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The Easterlin paradox at 50

Ekaterina Oparina
Andrew E. Clark
Richard Layard

LSE THE LONDON SCHOOL OF ECONOMICS AND POLITICAL SCIENCE

UKRI Economic and Social Research Council

Abstract
We use Gallup World Poll data from over 150 countries from 2009-2019 at both the individual and country levels to revisit the relationship between income and subjective wellbeing. Our inspiration is the paradox first proposed by Easterlin (1974), according to which higher incomes are associated with greater happiness in cross-sections yet increases in a country's GDP per head do not increase its average wellbeing. In our analysis subjective wellbeing (or happiness) is measured by the Cantril ladder on a 0-10 scale. Across individuals, other things equal, one unit of log income raises subjective wellbeing by 0.4 points. In other words, doubling income raises wellbeing by 0.3 points out of 10. Across countries, a crude regression of log income on per capita income gives a higher coefficient of 0.6. But, once social variables like health and social support are introduced, the picture changes. In rich countries, income no longer has a significant effect, either in country cross-sections or in time series: higher income only matters due to its correlation with the social variables. For low-income countries the result is also clear cut – income raises happiness in both cross-section and time series, whether the social variables are controlled for or not. For middle income countries the result is mixed.

Keywords: subjective wellbeing, income, GDP, Easterlin paradox, public goods
JEL codes: F15; R10; R12

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Ekaterina Oparina, Centre for Economic Performance at London School of Economics. Andrew E. Clark, Paris School of Economics and Centre for Economic Performance at London School of Economics. Richard Layard, Centre for Economic Performance at London School of Economics.

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1. Introduction

Fifty years ago Richard Easterlin wrote a famous article, propounding a paradox (Easterlin, 1974). In its modern form[1] the paradox that is claimed is this:

- At a point in time, richer people are happier than poorer people.
- But, over time, as populations grow richer, they do not grow happier.

The time series evidence which Easterlin offered came only from the US, and the fifty years since then confirm this picture of the US (see Layard and De Neve, 2023, Figure 13.3). But is it a general picture?[2]

In this paper we use the Gallup World Poll data from over 150 countries to investigate the hypothesis in a systematic way, The data are from 2009-2019. This is shorter than we would like, but we do our best to control for the business cycle by including unemployment as a covariate. We also include, as country covariates, five social variables which are also important determinants of wellbeing – social support, healthy life expectancy, freedom to make life choices, generosity, and lack of corruption.

Our main findings are these. For individuals the cross-section picture is clear – other things equal, richer people are happier than poorer people. Turning to country data, this differs between groups of countries.

For low-income countries, higher incomes are associated with higher average happiness even controlling for the social variables. This is true both across countries and over time. Higher income in those countries is associated with greater happiness, both in its own right and via the social variables.

However, in the cross-section of high income countries, richer countries are not happier than poorer countries once the social variables are included. If income is included in the regression without the social variables, it is associated with higher wellbeing. But this is because the social variables and income are positively correlated. If that correlation arises because those variables are positively affected by income, then income is having a positive effect - not through household income but through the social variables. But with the Gallup data one cannot establish whether that is the direction of causation.

Over time in the high-income group, there is no significant evidence that country income growth is correlated with country happiness growth. This supports the original Easterlin proposition for these countries.

Finally, the results for middle-income countries are more mixed. Richer middle-income countries are not happier than poorer middle-income countries once the social variables are included. But over time, income growth in middle-income countries is significantly correlated with happiness growth, whether the social variables are included or not.

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[2] There have been numerous previous attempts to investigate this – for example Sacks *et al*. (2010), Kaiser and Vendrik (2019), and Easterlin and O'Connor (2020).

2. Data

We analyse individual-level data from the Gallup World Poll (GWP). This covers 158 countries over the 2009-2019 period, and includes over 1.5 million individual observations. The empirical analysis of the relationship between subjective wellbeing and income is carried out both for all countries in the sample, and then separately for the different country income groups in the World Bank classification. The list of countries, split by the four World Bank income groups, appears in **Appendix Table A.1**.

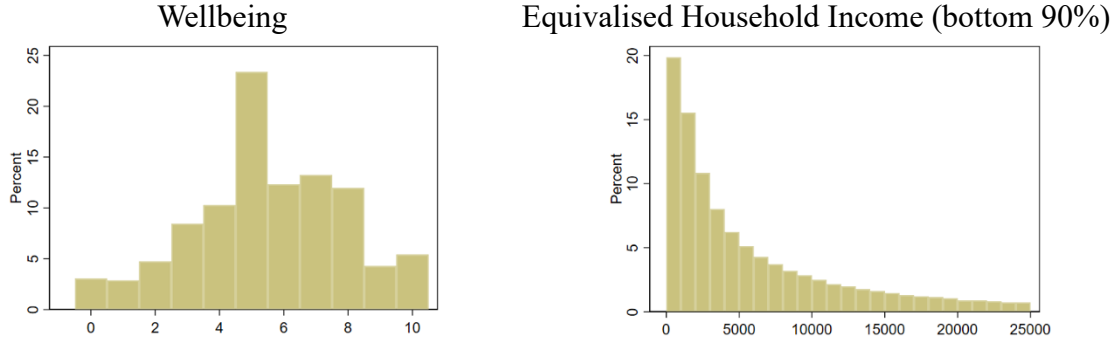
Our dependent variable is subjective wellbeing. This is measured in the Gallup World Poll by the responses to the Cantril Ladder question (Cantril, 1965) on a scale from 0 to 10:
Please imagine a ladder, with steps numbered from 0 at the bottom to 10 at the top. The top of the ladder represents the best possible life for you and the bottom of the ladder represents the worst possible life for you. On which step of the ladder would you say you personally feel you stand at this time?

2.1. Individual-level data

The left panel of **Figure 2.1** shows the distribution of subjective wellbeing as measured by the Cantril Ladder. The average reported subjective wellbeing in the dataset in the 2009-2019 period is 5.5, with a standard deviation of 2.4. Both the median and mode scores are 5.

We wish to relate wellbeing to income. We measure the latter by the logarithm of equivalised annual household income in PPP Dollars.[3] The right panel of **Figure 2.1** depicts the distribution of equivalent household income in the bottom 90% of the individual-level distribution.[4] The summary statistics for wellbeing, income and the other variables that are used in the empirical analysis appear in **Appendix Table A.2**.

Figure 2.1. The World distribution of subjective wellbeing (left-hand panel) and real equivalised household income (right-hand panel)

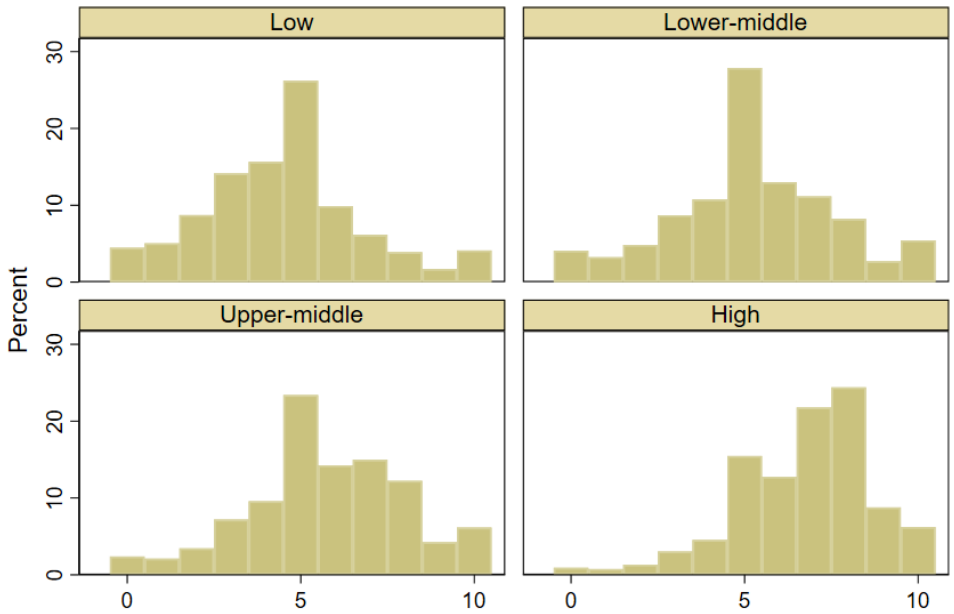


Notes: Gallup World Poll, 2009-2019. Wellbeing is measured via the Cantril Ladder. Household income is equivalent annual household income in 2016 PPP Dollars.

[3] Household annual pre-tax income in local currency is recorded as a continuous variable in the Gallup surveys. Gallup converts this figure into PPP Dollars using the latest-available individual consumption PPP conversion factors – the most recent PPP estimates produced by the World Bank (2014 for many countries) based on the 2011 International Comparison Program (ICP). In addition, the PPP rates are deflated using the US Dollar CPI, so that all income figures are in 2016 US Dollars. We convert the resulting figure to a household equivalised value using the OECD equivalence scale: the first household member is assigned a value of 1, each additional adult a value of 0.7, and each child 0.5.

[4] The 90th percentile figure for the distribution of global equivalised household income in 2009-2019 GWP data is $24,900, while the 99.9th percentile figure is $372,600.

Figure 2.2. The distribution of subjective wellbeing by country income group



Note: Gallup World Poll, 2009-2019. Wellbeing is measured via the Cantril Ladder.

We will below systematically investigate the income-wellbeing relationship both for all countries and then for countries at different levels of economic development, using the four World Bank income-group classifications.

Figure 2.2 depicts the distributions of wellbeing by these country income groups. Average wellbeing rises with income, with figures of 4.5 (2.27), 5.2 (2.34), 5.7 (2.27) and 6.7 (1.94) for the low, lower-middle, upper-middle and high-income country groups respectively (standard deviations in parentheses). **Appendix Figure A.1** in the Appendix plots the distribution of equivalised household income by country-income group.

