. To investigate, the bottom panel of Figure 1 shows the same age of minimum well-being estimated on a balanced panel (over all fourteen waves for GHQ, and over eight waves for life satisfaction). The balanced results again provide little support for the hypothesis that the age distribution shifts to the right by one year per wave.[11]

This evidence points to at least some role for a pure life-cycle effect, whereby for the same individual well-being changes systematically with age. It should be borne in mind, however, that the age of minimum well-being, which is the ratio of two estimated coefficients, is likely measured with a certain degree of error; as such we cannot consider Test 1's results to be definitive, but rather suggestive. What follows is a direct test of the importance of cohort effects which escapes this criticism.

Test 2: Introducing individual fixed effects.

A perhaps simpler approach to the question is to introduce controls for unobserved heterogeneity. To allow a flexible relationship between well-being and age, ten age dummies are created. The first refers to age 16-19, then 20-24, 25-29 and so on up to 60-64. The youngest age group is the omitted category, so all of the estimated coefficients in Table 2 are to be read as relative to the well-being of the youngest.

Table 2 shows three sets of regression results for both GHQ and life satisfaction. The first two regressions are estimated on pooled data. The first includes only the age dummies on the right-hand side, and thus provides a non-parametric estimate of the relationship between well-being and age. Well-being is U-shaped, with minimum well-being occurring at age 40-44 for both measures. The second column introduces the other demographic controls used in Table 1.

[11] Blanchflower and Oswald (2004) carry out a similar test on American General Social Survey data, and conclude that there is only slight evidence that the minimum moves to the right over time. The GSS is not, however, a panel.

These controls make the U-shape more pronounced, if anything, and do not change the age of minimum well-being.

The last column introduces individual fixed effects. The estimated coefficients on the age dummies in column 3 therefore represent the different levels of well-being reported by the same individual as they go through the life cycle. Of course, even with fairly long-run panel data, we do not observe the complete sequence of ages for any respondent. In the BHPS, any one individual can appear in a maximum of four different age categories in the GHQ regressions (over 14 waves) and three different age categories in the life satisfaction regressions (between waves 6 and 14).

The main result from the panel analysis is that, even controlling for individual fixed effects, well-being continues to show a U-shaped relationship with age. This is true for both GHQ and life satisfaction, although the U-shape is more pronounced for the former than for the latter. The age of minimum well-being is in the forties for both measures of well-being. The estimated relationships between well-being and age are illustrated in Figure 2. It is notable that the left-hand side of the "U" in the life satisfaction regressions depends entirely on the drop in well-being between ages 16-19 and 20-24. Thereafter, life satisfaction stays fairly flat up to the end of the forties.

As with test 1, on the estimated age of minimum well-being by wave, it is important to take panel exit and entry into account. Table 3 therefore repeats the analysis described in Table 2, but now estimated only on the balanced sample (4000 individuals for the GHQ score, and just under 3000 for life satisfaction). Even in this much smaller balanced sample, the top panel of Table 3 shows a persistent U-shaped relationship between age and GHQ. In the bottom panel, the relationship between age and life satisfaction is now less evident. Even so, the U-shape persists in the estimated coefficients, which are jointly significant. In addition, the real test of the U-

shape is whether the ends are greater than the middle. This test passes at the ten per cent level comparing the youngest age-group to those in their mid-forties, and at almost the one percent level when we compare the oldest age-group to those in their mid-forties.

Interpreting the results.

Well-being continues to be U-shaped in age even controlling for cohort effects (via individual fixed effects). As such, the well-being of any individual, no matter when they were born, will trace out the profile given by the "panel" lines in Figure 2. While it is easy to think of some aspects of life which might systematically be difficult between the ages of 35 and 45, it is worth noting that the multivariate analyses controls for a number of these (labour force and marital status, home ownership, and number of children). One open question is therefore the identification of the life cycle events that hit hard between the ages of 35 and 45. One possibility is stress at work (perhaps combined with young or adolescent children), although it is difficult to measure such phenomena accurately in large-scale datasets.

As a by-product of column 3 of Table 2, we can examine the distribution of the estimated fixed effects by birth cohort. Graphs showing the pattern of these fixed effects by year of birth are presented in Appendix C. A small number of birth years for which there were fewer than 20 individuals in the cell have been dropped: this applies particularly to the graphs by level of education. The shape of the cohort effects can be inferred from Figure 2. For GHQ, both pooled and panel results are U-shaped, but the distance between the two lines is greater for the older age-groups than for the younger age-groups: in other words, those born earlier report higher levels of well-being on the GHQ scale, independent of their current age.[12] However, the size of this estimated cohort effect is not overwhelmingly large: the difference between the average

[12] Easterlin (2006) reaches a similar conclusion for happiness in US cohorts.

fixed effect of those born in the 1930s and those born in the 1970s is about one-eighth of a GHQ point, on the 0-12 scale. By way of comparison, this is the size of the estimated effect of divorce on well-being in the pooled cross-section estimates in Table 1, but is only about one-third of the size of the effect of separation or unemployment.