2.2. Country-level data

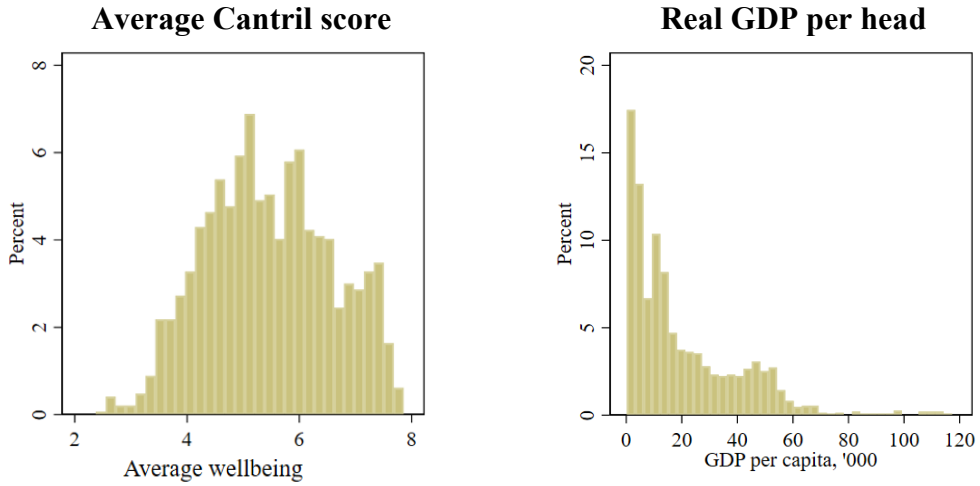
The analysis of the country-level relationship between income and subjective wellbeing uses the country-year average Cantril ladder scores from the Gallup World Poll. The average of these country-year scores is 5.46, with a standard deviation of 1.12. The income measure is real GDP per capita measured in US Dollars at purchasing power parity:[5] the average figure here is $20 351 with a standard deviation of 19 836. The aggregate dataset contains 1,467 country-year observations for 157 countries from 2009 to 2019.[6]

The distributions of the country-year wellbeing scores and levels of real GDP per head are depicted in **Figure 2.3**. The separate distributions of GDP and wellbeing by the four World Bank income groups appear in **Appendix Figure A.2** and **Appendix Figure A.3**, respectively.

[5] Source: The World Bank World Development indicators data complemented with information from the Penn World Tables (version 10).

[6] As compared to the individual-level data, which has 158 countries, the country-level analysis omits two countries due to missing GDP per capita (Somalia and South Sudan) and adds one (Djibouti) for which there is no individual income information in the Gallup data but there is GDP data.

Figure 2.3. Left panel: The distribution of country-year average subjective wellbeing (0-10). Right panel: The distribution of country-year real GDP per capita



Notes: Gallup World Poll, 2009-2019. There are 1467 observations covering 157 countries. The GDP figures come from the World Bank World Development indicators data complemented with the Penn World Tables (version 10).

The summary country-year statistics for wellbeing, real GDP and a number of the other variables used in the empirical analysis appear in **Appendix Table A.3**. **Appendix Table A.4** lists the countries, the years in which they are observed, and the total number of observations per country.

We will discuss below the role that a number of aggregate health and public-good variables play in the relationship between GDP per capita and subjective wellbeing at the country level. In the paper, we analyse five of these, inspired by Table 2.1 of the 2022 World Happiness Report (see Helliwell *et al*., 2022): social support, healthy life expectancy at birth, freedom to make life choices, generosity and perceptions of corruption.[7] For shorthand, we will call these five the 'WHR variables' or 'social variables'.[8] The definitions and descriptive statistics of these five variable appear in **Appendix Table A.5**.

Last, the descriptive statistics for the sample of countries with 10 or more observations in the 2009-2019 Gallup World Poll data are found in **Appendix Table A.6** and **Appendix Table A.7**. This is the sample that will be used for the panel country-level analysis.

[7] For some earlier evidence on the relationship between these kinds of social variables and subjective wellbeing, see Bartolini and Sarracino (2014).

[8] There is a sixth WHR-type variable that appears in the Gallup World Poll: Confidence in the Government. This variable is missing for a larger number of countries and years than the other five WHR variables. As in Helliwell *et al*. (2022) we therefore concentrate on the first five. We have checked that all of our cross-section and panel country-level results in Sections 3.2 and 3.3 below continue to hold in the smaller sample when we also introduce Confidence in the Government as a control variable.

3. Results

3.1. Individual Cross-Section Results

We start with an analysis of how an individual's income is related to their wellbeing over the whole world in Gallup World Poll data, and then within a given country in a given year (by including country and year fixed effects). The analysis is first carried out for all available countries, and then separately for the countries in the four World Bank income groups.

There are three main take-aways from this analysis:

- The worldwide coefficient on log income in cross-section data with subjective wellbeing measured by the Cantril ladder on a 0-10 scale is 0.4. This corresponds to around 0.17 of a standard deviation of the subjective wellbeing measure (which is 2.37 from **Appendix Table A.2**).
- The coefficient is reasonably similar across country income groups.
- The coefficient is similar for men and women. Income does however seem to matter more in mid-life (ages 35 to 65).

We begin by pooling individual data from all countries and all years over the 2009-2019 period, and regressing individual wellbeing on log equivalent income without any other controls. We use all of the available data from respondents who report non-zero income in this regression, and do not trim the individual income distribution.

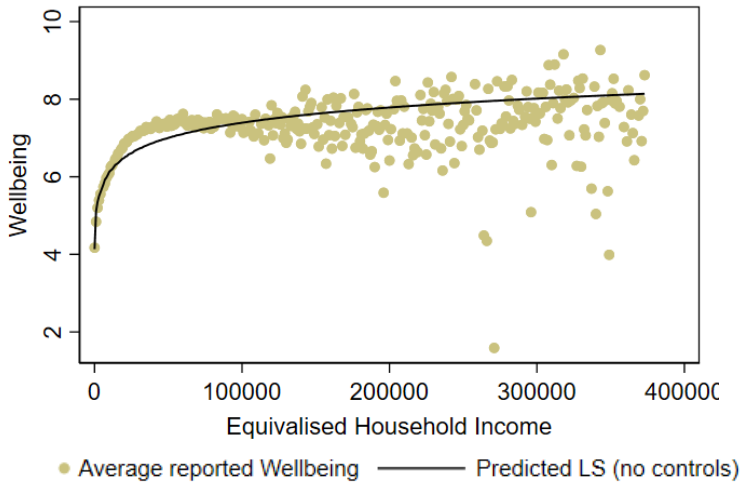
The results appear in column 1 of **Table 3.1**. The global coefficient on the logarithm of individual income in this wellbeing regression is 0.568, and very statistically significant. The size of this coefficient implies that doubling an individual's income is associated with higher wellbeing of approximately 0.4 on the 0 to 10 scale (or one-sixth of the standard deviation of wellbeing).[9]

This analysis uses the logarithm of income, which is very typical in the empirical analysis of wellbeing (see, for example, Clark *et al.*, 2018). To see whether the logarithmic functional form is a good description of the relationship between income and wellbeing, **Figure 3.1** compares the scatterplot of the raw data on income (by bins of one thousand Dollars) and wellbeing to the relationship predicted from the simple regression in **Table 3.1**.

The relationship in the raw data, as shown by the dots, is concave. The fitted value from the log regression specification matches the raw data well for the bottom three-quarters of the income distribution (*i.e.* for equivalent household incomes up to $11 500); it then underpredicts for most of the richer respondents (in the right-hand side of the figure, only one per cent of the sample has an income figure of over $75 000).

[9] As $\ln(2) \approx 0.69$, and the standard deviation of the Cantril Ladder is 2.37 from **Appendix Table A.2**. This figure is remarkably similar to the estimated instrumental variables effect of income on happiness in Ye *et al*. (2023) using data on monozygotic twins from the Chinese Twins Survey (column 3 of their Table 3) and that of lotter prizes on life satisfaction in Sweden in Figure 4 of Lindqvist *et al*. (2020).

Figure 3.1. Raw averages of wellbeing scores for different incomes and wellbeing levels predicted from a simple linear regression



Note: Average reported wellbeing is plotted by equivalised household income bands of one thousand PPP Dollars.

Column 2 of in **Table 3.1** adds country and year fixed effects as control variables. Thus here we estimate the income-wellbeing coefficient within a country and in a given year. Adding these controls reduces the income coefficient by 20% to 0.454.

Column 3 then adds exogenous individual variables: age (in quadratic form) and sex. The estimated relationship between the Cantril Ladder variable and age is U-shaped, with an estimated minimum at age 69. The finding of a U-shaped relationship between subjective wellbeing and age is standard in the literature: see, for example, Blanchflower (2021). Women report higher subjective wellbeing scores than do men in the Gallup World Poll data. This is often found to be the case: an early summary of the related literature is found in Nolen-Hoeksema and Rusting (1999).[10] The estimated income coefficient in this specification is unchanged at 0.456.

Last, column 4 adds a number of endogenous variables: unemployment, education, marital status and health. These are potential mediators or confounders of the effect of income on subjective wellbeing: for example, income may produce better health, or those in worse health may earn less. The coefficient in this specification is further somewhat reduced to 0.403.[11]

[10] Montgomery (2022) and Oparina and Srisuma (2022) argue that this difference may be explained by men's and women's different reporting behaviour.

[11] There is an addition potential issue of Common Method Variance regarding health, which is (like the Cantril Ladder) a subjective evaluation. Excluding health from the controls in column (4) increases the estimated income coefficient only slightly to 0.423 (0.018).

Table 3.1. Individual-level Cross-section to explain the Cantril Ladder

	(1) No controls	(2) Country and Year	(3) Age, sex, Country and Year	(4) All demographic controls, Country and Year
HH income (log)	0.568***	0.454***	0.456***	0.403***
	(0.056)	(0.020)	(0.019)	(0.018)
Age			-0.040***	-0.051***
			(0.003)	(0.003)
Age-squared / 100			0.029***	0.044***
			(0.003)	(0.003)
Female			0.126***	0.142***
			(0.015)	(0.014)
Unemployed				-0.450***
				(0.024)
Education (degree or above)				0.392***
				(0.021)
Partnered / Married				0.160***
				(0.017)
Health problems				-0.502***
				(0.025)
R^2	0.14	0.22	0.23	0.25
Observations	1,511,673	1,511,673	1,511,673	1,511,673

Notes: The controls in columns 3 and 4 include indicators for missing age and sex: country-year averages are applied for observations with missing age and the country-year modes for missing sex information. Columns 2 to 4 include country and year fixed effects. Standard errors in parentheses are clustered at the country level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Along the same lines, we may worry about measurement error at the top and bottom of the income distribution. When we trim income, by dropping the top and bottom 1% of the distribution of income within each country, we find somewhat higher estimated coefficients on log equivalised household income. This is consistent with low-income respondents being happier than predicted from a regression of the non-trimmed 98% of respondents (or, equivalently, the Top 1% not being as happy as predicted).[12]

The income coefficients that we find above are broadly in line with those in the literature on the cross-section relationship between individual wellbeing and individual income. Sacks *et al.* (2010) use standardised wellbeing scores from Gallup World Poll, World Values Survey and Pew Global Attitudes Survey and find estimated income coefficients in standardised wellbeing regressions of 0.232, 0.227 and 0.283 for the three datasets respectively. Their specification is similar to that in column 3. To compare our results to theirs, we convert the estimated coefficients from our unstandardised regressions by dividing by the wellbeing standard deviation of 2.37: this produces a figure of 0.192, which is similar to theirs. Clark *et al.* (2018) analyse British Cohort Study data, and find a coefficient on the log of equivalised household income of around 0.3 on the scale from 0 to 10 when only controlling for sex and age. This coefficient is lower than our global coefficient in column 3, which may indicate that the relationships are different in countries with different levels of income. This is what we investigate below.

[12] The regression results for the trimmed sample appear in **Appendix Table B.1**.

Table 3.2 contains the results of the four specifications in **Table 3.1** above separately by country income group.[13] For comparison purposes, Column 1 reproduces the results for all countries. Columns 2 to 5 then refer to the four World Bank country income groups.

Table 3.2. Individual-level Cross-section to explain the Cantril Ladder: by Country Income Group

	(1) All countries	(2) Low	(3) Lower-middle	(4) Upper-middle	(5) High
			Specification 1. No controls		
HH income (log)	0.568***	0.271**	0.438***	0.416***	0.584***
	(0.056)	(0.116)	(0.039)	(0.096)	(0.066)
			Specification 2. Country and Year FE		
HH income (log)	0.454***	0.372***	0.515***	0.528***	0.451***
	(0.020)	(0.040)	(0.028)	(0.042)	(0.040)
			Specification 3. Age, Sex, Country and Year FE		
HH income (log)	0.456***	0.372***	0.507***	0.533***	0.470***
	(0.019)	(0.040)	(0.025)	(0.039)	(0.040)
			Specification 4. All demographic controls, Country and Year FE		
HH income (log)	0.403***	0.348***	0.452***	0.448***	0.386***
	(0.018)	(0.037)	(0.024)	(0.034)	(0.035)
Observations	1,511,673	414,100	422,092	285,857	389,624
Countries	158	47	43	28	40

Notes: The controls in specifications 3 and 4 include indicators for missing age and sex: country-year averages are applied for observations with missing age and the country-year modes for missing sex information. Specifications 2 to 4 include country and year FEs. Standard errors in parentheses are clustered at country level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

The estimated coefficient on log equivalised household income turns out to be similar across income groups in **Table 3.2**, with there being no obvious gradient by country GDP.

Appendix C shows the results when we carry out the analysis separately by sex and age groups. The resulting coefficients (in **Appendix Table C.1** to **Appendix Table C.5**) are illustrated in Figures **Appendix Figure C.1** to **Appendix Figure C.4**. There is a very-notable hump-shaped relationship by age, with the estimated coefficient on log income being the largest in middle age. This hump shape is similar for men and women. These age and sex patterns appear in all of the four country income groups.

The canonical version of the Easterlin Paradox does not include a statement on how individuals' wellbeing responds to the **change** in individual income. The Gallup data does not allow us to explore this question, as it is a repeated cross-section. However, we do find this question important even though we cannot compare the results to those in the main body of the paper (all of which rely on the same Gallup data). We analyse the panel relationship between income and wellbeing using data from what are probably the three main panel surveys used in social science: the UK Household Longitudinal Survey (UKHLS), the Household, Income and Labour Dynamics in Australia (HILDA) and the German Socio-Economic Panel (SOEP). Since

[13] We omit the estimated coefficients on the control variables for brevity. The full set of results can be found in **Appendix Table B.2**.

the analysis is carried out for different countries and time periods, it is not incorporated in the main text of the paper and is presented in **Appendix E**.

Panel estimation, as is common, produces smaller estimated coefficients on log equivalised household income that are between one quarter and one half of those from pooled estimation of the same data. The income coefficients differ notably by age group, with smaller coefficients at younger and older ages and higher coefficients in mid-life (as was the case for the Gallup data in Appendix C); the coefficients are a little higher for women, but broadly similar across the sexes.

3.2. Cross section of countries

We now move to the country-level experience. As for the individual-level analysis, we start by analysing the relationship between subjective wellbeing and income with no other controls. We then progressively include a number of control variables, analogously to **Table 3.1**. The measure of subjective wellbeing here is the country-year average Cantril ladder score, and the measure of income is real GDP per capita in PPP Dollars.

We have two main take aways:

- There is a positive and almost-always significant cross-section relationship between log GDP per capita and country-average wellbeing both globally and within the four country-income groups. As in the individual-level analyses, there seems to be only little confounding from the control variables.
- The GDP per capita coefficient becomes less significant when we control for the WHR variables. Higher GDP per capita is associated with higher levels of other desirable characteristics (trust, rule of law, civil rights, etc.). These entirely mediate the relationship between national income and wellbeing, except in low-income countries.

We start by regressing country-year wellbeing on the country-year logarithm of real GDP per capita with no other controls: the results appear in column 1 of **Table 3.3**. The estimated coefficient on log GDP is 0.753, which is somewhat higher than the analogous estimated coefficient on log equivalised household income in an individual wellbeing equation (which was 0.568 with no other controls).

In **Table 3.3**, Specification 4*a* corresponds to Specification 4 in **Table 3.2**; Specification 4*b* is the same as Specification 4a but estimated only on the sample of countries that have information on the five WHR variables. These WHR variables are introduced in Specification 5. Thus, the sample size in Specifications 4*b* and 5 are the same.

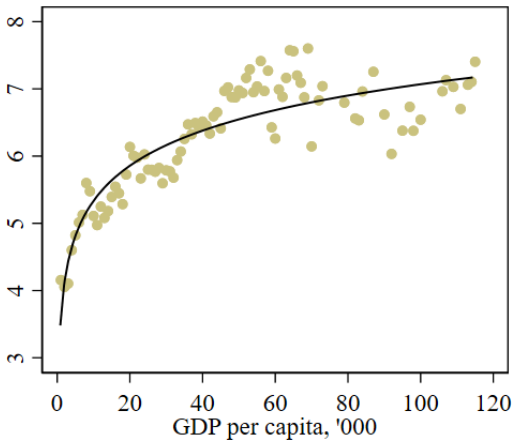
Table 3.3. Country-level Cross-section to explain the Cantril Ladder

	(1) No controls	(2) Year FE	(3) Age and sex, year FE	(4*a*) All demographic controls, All countries	(4*b*) All demographic controls, WHR sample	(5) All controls WHR sample
GDP per capita (log)	0.753***	0.754***	0.750***	0.614***	0.617***	0.349***
	(0.037)	(0.037)	(0.093)	(0.087)	(0.095)	(0.091)
Average age			-0.177	-0.254**	-0.293***	-0.211**
			(0.113)	(0.105)	(0.109)	(0.098)
Average age-squared			0.204*	0.281**	0.321***	0.236**
			(0.115)	(0.112)	(0.115)	(0.101)
Share of women			-1.835	-0.087	-2.194	-3.351
			(1.684)	(1.683)	(2.467)	(2.132)
Unemployed share				-4.654***	-5.020***	-2.253**
				(1.028)	(1.067)	(1.017)
Degree share				0.885	1.464*	1.188**
				(0.651)	(0.763)	(0.582)
Married share				-0.569	-0.383	-0.637
				(0.558)	(0.567)	(0.497)
Health problems share				-2.563***	-2.817***	-1.341**
				(0.602)	(0.632)	(0.555)
Social support						1.735***
						(0.400)
Healthy life expectancy at birth						0.029***
						(0.011)
Freedom to make life choices						1.277***
						(0.336)
Generosity						0.581**
						(0.270)
Perceptions of corruption						-0.371
						(0.304)
Constant	-1.601***	-1.454***	2.690	5.747***	7.526***	4.792**
	(0.343)	(0.345)	(1.913)	(1.933)	(2.028)	(2.042)
R^2	0.60	0.61	0.61	0.66	0.68	0.76
Observations	1467	1467	1467	1467	1306	1306

Note: Standard errors in parentheses are clustered at the country level. * p < 0.1, ** p < 0.05, *** p < 0.01.

We take the estimates from Specification 1 and, as in **Figure 3.1**, plot predicted wellbeing against the values in the raw data. **Figure 3.2** depicts the results. As for individual income, the relationship in the raw data is concave.

Figure 3.2. Predicted and reported wellbeing by GDP per capita. **Gallup, 2009-2019, 157 countries.**



In Specification 2, in column 2 of **Table 3.3** we add year dummies to the regression, which affects the estimated GDP coefficient only little. As for the individual-level regressions, Specification 3 then includes the country-year average of age, age-squared and the share of women. The estimated coefficient does not change. In Specification 4, the estimated GDP coefficient is lower, probably being mediated by the country-level health and unemployment variables. The estimated GDP coefficient in column 4 is around 0.6, which is larger than the figure of 0.4 for individual equivalised household income in Section 1.

The last specification in **Table 3.3** includes the following variables from the online Data Appendix for Table 2.1 of WHR 2022: social support, healthy life expectancy at birth, freedom to make life choices, generosity, and perceptions of corruption. These are available for almost all of the country-year pairs in the Gallup data we analyse. Including these country-level controls almost halves the estimated GDP coefficient (from 0.614 to 0.341). The interpretation here is either in terms of mediation, with higher GDP producing better health outcomes and social support for example, or in terms of confounding, with freedom providing the conditions for income growth and independently contributing to individual wellbeing. In general, the direction of causation between GDP and these social variables is not always obvious, as noted in Easterlin (2012). We discuss some of the evidence for mediation and confounding with respect to these five WHR variables in **Appendix H**.

We conclude that, within a given year, countries with higher GDP have higher average levels of wellbeing, as measured by the Cantril ladder. In addition, part of this correlation reflects the role of the five WHR variables (that either confound or mediate this relationship).

The results in the Gallup dataset continue to hold if, instead of log GDP per capita, we calculate the log of average real equivalised household income (the same income measure as used in the individual-level analysis) or the average of the log real equivalised household income figures. The comparison of the estimated coefficients using the three different country-level income measures appears in **Appendix Table D.1**.

Table 3.4 lists the estimates of Specifications 1 to 4, corresponding to columns 1 to 4 of **Table 3.3**, by income group.[14] The estimates for all countries combined, from **Table 3.3**, are shown in column 1 for comparison purposes.

In Specification 2, the coefficients on log GDP are positive and statistically significant (at the ten per cent level or better) in most income groups. It is notable that the estimated log GDP coefficient in high-income countries is larger than that in the other groups.

Adding controls for age and sex in Specification 3 makes little difference to the estimated GDP coefficients, while introducing the potential mediators (or confounders) in Specification 4 reduces this coefficient (but less so in rich countries).

These findings are to a certain extent in line with those in the literature. Deaton (2008) finds a cross-section GDP coefficient of 0.84 in the 2006 Gallup data, using a regression with no controls. Our estimated coefficient is 0.75 from the same specification with a longer time frame. To compare our estimates to the results in Sacks *et al.* (2010), we adjust their coefficients by the standard deviations of the country-level wellbeing scores in the analyses.[15] Sacks *et al.* (2010), in their analysis of data up to 2007, find a coefficient of 0.85 for Gallup. We find a comparable coefficient of 0.75, using the 0 to 10 scale. As in our results, their coefficients are only little affected by controlling for age and sex.

Specification 5 in **Table 3.4** includes the five WHR variables, as above. In this specification the estimated GDP coefficient is insignificant in three of the four income groups. The exception is low-income countries, where the coefficient is 30% lower than in Specification 4 but remains statistically significant.[16] As such, higher income matters for wellbeing in low-income countries, even holding social support, life expectancy and so on constant.