The same approach for life satisfaction suggests that the fixed effects must be U-shaped. The pooled results are markedly U-shaped, but the panel results are less so. The difference between them is the fixed effect, which must therefore itself have a U-shaped distribution. In this case, it does seem to be true that those born around the late 1950s to early 1960s have (fixed) lower levels of life satisfaction.

Why do the fixed effects have this pattern? Any attempt at explanation will be speculative, as by definition fixed effects reflect unobserved differences between individuals. With respect to the shape of GHQ fixed effects, one such piece of speculation as to why those born earlier have, *ceteris paribus*, higher levels of mental well-being appeals to social comparisons. Researchers in a number of social science disciplines have emphasised the importance of comparisons to reference groups (Adams, 1965, Frank, 1989, Kapteyn, van Praag and van Herwaarden, 1978, and Pollis, 1968). It seems likely that one type of comparison may occur with respect to the past, and perhaps even to a certain defined period (parents' situation during the individuals' childhood, or the individual's first job, for example). Secularly rising living standards will then imply that older cohorts compare current outcomes to lower reference levels, and will therefore report higher well-being scores.[13]

[13] Such comparisons to the past imply that, in the long run, the correlation between GDP per capita and individual well-being may well be small. For some recent empirical contributions to this debate, see Diener and Oishi (2000), Easterlin (1995) and Oswald (1997). This literature is surveyed in Clark *et al.* (2006).

Is Everyone the Same?

It is of interest to carry out the above analysis separately for different demographic groups. Specifically, Table 2's regressions were re-run for men and for women, and for three different educational groups (where high education corresponds to qualifications obtained in higher education, and medium education to A-Level, O-Level or Nursing qualifications).

Both the estimated U-shape and the fixed effects profile differ by demographic group. The U-shaped relationship between well-being and age is much more prominent for men than for women. In addition, the negative trend in the GHQ fixed effect (so that older cohorts are happier than younger cohorts) is found only for women. Regarding education, the U-shape is stronger for the higher-educated than for the other groups, and the negative trend in the GHQ fixed effect is found only for the higher-educated. However, the U-shaped fixed effect in life satisfaction is found for all demographic groups.

5. Conclusion

This paper has used fourteen waves of British panel data to confirm that subjective well-being is U-shaped in age in pooled data. The application of panel analysis techniques allows us to distinguish the life-cycle or ageing component of this relationship from the fixed effect or cohort part. The results show that, even controlling for individual fixed effects, both life satisfaction and GHQ scores remain U-shaped in age. The analysis of the fixed effect in GHQ scores shows that individuals from earlier cohorts (i.e. those who were born earlier) will have, *ceteris paribus*, distinctly higher levels of subjective well-being, as measured by the GHQ-12 score, than those from later cohorts. This pattern is markedly different by sex, and by level of education. The fixed effects in life satisfaction exhibit a U-shaped relationship.

The main result of this analysis may be considered as essentially negative: whereas we

previously thought that there was only one phenomenon to explain (the U-shape), there are now two: a U-shaped life-cycle or aging effect, and the cohort profiles. This paper has not explicitly tested any theories of why these data shapes pertain, although the GHQ fixed effects results are consistent with reference group theory, in that those born earlier may have lower standards of comparison.

This paper's conclusions are based on British data, although the robust U-shaped relationship is found across two rather different measures of well-being (while weaker for life satisfaction than for the GHQ). It may be that other datasets will produce different results. The simple method used in this paper can be easily applied to any panel data set of sufficiently long duration. The search for consistent patterns in well-being data should perhaps now pay more attention to the structure of the fixed effect, and in particular to its relationship with year of birth.

Appendix A

The twelve questions used to create the GHQ-12 measure appear in the BHPS questionnaire as follows:

1. Here are some questions regarding the way you have been feeling over the last few weeks. For each question please ring the number next to the answer that best suits the way you have felt.

Have you recently....

a) been able to concentrate on whatever you're doing ?

Better than usual.....1
Same as usual 2
Less than usual 3
Much less than usual..... 4

then

b) lost much sleep over worry ?
e) felt constantly under strain ?
f) felt you couldn't overcome your difficulties ?
i) been feeling unhappy or depressed ?
j) been losing confidence in yourself ?
k) been thinking of yourself as a worthless person ?

with the responses:

Not at all 1
No more than usual..... 2
Rather more than usual..... 3
Much more than usual 4

then

c) felt that you were playing a useful part in things ?
d) felt capable of making decisions about things ?
g) been able to enjoy your normal day-to-day activities ?
h) been able to face up to problems ?
l) been feeling reasonably happy, all things considered ?

with the responses:

More so than usual 1
About same as usual 2
Less so than usual 3
Much less than usual..... 4

Appendix B

The Distribution of Well-Being in the BHPS (Inverted Caseness index of the GHQ-12)

Well-being Score	*Number of Observations*	*Cumulative Percentage*
0	2 218	1.6
1	1 829	3.0
2	1 958	4.4
3	2 226	6.1
4	2 558	7.9
5	3 080	10.2
6	3 774	13.0
7	4 618	16.4
8	5 753	20.6
9	7 767	26.3
10	11 210	34.5
11	18 977	48.5
12	70 088	100.0
Total	**136 055**	**100.0**

Source: BHPS Waves 1-14.