The reduction in the size of the estimated GDP per capita coefficients mostly comes from the inclusion of controls for social support, healthy life expectancy, and freedom to make life choices, and, for high-income countries, the perception of corruption.[17]

[14] The detailed results for all of the specifications across income groups are listed in **Appendix Table D.2** to **Appendix Table D.7.**

[15] Sacks *et al.* (2010) use the country-average of standardised wellbeing scores, while our country-average scores are not standardised. Unlike the individual-level scores, country-average standardised scores do not in general have a standard deviation of 1. To compare the estimates, we divide the estimates from Sacks *et al.* (2010) by the standard deviation of the country-level averages of the standardised scores and then multiply by the standard deviation of the country-level averages of the non-standardised scores. The standard deviations for the WVS and EB scores are retrieved from the data kindly provided by Daniel Sacks. The standard deviation of the scores in Gallup are estimated using the data over the comparable period.

[16] Section 3 below carries out panel analysis, and only uses data on countries for which we have at least 10 observations over the (11-year) 2009-2019 period. To facilitate the comparison between the results from this panel analysis and the cross-section results in the current sections, **Appendix Table D.8** reproduces Specifications 4 and 5 from **Table 3.4** using only the observations that are retained for the panel analysis.

[17] **Appendix Table D.9** presents specifications that add one WHR variable at a time.

Table 3.4. Country-level Cross-section to explain the Cantril Ladder: by Country Income

	(1) All countries	(2) Low	(3) Lower-middle	(4) Upper-middle	(5) High
			Specification 1: No controls		
GDP per capita (log)	0.753***	0.631***	0.348*	0.362**	1.201***
	(0.037)	(0.116)	(0.191)	(0.169)	(0.372)
			Specification 2: Year FE		
GDP per capita (log)	0.754***	0.636***	0.348*	0.366**	1.199***
	(0.037)	(0.118)	(0.202)	(0.173)	(0.385)
			Specification 3: Age, sex, year FE		
GDP per capita (log)	0.750***	0.663***	0.592***	0.394**	1.289***
	(0.093)	(0.116)	(0.216)	(0.185)	(0.417)
			Specification 4*a*: All demographic controls		
GDP per capita (log)	0.614***	0.524***	0.259	0.329***	1.235***
	(0.087)	(0.103)	(0.241)	(0.095)	(0.406)
Countries:	157	45	44	28	40
			Specification 4*b*: All demographic controls, countries with WHR information		
GDP per capita (log)	0.617***	0.520***	0.232	0.325***	1.144**
	(0.095)	(0.103)	(0.257)	(0.092)	(0.483)
Countries:	148	45	40	27	36
			Specification 5: All controls, countries with WHR information		
GDP per capita (log)	0.349***	0.365***	0.002	0.092	0.215
	(0.091)	(0.128)	(0.221)	(0.098)	(0.212)
Countries:	148	45	40	27	36

Notes: The additional controls in Specification 3 are country-year average age, age-squared and the share of women. The controls in Specifications 4*a* and 4*b* are country-year age, age-squared, the share of women, unemployed, degree holders, married or partnered respondents and the share of respondents who reported health problems. Specification 5 includes the controls from Specifications 4*a* and 4*b* and the five WHR variables (Social support, Healthy life expectancy at birth, Freedom to make life choices, Generosity, and Perceptions of corruption). Standard errors in parentheses are clustered at the country level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

3.3. Panel of countries. Gallup

There is one main take away here:

- GDP rises in high-income countries do not produce greater wellbeing. They do add some wellbeing in upper-middle income countries. Low and low-middle income countries receive the largest gain from the GDP increase. These conclusions hold whether we control for the WHR variables or not.

We now use the same country-year data as above to estimate the relationship between GDP and average wellbeing within the same country over time, *i.e.* a panel analysis at the country level. We restrict the sample to only include the countries for which we have at least 10 observations over time.

As we did for the cross-section country-level analysis, we split the sample into four country income-groups: these results appear in columns (2) through (5) of **Table 3.5**.

Table 3.5. Country-level Panel to explain the Cantril Ladder: by Country Income.

	(1) All countries	(2) Low	(3) Lower-middle	(4) Upper-middle	(5) High
	Specification 2: Country and Year FE				
GDP per capita (log)	0.618***	0.890**	1.877**	0.553***	1.209
	(0.106)	(0.322)	(0.765)	(0.060)	(0.787)
	Specification 3: Age, sex, country and year FE				
GDP per capita (log)	0.615***	0.976***	1.708**	0.594***	1.212
	(0.109)	(0.342)	(0.733)	(0.066)	(0.833)
	Specification 4*a*: All demographic controls, all countries				
GDP per capita (log)	0.591***	0.822***	1.324*	0.593***	0.701
	(0.069)	(0.291)	(0.719)	(0.040)	(0.743)
Countries:	106	24	30	24	28
	Specification 4*b*: All demographic controls, countries with WHR information				
GDP per capita (log)	0.607***	0.818**	2.337***	0.588***	0.574
	(0.077)	(0.353)	(0.569)	(0.038)	(0.549)
Countries:	101	24	26	23	28
	Specification 5: All controls, countries with WHR information				
GDP per capita (log)	0.568***	1.085**	2.339***	0.373***	0.268
	(0.083)	(0.453)	(0.611)	(0.093)	(0.448)
Countries:	101	24	26	23	28

Notes: Only Countries with 10 or More Observations. The additional controls in Specification 3 are country-year average age, age-squared and the share of women. The controls in Specifications 4*a* and 4*b* are country-year age, age-squared, the share of women, unemployed, degree holders, married or partnered respondents and the share of respondents who reported health problems. Specification 5 includes the controls from Specifications 4*a* and 4*b* and the five WHR variables (Social support, Healthy life expectancy at birth, Freedom to make life choices, Generosity, and Perceptions of corruption). Standard errors in parentheses are clustered at the country level. The full estimation results behind this table are presented in **Appendix Table G.1** to **Appendix Table G.5**. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

The overall correlation in column (1) is positive at the World level, whereas the Easterlin paradox would predict an insignificant coefficient. In columns (2) to (5), the estimated coefficients are higher for lower-income countries, as in the cross-section. In this panel analysis changes in income are not correlated with changes in wellbeing in rich countries. This finding is consistent with the lack of an upward wellbeing trend in long-running single-country surveys in Australia, Germany, the UK and the US despite the growth in real GDP per capita in these countries.[18] It should be underlined that the panels of countries in **Table 3.5** are only short, and it is therefore more difficult to distinguish long-run trends from business-cycle movements.[19]

To control for the cycle, we include unemployment in Specification 4. Towards the bottom of the table, Specification (4*b*) reproduces Specification (4*a*) but only for the countries with WHR information. The comparison of Specification (4*b*) to Specification (5) then reveals the role of the social variables: unlike in the cross-sectional analysis, there is almost no mediating role for these variables. For the whole sample, the coefficient in Specification (4*b*) is 0.607, and adding the WHR variables with Specification (5) produces a figure of 0.568. The smaller GDP per

[18] Clark *et al.* (2018). Figure 2.3. See also World Happiness Report.

[19] In particular, eight of the thirteen countries identified as "Expansion-Only Transition Countries" in Easterlin and O'Connor (2020), for which we do not observe an economic downturn, appear in the Upper-Middle income group: this may explain the large estimated income coefficient in this group.

capita coefficient for high-income countries in column (5) largely results from the inclusion of controls for social support and the perception of corruption. The control for freedom to make life choices produces a smaller coefficient in upper-middle and high-income countries.[20] This is the same pattern as appeared in the cross-section of countries in **Appendix Table D.9**.

First, this may reflect the smaller variation in the WHR variables over our relatively-short 2009-2019 time period (so that they mediate/confound less): the between-country variation in these variables is two to seven times larger than the within-country variation. Second, the returns to higher GDP per capita could be very concave: in this case, GDP growth may bring very little benefit in terms of higher healthy life expectancy, for example, beyond some level of income. To investigate, **Appendix Figure G.1** plots the relationship between the change in the WHR variables and GDP per capita growth within countries. The arrows in these figures go from the first to the last observations per country. Arrows that point in the North-East direction indicate that real GDP per capita growth (which is what the majority of countries experienced) went hand-in-hand with a rise in the variable concerned. The top-left panel of **Appendix Figure G.1** refers to health life expectancy at birth. Here it is the case that the majority of arrows do indeed point to the North-East, so that countries that became richer also experienced higher values of healthy life expectancy at birth. In addition, the relationship looks to be very concave: small rises in GDP at the left of the figure are associated with large rises in life expectancy, while the arrows to the right of the figure are much flatter. The corresponding figures for freedom to make life choices and corruption also have arrows that point in mostly the same direction: as countries become richer their citizens consider that they have more freedom and perceive less corruption. The relationships for the last two variables, generosity and social support are on the contrary much messier.

4. Conclusion

We have investigated the relationship between income and subjective wellbeing in 11 waves of Gallup World Poll data. Across individuals the relationship between income and wellbeing is positive. Across the whole world, the coefficient when subjective wellbeing (0-10, Cantril Ladder) is regressed on log income is 0.4. This coefficient is reasonably similar for individuals in different country income groups.

Turning to country differences, countries with higher GDP per head also have higher average wellbeing scores, again both across the whole world and within the four country income groups. The global coefficient with no controls is 0.6. However, introducing controls produces a very different picture. If we include the country-level social variables, the result is striking. The social variables matter for understanding why some countries are happier than others. And within three of the four country income groups, income no longer has any independent effect on wellbeing. It is only among the low-income countries that income on its own appears to make a difference.

This result outside low income countries is striking because it differs so strongly from the result across individuals within a country. One natural explanation is as follows. What matters to people is their income relative to the country mean. When we estimate regressions including a country fixed effect (as in Table 3.1, columns 2-4), we are holding the country mean fixed and the effect of individual income on wellbeing is really a relative income effect.[21] Meanwhile,

[20] **Appendix Table G.6** presents specifications that add one WHR variable at a time.
[21] For other evidence on the importance of relative income, see Clark *et al*. (2008) and Layard *et al.* (2010).

absolute income may be important, but only indirectly through its effect on the social variables. Income and the social variables are positively correlated. But with Gallup data we cannot disentangle which is causing which. Moving to time series within countries, the analysis confirms the findings of a strong absolute income effect in poor countries and no significant effect in rich countries. And it was rich countries Easterlin was talking about.

But in middle income countries the findings differ. While (holding social variables constant) the cross-section showed no absolute effect of income, the time series show a positive effect. As is well known, panel estimates are more affected by measurement error than cross-sectional ones are. But cross-sections are very vulnerable to omitted variables. That is where we have to leave it.

But two findings are surely of huge importance. For low income countries, economic growth improves the human lot. For rich countries, it mainly does so (if it does) through its effects, not on household income, but on life-expectancy, social support, and the rule of law.

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Appendix A. Appendix for the Data Section.