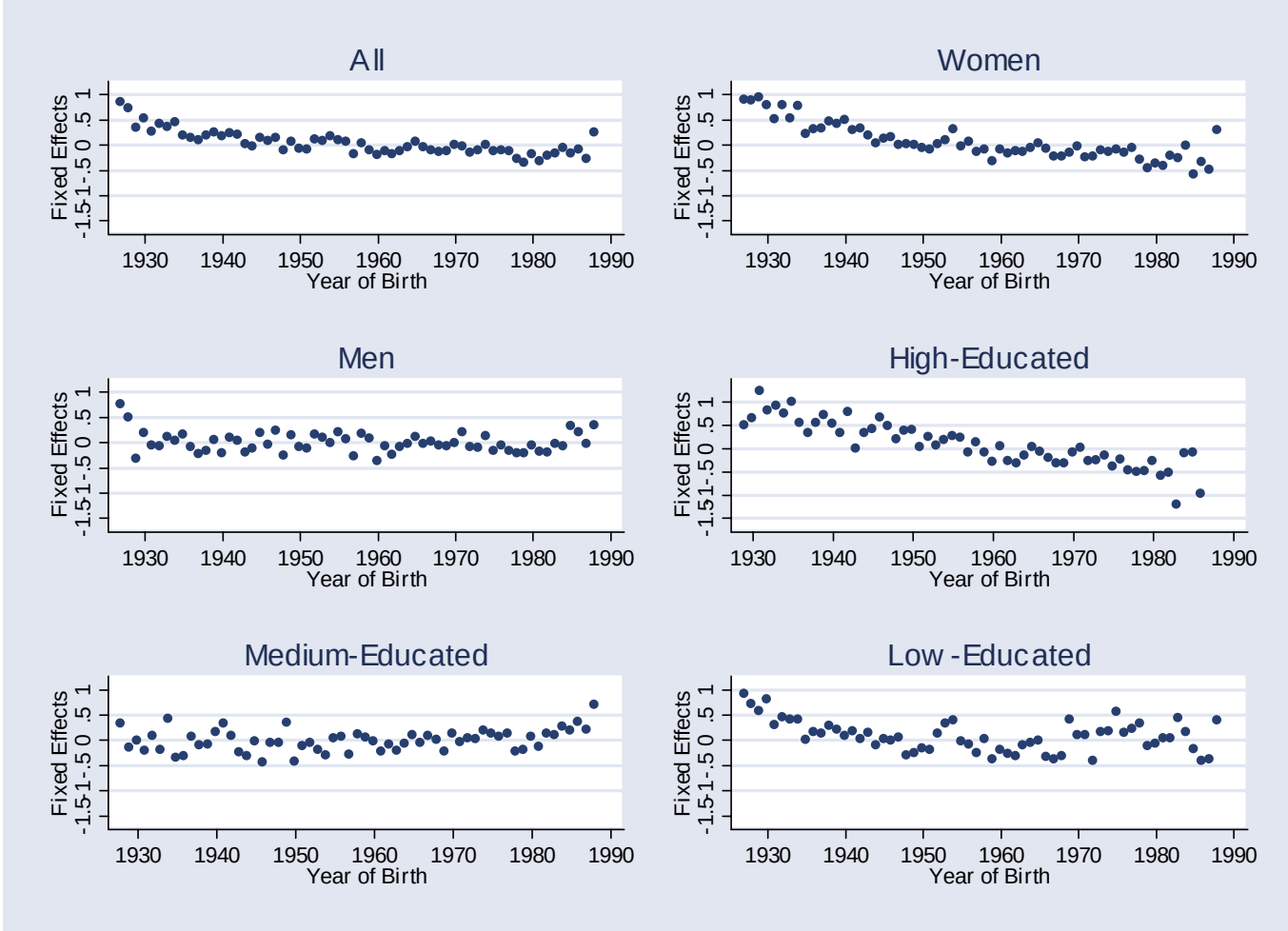
The Distribution of Well-Being in the BHPS (Life Satisfaction)

Well-being Score	*Number of Observations*	*Cumulative Percentage*
1	1 278	1.5
2	1 985	3.9
3	5 348	10.2
4	12 289	24.7
5	25 848	55.2
6	28 052	88.3
7	9 944	100.0
Total	**85 134**	**100.0**

Source: BHPS Waves 6-10 and 12-14.

Appendix C

GHQ Fixed Effects by Year of Birth



Life Satisfaction Fixed Effects by Year of Birth

TABLE 1. WELL-BEING REGRESSIONS. BHPS WAVES 1 TO 14 POOLED

	Caseness GHQ	Life Satisfaction
Age	-0.089**	-0.075**
	(0.005)	(0.003)
Age-squared/100	0.115**	0.091**
	(0.006)	(0.003)
Total Income	-0.027**	0.018**
	(0.008)	(0.004)
Self-Employed	-0.088**	0.054**
	(0.029)	(0.016)
Unemployed	-0.985**	-0.401**
	(0.038)	(0.021)
Retired	-0.062	0.107**
	(0.043)	(0.022)
Other LFS	-0.684**	-0.202**
	(0.022)	(0.012)
Male	0.433**	-0.092**
	(0.017)	(0.009)
Married	0.058*	0.256**
	(0.025)	(0.013)
Separated	-0.917**	-0.273**
	(0.054)	(0.029)
Divorced	-0.348**	-0.098**
	(0.035)	(0.018)
Widowed	-0.627**	-0.134**
	(0.062)	(0.033)
One Child	-0.023	-0.051**
	(0.024)	(0.013)
Two Children	0.095**	-0.043**
	(0.026)	(0.014)
Three+ Children	0.056	-0.049*
	(0.038)	(0.021)
Renter	-0.166**	-0.163**
	(0.019)	(0.010)
Education: High	-0.264**	-0.119**
	(0.022)	(0.012)
Education: Medium	-0.100**	-0.082**
	(0.021)	(0.011)
Health: Excellent	2.121**	1.039**
	(0.022)	(0.012)
Health: Good	1.688**	0.690**
	(0.019)	(0.010)
Wave Dummies	Yes	Yes
Region Dummies	Yes	Yes
Observations	132665	82096

Standard errors in parentheses. * significant at 5%; ** significant at 1%

Estimated Age of Minimum Well-Being	***38.8***	***41.5***

TABLE 2. POOLED AND PANEL WELL-BEING REGRESSIONS.

GHQ

	No controls	*Demographic controls*	*Demographic controls plus Individual Fixed Effects*
Age 20-24	-0.114**	-0.189**	-0.202**
	(0.037)	(0.040)	(0.048)
Age 25-29	-0.062	-0.245**	-0.335**
	(0.043)	(0.049)	(0.068)
Age 30-34	-0.194**	-0.368**	-0.461**
	(0.046)	(0.056)	(0.089)
Age 35-39	-0.290**	-0.439**	-0.524**
	(0.047)	(0.060)	(0.109)
Age 40-44	-0.359**	-0.502**	-0.610**
	(0.050)	(0.063)	(0.130)
Age 45-49	-0.322**	-0.401**	-0.621**
	(0.051)	(0.064)	(0.151)
Age 50-54	-0.277**	-0.283**	-0.512**
	(0.054)	(0.065)	(0.172)
Age 55-59	-0.159**	-0.071	-0.372
	(0.055)	(0.067)	(0.194)
Age 60-64	0.099	0.148*	-0.218
	(0.056)	(0.072)	(0.217)
Constant	10.259**	9.217**	9.752**
	(0.033)	(0.069)	(0.117)
Observations	136055	132665	132665

Life Satisfaction

	No controls	*Demographic controls*	*Demographic controls plus Individual Fixed Effects*
Age 20-24	-0.147**	-0.180**	-0.146**
	(0.022)	(0.024)	(0.025)
Age 25-29	-0.149**	-0.291**	-0.148**
	(0.025)	(0.028)	(0.037)
Age 30-34	-0.164**	-0.353**	-0.142**
	(0.025)	(0.031)	(0.047)
Age 35-39	-0.269**	-0.454**	-0.167**
	(0.026)	(0.033)	(0.056)
Age 40-44	-0.319**	-0.515**	-0.170**
	(0.027)	(0.034)	(0.065)
Age 45-49	-0.297**	-0.489**	-0.173*
	(0.028)	(0.035)	(0.075)
Age 50-54	-0.212**	-0.412**	-0.147
	(0.029)	(0.035)	(0.085)
Age 55-59	-0.076*	-0.249**	-0.056
	(0.030)	(0.037)	(0.095)
Age 60-64	0.116**	-0.103*	0.054
	(0.032)	(0.042)	(0.106)
Constant	5.333**	5.022**	4.823**
	(0.019)	(0.037)	(0.080)
Observations	84744	82096	82096

Robust standard errors in parentheses. * significant at 5%; ** significant at 1%.
The regressions in Columns 2 and 3 include all of Table 1's controls (except for age and age-squared).

TABLE 3. POOLED AND PANEL BALANCED WELL-BEING REGRESSIONS.