Appendix Table A.1 Gallup World Poll Countries by Income Group (2006 World Bank classification)

Low-income countries (47 countries)
Afghanistan, Bangladesh, Benin, Burkina Faso, Burundi, Cambodia, Central African Republic, Chad, Comoros, Congo (Dem. Rep.), Cote d'Ivoire, Ethiopia, Gambia, Ghana, Guinea, Haiti, India, Kenya, Kyrgyz Republic, Lao PDR, Liberia, Madagascar, Malawi, Mali, Mauritania, Mongolia, Mozambique, Myanmar, Nepal, Niger, Nigeria, Pakistan, Rwanda, Senegal, Sierra Leone, Somalia, South Sudan, Sudan, Tajikistan, Tanzania, Togo, Uganda, Uzbekistan, Vietnam, Yemen, Zambia, Zimbabwe.
Lower-middle income countries (43 countries)
Albania, Algeria, Angola, Armenia, Azerbaijan, Belarus, Bhutan, Bolivia, Bosnia and Herzegovina, Cameroon, China, Colombia, Congo, Dominican Republic, Ecuador, Egypt, Arab Rep., El Salvador, Eswatini, Georgia, Guatemala, Honduras, Indonesia, Iran, Islamic Rep., Iraq, Jamaica, Jordan, Kosovo, Lesotho, Moldova, Morocco, Namibia, Nicaragua, North Macedonia, Paraguay, Peru, Philippines, Sri Lanka, Syrian Arab Republic, Thailand, Tunisia, Turkmenistan, Ukraine, West Bank and Gaza.
Upper-middle income countries (28 counties):
Argentina, Botswana, Brazil, Bulgaria, Chile, Costa Rica, Croatia, Gabon, Hungary, Kazakhstan, Latvia, Lebanon, Libya, Lithuania, Malaysia, Mauritius, Mexico, Montenegro, Panama, Poland, Romania, Russian Federation, Serbia, Slovak Republic, South Africa, Turkey, Uruguay, Venezuela.
High-income countries (40 countries):
Australia, Austria, Bahrain, Belgium, Canada, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hong Kong SAR (China), Iceland, Ireland, Israel, Italy, Japan, Korea (Rep.), Kuwait, Luxembourg, Malta, Netherlands, New Zealand, Norway, Portugal, Puerto Rico, Qatar, Saudi Arabia, Singapore, Slovenia, Spain, Sweden, Switzerland, Taiwan, Trinidad and Tobago, United Arab Emirates, United Kingdom, United States.

Appendix Table A.2. Individual-level Data Summary Statistics

	Mean	SD
Wellbeing: Cantril Ladder (0-10)	5.51	2.37
Equiv. HH income (Int $)	11,243	510,418
HH income (log)	8.26	1.56
Age	41.7	17.8
Female	0.54	0.50
Unemployed	0.06	0.24
Education (Degree or above)	0.17	0.37
Partnered / Married	0.58	0.49
Health problems	0.25	0.43
Observations	1,511,673	

Appendix Table A.3. Country-level Data Summary Statistics. Gallup World Poll.

	Mean	SD
Average wellbeing	5.46	1.12
GDP pc	20350.71	19836.20
GDP pc (log)	9.37	1.16
Average age	39.54	5.42
Share of women	0.51	0.03
Unemployed, share	0.07	0.04
Education (degree or above), share	0.12	0.10
Partnered / Married, share	0.57	0.09
Health problems, share	0.25	0.08
Observations	1,467	
Countries	157	

Appendix Table A.4. Number of Observations per Country by World Bank Income Group. Gallup World Poll.

Country name	Years	N
Low-income group		
Afghanistan	2009 - 2019	11
Bangladesh	2009 - 2019	11
Benin	2011 - 2019	9
Burkina Faso	2010 - 2019	10
Burundi	2009 - 2018	4
Cambodia	2010 - 2019	10
Central African Republic	2010 - 2017	4
Chad	2009 - 2019	11
Comoros	2009 - 2019	6
Congo, Dem. Rep.	2009 - 2017	8
Cote d'Ivoire	2013 - 2019	7
Ethiopia	2012 - 2019	8
Gambia, The	2017 - 2019	3
Ghana	2009 - 2019	11
Guinea	2011 - 2019	9
Haiti	2010 - 2018	9
India	2009 - 2019	11
Kenya	2010 - 2019	9
Kyrgyz Republic	2009 - 2019	11
Lao PDR	2011 - 2019	5
Liberia	2010 - 2019	7
Madagascar	2011 - 2019	9
Malawi	2009 - 2019	10
Mali	2009 - 2019	11
Mauritania	2009 - 2019	11
Mongolia	2010 - 2019	10
Mozambique	2011 - 2019	5
Myanmar	2012 - 2019	8
Nepal	2009 - 2019	10
Niger	2009 - 2019	11
Nigeria	2009 - 2019	9
Pakistan	2009 - 2019	11
Rwanda	2009 - 2019	10
Senegal	2009 - 2019	11
Sierra Leone	2010 - 2019	9
Sudan	2009 - 2014	5
Tajikistan	2009 - 2019	11
Tanzania	2009 - 2019	11
Togo	2011 - 2019	7
Uganda	2009 - 2019	11

Country name	Years	N
Uzbekistan	2009 - 2019	11
Vietnam	2009 - 2019	10
Yemen, Rep.	2009 - 2019	11
Zambia	2009 - 2019	10
Zimbabwe	2010 - 2019	9
Lower-middle income group		
Albania	2010 - 2019	10
Algeria	2011 - 2019	7
Angola	2011 - 2014	4
Armenia	2009 - 2019	11
Azerbaijan	2011 - 2019	9
Belarus	2009 - 2019	11
Bhutan	2013 - 2015	3
Bolivia	2009 - 2019	11
Bosnia and Herzegovina	2010 - 2019	10
Cameroon	2010 - 2019	10
China	2009 - 2019	11
Colombia	2009 - 2019	11
Congo, Rep.	2011 - 2019	9
Djibouti	2009 - 2011	2
Dominican Republic	2009 - 2019	11
Ecuador	2009 - 2019	9
Egypt, Arab Rep.	2009 - 2019	11
El Salvador	2009 - 2019	11
Eswatini	2011 - 2019	3
Georgia	2009 - 2019	10
Guatemala	2009 - 2019	11
Honduras	2009 - 2019	11
Indonesia	2009 - 2019	11
Iran, Islamic Rep.	2011 - 2019	9
Iraq	2009 - 2019	11
Jamaica	2011 - 2019	5
Jordan	2009 - 2019	11
Kosovo	2010 - 2019	10
Lesotho	2011 - 2019	4
Moldova	2009 - 2019	10
Morocco	2011 - 2019	8
Namibia	2014 - 2019	4
Nicaragua	2009 - 2019	11
North Macedonia	2009 - 2019	11
Paraguay	2009 - 2019	11
Peru	2009 - 2019	11

Country name	Years	N
Philippines	2009 - 2019	11
Sri Lanka	2009 - 2019	10
Syrian Arab Republic	2009 - 2015	6
Thailand	2009 - 2019	10
Tunisia	2009 - 2019	11
Turkmenistan	2009 - 2019	10
Ukraine	2009 - 2019	11
West Bank and Gaza	2009 - 2019	11
Upper-middle income group		
Argentina	2009 – 2019	11
Botswana	2010 – 2019	10
Brazil	2009 – 2019	11
Bulgaria	2009 – 2019	11
Chile	2009 – 2019	11
Costa Rica	2009 – 2019	11
Croatia	2010 – 2019	10
Gabon	2012 – 2019	8
Hungary	2010 – 2019	10
Kazakhstan	2009 – 2019	11
Latvia	2009 – 2019	10
Lebanon	2009 – 2019	11
Libya	2015 – 2019	5
Lithuania	2009 – 2019	11
Malaysia	2009 – 2019	9
Mauritius	2011 – 2019	6
Mexico	2009 – 2019	11
Montenegro	2010 – 2019	10
Panama	2009 – 2019	11
Poland	2009 – 2019	11
Romania	2010 – 2019	10
Russian Federation	2009 – 2019	11
Serbia	2010 – 2019	10
Slovak Republic	2010 – 2019	10
South Africa	2010 – 2019	10
Turkey	2009 – 2019	11
Uruguay	2009 – 2019	11
Venezuela, RB	2009 – 2019	11
High-income group		
Australia	2010 - 2019	9
Austria	2009 - 2019	11
Bahrain	2009 - 2019	10
Belgium	2010 - 2019	10

Country name	Years	N
Canada	2009 - 2019	11
Cyprus	2009 - 2019	11
Czech Republic	2009 - 2018	10
Denmark	2009 - 2019	11
Estonia	2011 - 2019	9
Finland	2010 - 2019	10
France	2009 - 2019	11
Germany	2009 - 2019	11
Greece	2009 - 2019	11
Hong Kong	2009 - 2017	7
Iceland	2012 - 2019	6
Ireland	2009 - 2019	11
Israel	2009 - 2019	11
Italy	2009 - 2019	11
Japan	2009 - 2019	11
Korea, Rep.	2009 - 2019	11
Kuwait	2013 - 2019	7
Luxembourg	2010 - 2019	10
Malta	2010 - 2019	10
Netherlands	2010 - 2019	10
New Zealand	2010 - 2019	10
Norway	2012 - 2019	7
Portugal	2009 - 2019	11
Puerto Rico	2014 - 2014	1
Qatar	2011 - 2012	2
Saudi Arabia	2009 - 2019	11
Singapore	2009 - 2019	9
Slovenia	2009 - 2019	11
Spain	2009 - 2019	9
Sweden	2009 - 2019	11
Switzerland	2009 - 2019	8
Taiwan	2010 - 2019	10
Trinidad and Tobago	2011 - 2017	3
United Arab Emirates	2009 - 2019	11
United Kingdom	2009 - 2019	11
United States	2009 - 2019	11

Appendix Table A.5. Country-level Data Summary Statistics for the Sample with WHR variables

	Mean	SD
Average wellbeing	5.43	1.16
GDP pc	19364.04	19415.60
GDP pc (log)	9.31	1.16
Average age	39.62	5.46
Share of women	0.51	0.02
Unemployed, share	0.07	0.04
Education (degree or above), share	0.11	0.09
Partnered / Married, share	0.56	0.09
Health problems, share	0.25	0.07
WHR Variables:		
Social support	0.81	0.12
Healthy life expectancy at birth	63.07	6.79
Freedom to make life choices	0.75	0.14
Generosity	-0.00	0.16
Perceptions of corruption	0.75	0.19
Observations	1306	

Notes: The WHR variables come from Helliwell *et al*. (2022), where they are described as follows. "*Social support* is the national average of the binary responses (0 = No, 1 = Yes) to the Gallup World Poll (GWP) question "If you were in trouble, do you have relatives or friends you can count on to help you whenever you need them, or not?" *Freedom to make* life choices is the national average of binary responses (0 = No, 1 = Yes) to the GWP question "Are you satisfied or dissatisfied with your freedom to choose what you do with your life?". *Generosity* is the residual of regressing the national average of GWP responses to the donation question "Have you donated money to a charity in the past month?" on log GDP per capita. *Perceptions of corruption* are the average of binary answers to two GWP questions: "Is corruption widespread throughout the government in this country or not?" and "Is corruption widespread within businesses in this country or not?" Where data for government corruption are missing, the perception of business corruption is used as the overall corruption-perception measure. The time series for *healthy life expectancy* at birth is constructed based on data from the World Health Organization (WHO) Global Health Observatory data repository, with data available for 2000, 2010, 2015, and 2019. Interpolation and extrapolation are used to match this report's sample period (2005-2021)."