GHQ

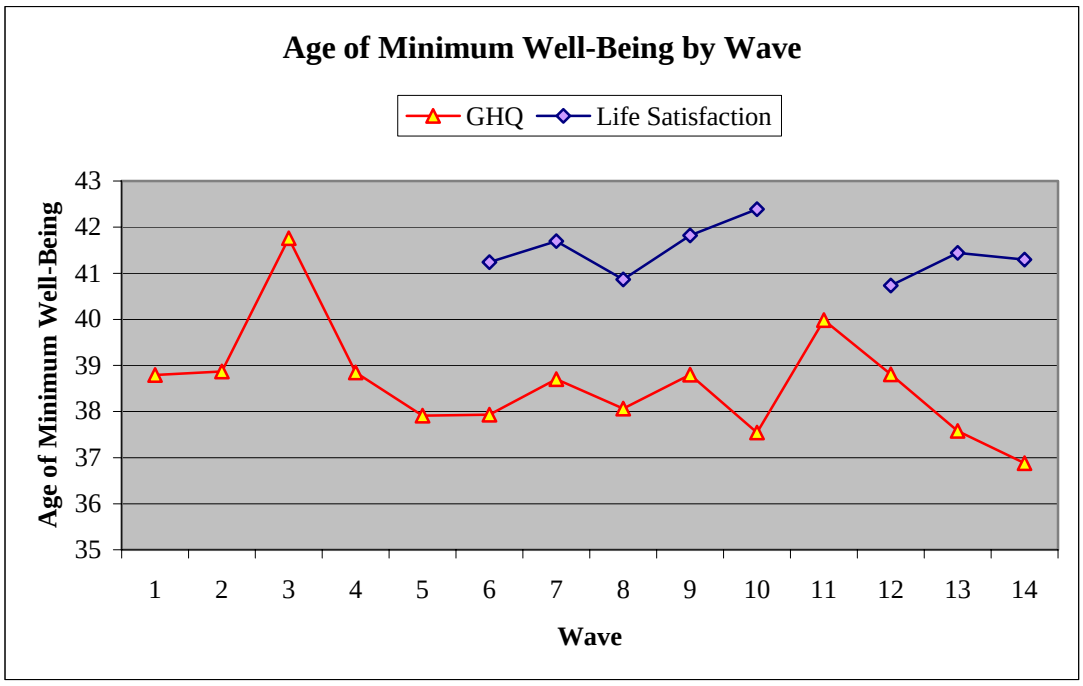
	No controls	*Demographic controls*	*Demographic controls plus Individual Fixed Effects*
Age 20-24	-0.388**	-0.301**	-0.274*
	(0.106)	(0.113)	(0.134)
Age 25-29	-0.506**	-0.490**	-0.575**
	(0.114)	(0.128)	(0.154)
Age 30-34	-0.688**	-0.697**	-0.822**
	(0.120)	(0.139)	(0.185)
Age 35-39	-0.639**	-0.685**	-0.873**
	(0.120)	(0.146)	(0.218)
Age 40-44	-0.768**	-0.812**	-1.017**
	(0.123)	(0.151)	(0.252)
Age 45-49	-0.800**	-0.764**	-1.023**
	(0.125)	(0.153)	(0.287)
Age 50-54	-0.593**	-0.507**	-0.783*
	(0.127)	(0.157)	(0.324)
Age 55-59	-0.509**	-0.398*	-0.681
	(0.139)	(0.174)	(0.364)
Age 60-64	-0.163	-0.164	-0.429
	(0.166)	(0.212)	(0.408)
Constant	10.726**	9.505**	9.922**
	(0.107)	(0.155)	(0.240)
Observations	39704	39280	39280

Life Satisfaction

	No controls	*Demographic controls*	*Demographic controls plus Individual Fixed Effects*
Age 20-24	-0.072	-0.110*	-0.067
	(0.053)	(0.056)	(0.047)
Age 25-29	-0.077	-0.222**	-0.102
	(0.060)	(0.065)	(0.059)
Age 30-34	-0.108	-0.294**	-0.134
	(0.061)	(0.069)	(0.072)
Age 35-39	-0.190**	-0.386**	-0.162
	(0.061)	(0.072)	(0.084)
Age 40-44	-0.250**	-0.461**	-0.161
	(0.061)	(0.073)	(0.097)
Age 45-49	-0.263**	-0.448**	-0.155
	(0.062)	(0.075)	(0.111)
Age 50-54	-0.180**	-0.382**	-0.091
	(0.063)	(0.075)	(0.124)
Age 55-59	-0.065	-0.264**	-0.008
	(0.065)	(0.079)	(0.138)
Age 60-64	0.139	-0.095	0.139
	(0.077)	(0.096)	(0.155)
Constant	5.318**	4.871**	4.764**
	(0.055)	(0.077)	(0.122)
Observations	32120	31416	31416

Robust standard errors in parentheses. * significant at 5%; ** significant at 1%.
The regressions in Columns 2 and 3 include all of Table 1's controls (except for age and age-squared).