Appendix Table A.6. Country-level Data Summary Statistics for Countries with 10 or more observations

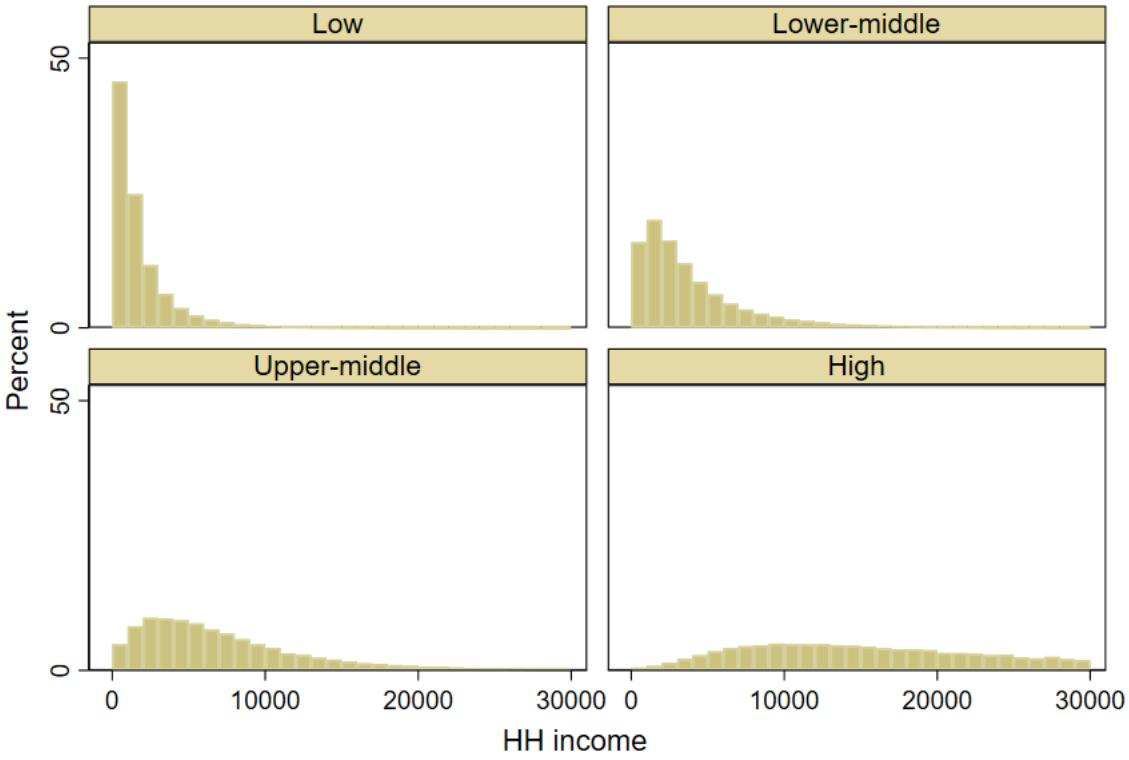
	Mean	SD
Average wellbeing	5.58	1.08
GDP pc	21192.33	18850.45
GDP pc (log)	9.49	1.08
Average age	40.23	5.42
Share of women	0.51	0.03
Unemployed, share	0.07	0.04
Education (degree or above), share	0.13	0.10
Partnered / Married, share	0.58	0.09
Health problems, share	0.25	0.07
Observations	1131	

Appendix Table A.7. Country-level Data Summary Statistics for Countries with 10 or more observations and the WHR variables

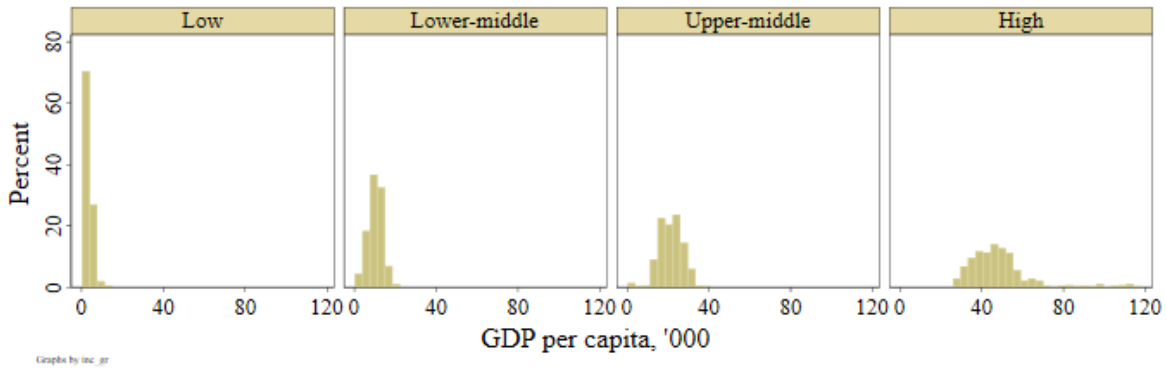
	Mean	SD
Average wellbeing	5.57	1.12
GDP pc	20611.90	18827.43
GDP pc (log)	9.45	1.09
Average age	40.39	5.44
Share of women	0.52	0.02
Unemployed, share	0.07	0.04
Education (degree or above), share	0.12	0.09
Partnered / Married, share	0.57	0.09
Health problems, share	0.25	0.07
WHR Variables:		
Social support	0.83	0.11
Healthy life expectancy at birth	64.13	5.89
Freedom to make life choices	0.75	0.14
Generosity	-0.01	0.16
Perceptions of corruption	0.76	0.19
Observations	1000	

Note: See notes to Table A.5.

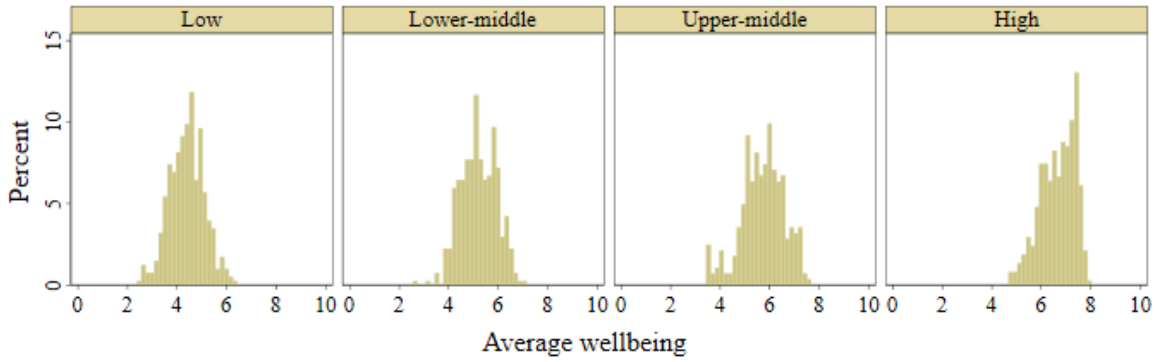
Appendix Figure A.1. The Distribution of Equivalised Household Income (Bottom 90% of the Global Distribution) by Country Income Group



Appendix Figure A.2. Real GDP per Capita by Income Group: The Whole Distribution



Appendix Figure A.3. The Distribution of Country-Year Average Wellbeing by Income Group



Appendix B. Appendix for the Section Results: Individual cross-section.

Appendix Table B.1. Replication of Table 3.1 with the Top and Bottom 1% of Incomes Trimmed

	No controls	FE	Age, sex, FE	All demographic controls
HH income (log)	0.592***	0.508***	0.509***	0.451***
	(0.063)	(0.021)	(0.020)	(0.019)
Age-squared / 100			-0.040***	-0.051***
			(0.003)	(0.003)
Age-squared / 100			0.029***	0.043***
			(0.003)	(0.003)
Female			0.130***	0.146***
			(0.015)	(0.015)
Unemployed				-0.435***
				(0.023)
Education (degree or above)				0.367***
				(0.021)
Partnered / Married				0.163***
				(0.017)
Health problems				-0.494***
				(0.025)
Constant	0.648	0.624***	1.466***	2.092***
	(0.528)	(0.153)	(0.155)	(0.149)
R^2	0.14	0.22	0.24	0.25
Observations	1481791	1481791	1481791	1481791

Notes: The logarithm on household income is calculated as a logarithm of (1+income). The controls in columns 3 and 4 include indicators for missing age and sex: country-year averages are applied for observations with missing age and the country-year modes for missing sex information. Standard errors in parentheses are clustered at country level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Appendix Table B.2. Full Results from Table 3.2.

	All countries	All countries			
		Low	Lower-middle	Upper-middle	High
Specification 1. No controls					
HH income (log)	0.568***	0.271**	0.438***	0.416***	0.584***
	(0.056)	(0.116)	(0.039)	(0.096)	(0.066)
Specification 2. Country and Year FE					
HH income (log)	0.454***	0.372***	0.515***	0.528***	0.451***
	(0.020)	(0.040)	(0.028)	(0.042)	(0.040)
Specification 3. Age, Sex, Country and Year FE					
HH income (log)	0.456***	0.372***	0.507***	0.533***	0.470***
	(0.019)	(0.040)	(0.025)	(0.039)	(0.040)
Age	-0.040***	-0.028***	-0.061***	-0.046***	-0.035***
	(0.003)	(0.003)	(0.005)	(0.004)	(0.004)
Age-squared / 100	0.029***	0.025***	0.048***	0.028***	0.026***
	(0.003)	(0.003)	(0.006)	(0.004)	(0.004)
Female	0.126***	0.072**	0.199***	0.134***	0.127***
	(0.015)	(0.029)	(0.035)	(0.023)	(0.022)
Specification 4. All demographic controls, Country and Year FE					
HH income (log)	0.403***	0.348***	0.452***	0.448***	0.386***
	(0.018)	(0.037)	(0.024)	(0.034)	(0.035)
Age	-0.051***	-0.029***	-0.068***	-0.061***	-0.057***
	(0.003)	(0.003)	(0.005)	(0.005)	(0.004)
Age-squared / 100	0.044***	0.029***	0.060***	0.048***	0.049***
	(0.003)	(0.004)	(0.006)	(0.004)	(0.003)
Female	0.142***	0.088***	0.213***	0.150***	0.154***
	(0.014)	(0.028)	(0.034)	(0.024)	(0.022)
Unemployed	-0.450***	-0.250***	-0.469***	-0.527***	-0.637***
	(0.024)	(0.035)	(0.042)	(0.037)	(0.044)
Education (degree or above)	0.392***	0.505***	0.353***	0.417***	0.313***
	(0.021)	(0.061)	(0.030)	(0.030)	(0.033)
Partnered / Married	0.160***	0.007	0.095***	0.219***	0.339***
	(0.017)	(0.017)	(0.028)	(0.025)	(0.022)
Health problems	-0.502***	-0.238***	-0.514***	-0.583***	-0.745***
	(0.025)	(0.023)	(0.038)	(0.031)	(0.033)
Observations	1,511,673	414,100	422,092	285,857	389,624
Countries	158	47	43	28	40

Notes: The controls in specifications 3 and 4 include indicators for missing age and sex: country-year averages are applied for observations with missing age and the country-year modes for missing sex information. Standard errors in parentheses are clustered at country level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Appendix Table B.3. Individual-level Cross-section. Literature

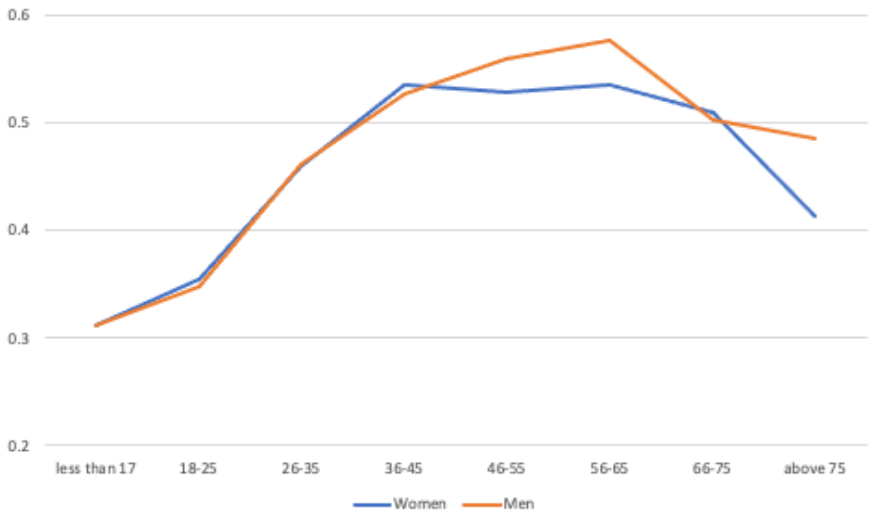
Author	Outcome measure	Income measure	Controls	Data	Coefficient
Clark *et al.* (2018) Table 2.1	Non-standardised Life satisfaction (0 to10)	Log of Equivalised HH income	[1] Sex and age [2] Qualification, employment, criminality, partnered, physical and emotional health	BCS (ages 34 and 42)	[1] 0.30 [2] 0.20
Clark *et al.* (2018) Table 2.2	Non-standardised Life satisfaction (0 to10)	Log of Equivalised HH income	Individual and year fixed effects, individual characteristics: age, sex, marital status, employment, physical and mental health	BHPS (1991-2008), SOEP (1984-2015), HILDA (2001-2015), BRFSS (2005-2013).	0.16 (BHPS) 0.24 (SOEP) 0.16 (HILDA) 0.31 (BRFSS)
Sacks *et al.* (2010)	Standardised: Ladder Question (GWP and Pew), Life satisfaction (WVS)	Log of HH income	[1] country and wave dummies only [2] A quartic in age, interacted with sex, country and wave dummies	Gallup World Poll (2006), World Values Survey (1980-2004) and Pew Global Attitudes Survey (2002)	Standardised coefficients [1] 0.24 (GWP), 0.22 (WVS), 0.28 (Pew) [2] 0.23 (GWP), 0.23 (WVS), 0.28 (Pew)

Notes: The results reported are the those from within-country regressions of wellbeing on the logarithm of income. British Cohort Study (BCS), UK; British Household Panel Survey (BHPS), UK; German Socio-Economic Panel (SOEP), Germany; Household, Income and Labor Dynamics in Australia (HILDA), Australia; Behavioral Risk Factor Surveillance System (BRFSS), USA. For comparison purposes, our non-standardised Cantril coefficient on the log of household income is 0.4 (the standardised figure is 0.17).

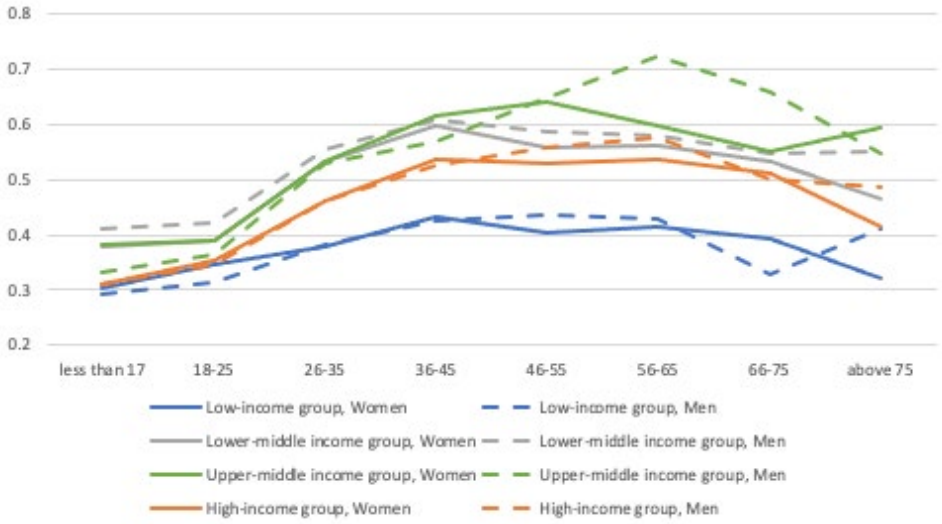
Appendix C. Individual Cross-section: Separate Analyses by Gender and Age

Appendix Table C.1 to **Appendix Table C.5** report the income coefficients for women and men of different ages in all countries, and then for the countries in different income groups. The coefficients come from separate regressions for the various sex-age subsamples.

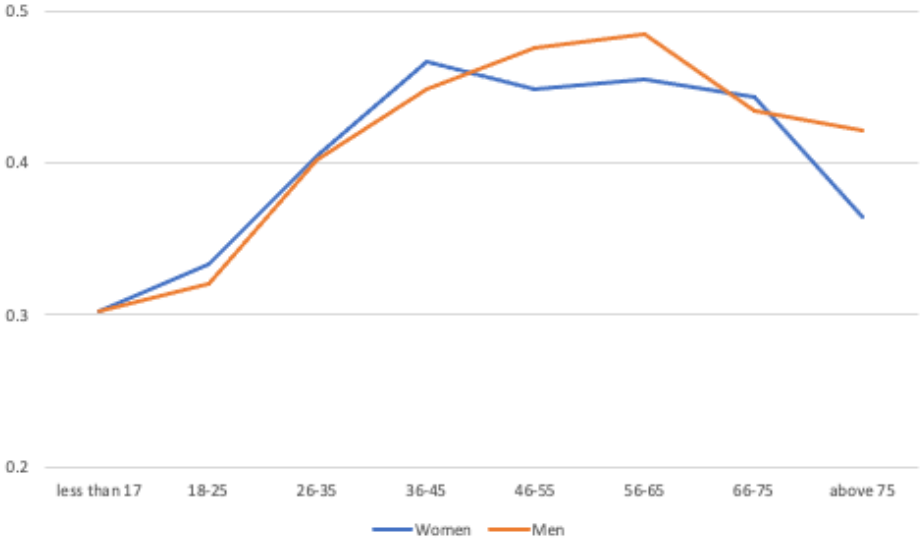
Appendix Figure C.1. Coefficients on Income for Women and Men of Different Ages. All Countries. Specification: Country and Year FE



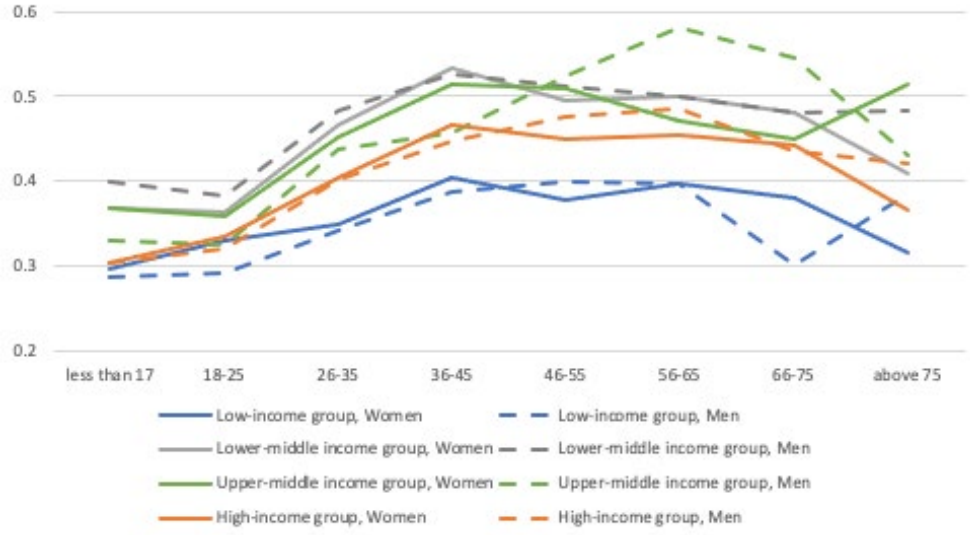
Appendix Figure C.2. Coefficients on Income for Women and Men of Different Ages by Country-income Group. Specification: Country and Year FE



Appendix Figure C.3. Coefficients on Income for Women and Men of Different Ages. All Countries. Specification: All Demographic Controls



Appendix Figure C.4. Coefficients on Income for Women and Men of Different Ages by Country-income Group. Specification: All Demographic Controls



Appendix Table C.1. Results for Different Sexes / Ages. All Countries

	No controls	Country and Year	Age, Country and Year	All demographic controls
	Panel A: Women, all ages			
HH income (log)	0.569***	0.458***	0.456***	0.405***
Obs: 811256	(0.056)	(0.020)	(0.019)	(0.018)
	Panel A1: Women, age up to 17			
HH income (log)	0.533***	0.311***		0.303***
Obs: 38462	(0.069)	(0.023)		(0.022)
	Panel A2: Women, age 18-25			
HH income (log)	0.537***	0.354***		0.334***
Obs: 138630	(0.069)	(0.021)		(0.020)
	Panel A3: Women, age 26-35			
HH income (log)	0.572***	0.460***		0.404***
Obs: 173320	(0.068)	(0.021)		(0.020)
	Panel A4: Women, age 36-45			
HH income (log)	0.627***	0.535***		0.467***
Obs: 143756	(0.064)	(0.021)		(0.020)
	Panel A5: Women, age 46-55			
HH income (log)	0.639***	0.529***		0.449***
Obs: 119536	(0.041)	(0.022)		(0.020)
	Panel A6: Women, age 56-65			
HH income (log)	0.665***	0.536***		0.455***
Obs: 99591	(0.044)	(0.025)		(0.023)
	Panel A7: Women, age 66-75			
HH income (log)	0.693***	0.510***		0.443***
Obs: 64030	(0.054)	(0.033)		(0.030)
	Panel A8: Women, age above 75			
HH income (log)	0.619***	0.414***		0.365***
Obs: 33931	(0.052)	(0.041)		(0.037)
	Panel B: Men, all ages			
HH income (log)	0.569***	0.457***	0.458***	0.401***
Obs: 700417	(0.057)	(0.020)	(0.020)	(0.018)
	Panel B1: Men, age up to 17			
HH income (log)	0.547***	0.311***		0.303***
Obs: 37031	(0.074)	(0.024)		(0.023)
	Panel B2: Men, age 18-25			
HH income (log)	0.513***	0.348***		0.320***
Obs: 122228	(0.073)	(0.025)		(0.023)
	Panel B3: Men, age 26-35			
HH income (log)	0.566***	0.461***		0.402***
Obs: 149577	(0.060)	(0.022)		(0.020)
	Panel B4: Men, age 36-45			
HH income (log)	0.614***	0.526***		0.448***
Obs: 126263	(0.062)	(0.023)		(0.023)
	Panel B5: Men, age 46-55			
HH income (log)	0.634***	0.559***		0.475***
Obs: 102738	(0.049)	(0.022)		(0.020)