FIGURE 1. THE ESTIMATED MINIMUM OF THE U-SHAPE, BY WAVE



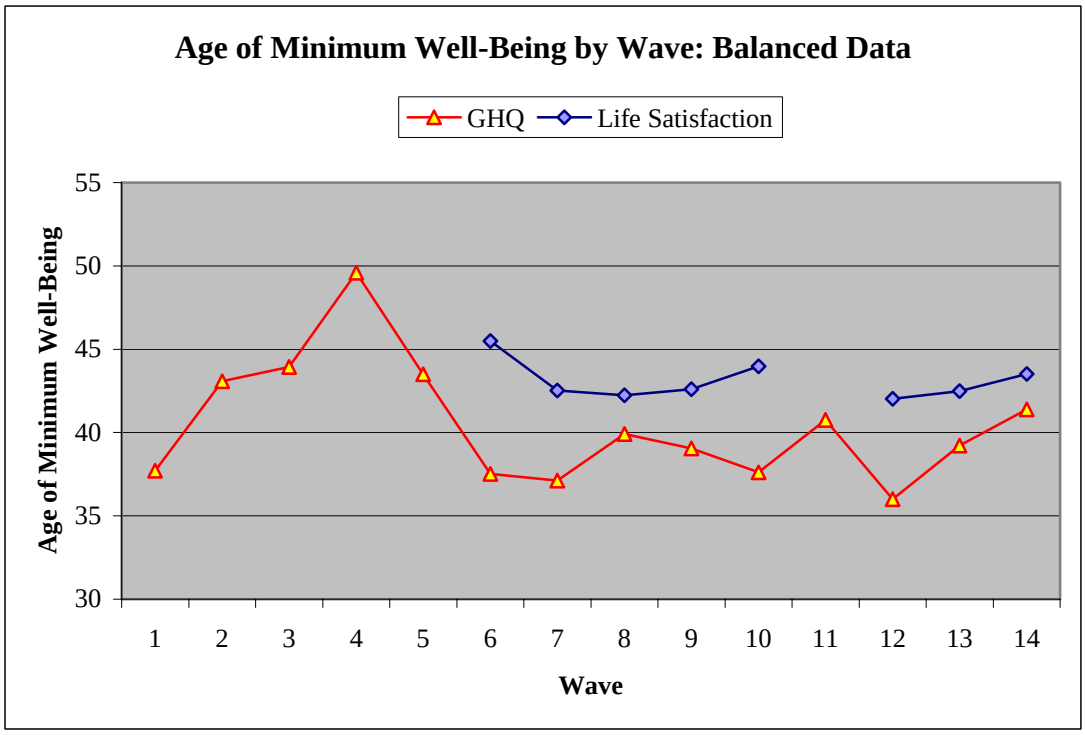
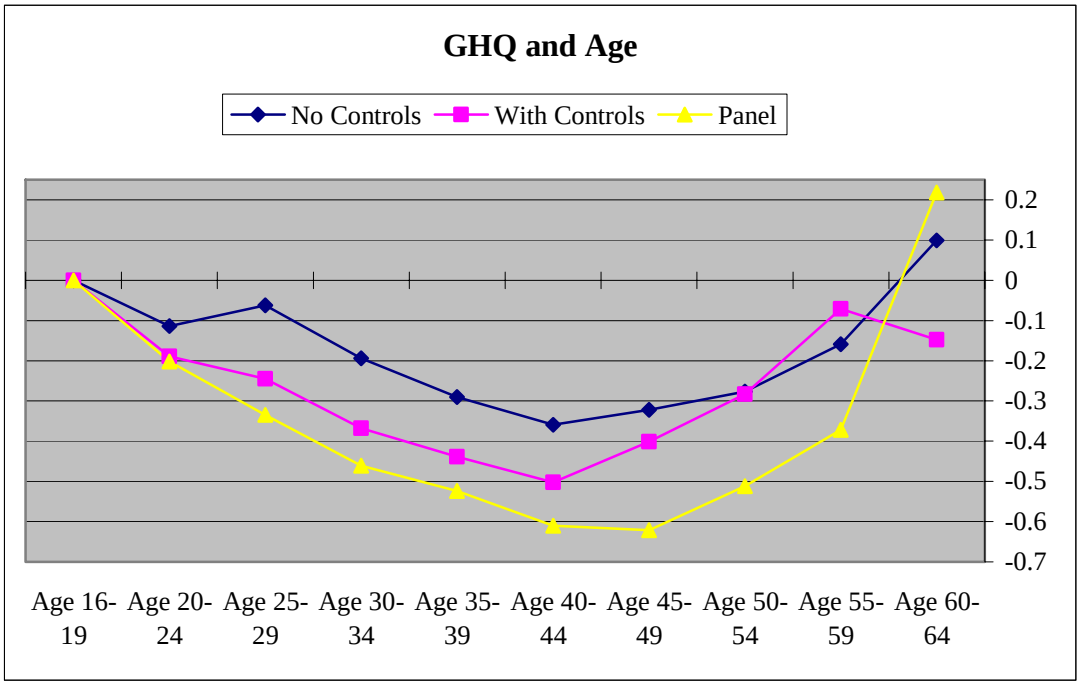
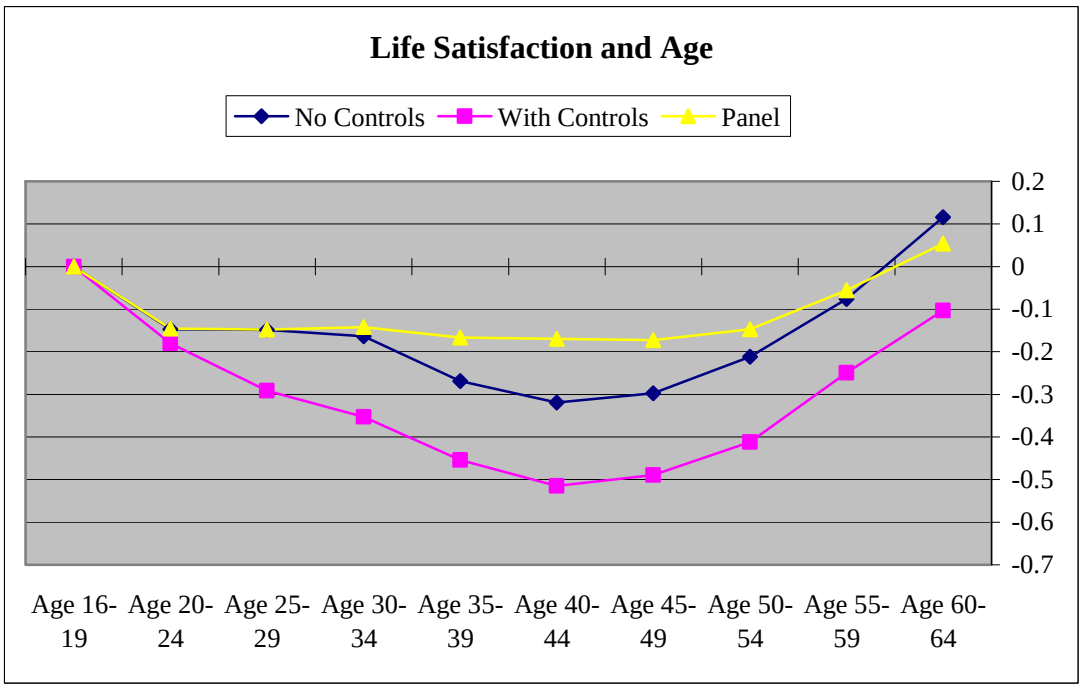


FIGURE 2. AGE AND WELL-BEING: POOLED AND PANEL RESULTS





REFERENCES

Adams, J. S. (1965). "Inequity in Social Exchange". In L.Berkowitz (Ed.), *Advances in Experimental Social Psychology 2* . New York and London: Academic Press.

Argyle, M. (1989). *The Psychology of Happiness*. London: Routledge.

Blanchflower, D.G. and Oswald, A.J. (2004). "Well-Being over Time in Britain and the USA". *Journal of Public Economics*, **88**, 1359-1386.

Bouchard, T. J., Lykken, D. T., McGue, M., Segal, N. L. and Tellegen, A. (1990). "Sources of Human Psychological Differences: The Minnesota Study of Twins Reared Apart". *Science*, **250**, 223-228.

Clark, A.E. (2005). "Your Money or Your Life: Changing Job Quality in OECD Countries". *British Journal of Industrial Relations, 43*, 377-400.

Clark, A.E., Frijters, P. and Shields, M. (2006). "Income and Happiness: Evidence, Explanations and Economic Implications". PSE, Discussion Paper 2006-24.

Clark A.E. and Oswald A.J. (1994). "Unhappiness and Unemployment". *Economic Journal*, **104**, 648-659.

Clark A.E., Oswald A. and Warr P. (1996). "Is Job Satisfaction U-shaped in Age?" *Journal of Occupational and Organizational Psychology*, **69**, 57-81.

Cribier, F. (2005). "Changes in the experience of life between two cohorts of Parisian pensioners, born in *circa* 1907 and 1921". *Aging & Society*, **25**, 1-18.

Diener, E. and Oishi, S. (2000). "Money and happiness: Income and subjective well-being across nations". In E. Diener & E. M. Suh (Eds.), *Cross-cultural psychology of subjective well-being* . Boston: MIT Press.

Di Tella R., MacCulloch R.J. and Oswald A.J. (2001). "Preferences over inflation and unemployment: Evidence from surveys of happiness". *American Economic Review*, **91**, 335-341.

Easterlin, R. A. (1995). "Will Raising the Incomes of All Increase the Happiness of All?". *Journal of Economic Behavior and Organization*, **27**, 35-47.

Easterlin, R. (2006). "Life Cycle Happiness and Its Sources". *Journal of Economic Psychology*, forthcoming.

Easterlin, R. A. and Schaeffer, C. M. (1999). "Income and Subjective Well-Being Over the Life-Cycle". In C. D. Ryff & V. W. Marshall (Eds.), *The Self and Society in Aging Processes*. New York: Springer Publishing Co.

Ferrer-i-Carbonell, A. and Frijters, P. (2004). "How important is methodology for the estimates of the determinants of happiness?". *Economic Journal*, **114**, 641-659.

Frank, R. H. (1989). "Frames of Reference and the Quality of Life". *American Economic Review*, **79**, 80-85.

Frey, B. S. and Stutzer, A. (2002). *Happiness and Economics*. Princeton and Oxford: Princeton University Press.

Frijters, P., Haisken-DeNew, J. and Shields, M. (2004). "Money does matter! Evidence from increasing real incomes and life satisfaction in East Germany following reunification". *American Economic Review*, **94**, 730-740.

Graham C. (2005). "Insights on development from the economics of happiness". *World Bank Research Observer*, **20**, 201-231.

Goldberg, D. P. (1972). *The Detection of Psychiatric Illness by Questionnaire*. Oxford: Oxford University Press.

Hayo, B. and Seifert, W. (2002). "Subjective Economic Well-Being in Eastern Europe". *Journal of Economic Psychology*, **24**, 329-348.

Helliwell J. (2003). "How's life? Combining individual and national variables to explain subjective well-being". *Economic Modelling*, **20**, 331-360.

Kapteyn, A., van Praag, B. M. S. and van Herwaarden, F. G. (1978). "Individual Welfare Functions and Social Reference Spaces". *Economics Letters*, **1**, 173-177.

Kohler, H.-P., Behrman, J. and Skytthe, A. (2005). "Partner + Children = Happiness? The Effects of Partnerships and Fertility on Well-Being". *Population and Development Review*, **31**, 407–445.

Lelkes, O. (2006). "Life-cycle Happiness". European Centre, mimeo.

Long, A. (2005). "Happily Ever After? A Study of Job Satisfaction in Australia". *The Economic Record*, **81**, 303-321.

Lucas, R., Clark, A.E., Georgellis, Y. and Diener, E. (2003). "Re-Examining Adaptation and the Setpoint Model of Happiness: Reaction to Changes in Marital Status". *Journal of Personality and Social Psychology*, **84**, 527-539.

Lucas, R., Clark, A.E., Georgellis, Y. and Diener, E. (2004). "Unemployment Alters the Set-Point for Life Satisfaction". *Psychological Science*, **15**, 8-13.

Mroczek D.K. and Kolarz C.M. (1998). "The effect of age on positive and negative affect: A developmental perspective on happiness". *Journal of Personality and Social Psychology*, **75**, 1333-1349.

Mroczek D.K and Spiro A. (2005). "Change in life satisfaction during adulthood: Findings from the Veterans Affairs Normative Aging study". *Journal of Personality and Social Psychology*, **88**, 189-202.

Nolen-Hoeksema, S. and Rusting, C.L. (1999). "Gender differences in well-being". In D. Kahneman, E. Diener and N. Schwarz (Eds.), *Well-being: The foundations of hedonic psychology*. New York: Russell Sage Foundation.

Oswald, A. J. (1997). "Happiness and economic performance". *Economic Journal*, **107**, 1815-31.

Pollis, N. P. (1968). "Reference Group Re-examined". *British Journal of Sociology*, **19**, 300-307.

Powdthavee N. (2005). "Unhappiness and crime: Evidence from South Africa". *Economica*, **72**, 531-547.

Propper C., Jones K., Bolster A., Burgess S., Johnston R. and Sarker R.. (2005). "Local neighbourhood and mental health: Evidence from the UK". *Social Science and Medicine*, **61**, 2065-2083.

Senik, C. (2004). "When Information Dominates Comparison: A Panel Data Analysis Using Russian Subjective Data.". *Journal of Public Economics*, **88**, 2099-2123.

Shields M.A. and Wheatley Price S. (2005). "Exploring the economic and social determinants of psychological well-being and perceived social support in England". *Journal of the Royal Statistical Society (Series A)*, **168**, 513-537.

Tellegen, A., Lykken, D. T., Bouchard, T. J., Wilcox, K. J., Segal, N. L. and Rich, S. (1988). "Personality Similarity in Twins Reared Apart and Together". *Journal of Personality and Social Psychology*, **54**, 1031-1039.

Theodossiou I. (1998). "The effects of low-pay and unemployment on psychological well-being: A logistic regression approach". *Journal of Health Economics*, **17**, 85-104.

Uppal S. (2006). "Impact of the timing and severity of disability on the subjective well-being of individuals with disabilities". *Social Science and Medicine*, **63**, 525-539.

Winkelmann L. and Winkelmann R. (1998). "Why are the unemployed so unhappy? Evidence from panel data". *Economica*, **65**, 1-15.

Van Praag, B. and Ferrer-i-Carbonell, A. (2004). *Happiness Quantified*. Oxford: Oxford University Press.

Zimmermann, A. and Easterlin, R. (2006). "Happily Ever After? Cohabitation, Marriage, Divorce, and Happiness in Germany". *Population and Development Review*, **32**, 511-528.