	Panel B6: Men, age 56-65		
HH income (log)	0.648***	0.577***	0.485***
Obs: 84319	(0.044)	(0.024)	(0.022)
	Panel B7: Men, age 66-75		
HH income (log)	0.664***	0.502***	0.434***
Obs: 53822	(0.045)	(0.028)	(0.028)
	Panel B8: Men, age above 75		
HH income (log)	0.637***	0.486***	0.421***
Obs: 24439	(0.035)	(0.038)	(0.036)

Appendix Table C.2. Results for Different Sexes / Ages. Low-income Group

	No controls	Country and Year	Age, Country and Year	All demographic controls
	Panel A: Women, all ages			
HH income (log)	0.289**	0.377***	0.376***	0.355***
Obs: 210887	(0.120)	(0.038)	(0.038)	(0.036)
	Panel A1: Women, age up to 17			
HH income (log)	0.250**	0.304***		0.297***
Obs: 16225	(0.108)	(0.037)		(0.037)
	Panel A2: Women, age 18-25			
HH income (log)	0.266**	0.347***		0.331***
Obs: 54039	(0.116)	(0.037)		(0.035)
	Panel A3: Women, age 26-35			
HH income (log)	0.273**	0.379***		0.349***
Obs: 59062	(0.121)	(0.040)		(0.037)
	Panel A4: Women, age 36-45			
HH income (log)	0.300**	0.433***		0.405***
Obs: 36320	(0.135)	(0.043)		(0.042)
	Panel A5: Women, age 46-55			
HH income (log)	0.360***	0.403***		0.377***
Obs: 22446	(0.107)	(0.050)		(0.049)
	Panel A6: Women, age 56-65			
HH income (log)	0.386***	0.414***		0.396***
Obs: 14204	(0.135)	(0.047)		(0.048)
	Panel A7: Women, age 66-75			
HH income (log)	0.356**	0.393***		0.381***
Obs: 5929	(0.151)	(0.037)		(0.038)
	Panel A8: Women, age above 75			
HH income (log)	0.352**	0.322***		0.315***
Obs: 2662	(0.146)	(0.062)		(0.063)
	Panel B: Men, all ages			
HH income (log)	0.254**	0.369***	0.369***	0.339***
Obs: 203213	(0.112)	(0.043)	(0.042)	(0.040)
	Panel B1: Men, age up to 17			
HH income (log)	0.236**	0.291***		0.286***
Obs: 15175	(0.107)	(0.036)		(0.036)
	Panel B2: Men, age 18-25			
HH income (log)	0.207*	0.313***		0.292***
Obs: 47206	(0.111)	(0.049)		(0.046)
	Panel B3: Men, age 26-35			
HH income (log)	0.253**	0.383***		0.341***
Obs: 53722	(0.113)	(0.041)		(0.037)
	Panel B4: Men, age 36-45			
HH income (log)	0.279**	0.426***		0.387***
Obs: 37500	(0.120)	(0.048)		(0.048)
	Panel B5: Men, age 46-55			
HH income (log)	0.304**	0.436***		0.400***
Obs: 23762	(0.118)	(0.048)		(0.048)

	Panel B6: Men, age 56-65		
HH income (log)	0.329***	0.428***	0.397***
Obs: 15709	(0.115)	(0.058)	(0.057)
	Panel B7: Men, age 66-75		
HH income (log)	0.268***	0.330***	0.302***
Obs: 7223	(0.099)	(0.059)	(0.057)
	Panel B8: Men, age above 75		
HH income (log)	0.431***	0.412***	0.386***
Obs: 2916	(0.094)	(0.052)	(0.053)

Appendix Table C.3. Results for Different Sexes / Ages. Lower-middle Income Group

	No controls	Country and Year	Age, Country and Year	All demographic controls
	Panel A: Women, all ages			
HH income (log)	0.415***	0.515***	0.502***	0.452***
Obs: 232817	(0.042)	(0.026)	(0.023)	(0.023)
	Panel A1: Women, age up to 17			
HH income (log)	0.307***	0.377***		0.369***
Obs: 11653	(0.063)	(0.040)		(0.041)
	Panel A2: Women, age 18-25			
HH income (log)	0.354***	0.391***		0.364***
Obs: 41712	(0.042)	(0.027)		(0.027)
	Panel A3: Women, age 26-35			
HH income (log)	0.459***	0.532***		0.467***
Obs: 52297	(0.041)	(0.028)		(0.026)
	Panel A4: Women, age 36-45			
HH income (log)	0.524***	0.597***		0.533***
Obs: 43268	(0.040)	(0.027)		(0.027)
	Panel A5: Women, age 46-55			
HH income (log)	0.459***	0.558***		0.494***
Obs: 27005	(0.045)	(0.031)		(0.029)
	Panel A6: Women, age 56-65			
HH income (log)	0.453***	0.562***		0.499***
Obs: 14204	(0.051)	(0.032)		(0.032)
	Panel A7: Women, age 66-75			
HH income (log)	0.372***	0.534***		0.480***
Obs: 14877	(0.083)	(0.041)		(0.042)
	Panel A8: Women, age above 75			
HH income (log)	0.301***	0.464***		0.409***
Obs: 6761	(0.088)	(0.051)		(0.045)
	Panel B: Men, all ages			
HH income (log)	0.469***	0.527***	0.515***	0.454***
Obs: 189275	(0.039)	(0.030)	(0.028)	(0.027)
	Panel B1: Men, age up to 17			
HH income (log)	0.375***	0.412***		0.398***
Obs: 11522	(0.059)	(0.045)		(0.044)
	Panel B2: Men, age 18-25			
HH income (log)	0.395***	0.421***		0.382***
Obs: 35114	(0.055)	(0.038)		(0.035)
	Panel B3: Men, age 26-35			
HH income (log)	0.508***	0.555***		0.483***
Obs: 39598	(0.036)	(0.032)		(0.032)
	Panel B4: Men, age 36-45			
HH income (log)	0.562***	0.608***		0.526***
Obs: 33661	(0.041)	(0.035)		(0.037)
	Panel B5: Men, age 46-55			
HH income (log)	0.525***	0.585***		0.511***
Obs: 28048	(0.043)	(0.033)		(0.032)

	Panel B6: Men, age 56-65		
HH income (log)	0.481***	0.580***	0.500***
Obs: 22462	(0.047)	(0.033)	(0.033)
	Panel B7: Men, age 66-75		
HH income (log)	0.463***	0.546***	0.481***
Obs: 13141	(0.053)	(0.036)	(0.037)
	Panel B8: Men, age above 75		
HH income (log)	0.450***	0.550***	0.482***
Obs: 5729	(0.071)	(0.050)	(0.052)

Appendix Table C.4. Results for Different Sexes / Ages. Upper-middle Income Group

	No controls	Country and Year	Age, Country and Year	All demographic controls
	Panel A: Women, all ages			
HH income (log)	0.407***	0.542***	0.545***	0.461***
Obs: 162620	(0.103)	(0.041)	(0.038)	(0.033)
	Panel A1: Women, age up to 17			
HH income (log)	0.364***	0.383***		0.369***
Obs: 5521	(0.118)	(0.041)		(0.040)
	Panel A2: Women, age 18-25			
HH income (log)	0.384***	0.390***		0.358***
Obs: 22986	(0.112)	(0.034)		(0.033)
	Panel A3: Women, age 26-35			
HH income (log)	0.485***	0.533***		0.451***
Obs: 31595	(0.106)	(0.040)		(0.036)
	Panel A4: Women, age 36-45			
HH income (log)	0.509***	0.617***		0.514***
Obs: 28265	(0.112)	(0.044)		(0.039)
	Panel A5: Women, age 46-55			
HH income (log)	0.451***	0.640***		0.509***
Obs: 25038	(0.094)	(0.045)		(0.038)
	Panel A6: Women, age 56-65			
HH income (log)	0.427***	0.598***		0.472***
Obs: 23067	(0.108)	(0.058)		(0.053)
	Panel A7: Women, age 66-75			
HH income (log)	0.389***	0.549***		0.450***
Obs: 16596	(0.107)	(0.056)		(0.053)
	Panel A8: Women, age above 75			
HH income (log)	0.449***	0.594***		0.514***
Obs: 9552	(0.130)	(0.069)		(0.069)
	Panel B: Men, all ages			
HH income (log)	0.431***	0.528***	0.528***	0.441***
Obs: 123237	(0.090)	(0.044)	(0.042)	(0.037)
	Panel B1: Men, age up to 17			
HH income (log)	0.311***	0.332***		0.329***
Obs: 5289	(0.098)	(0.048)		(0.047)
	Panel B2: Men, age 18-25			
HH income (log)	0.371***	0.365***		0.324***
Obs: 19663	(0.106)	(0.036)		(0.034)
	Panel B3: Men, age 26-35			
HH income (log)	0.479***	0.530***		0.438***
Obs: 25054	(0.101)	(0.050)		(0.047)
	Panel B4: Men, age 36-45			
HH income (log)	0.491***	0.567***		0.456***
Obs: 21662	(0.091)	(0.051)		(0.048)
	Panel B5: Men, age 46-55			
HH income (log)	0.506***	0.647***		0.523***
Obs: 18591	(0.089)	(0.051)		(0.042)

	Panel B6: Men, age 56-65		
HH income (log)	0.573***	0.724***	0.581***
Obs: 16306	(0.083)	(0.054)	(0.047)
	Panel B7: Men, age 66-75		
HH income (log)	0.467***	0.657***	0.546***
Obs: 11309	(0.111)	(0.062)	(0.061)
	Panel B8: Men, age above 75		
HH income (log)	0.399**	0.548***	0.431***
Obs: 5363	(0.150)	(0.123)	(0.120)

Appendix Table C.5. Results for Different Sexes / Ages. High-income Group

	No controls	Country and Year	Age, Country and Year	All demographic controls
	Panel A: Women, all ages			
HH income (log)	0.596***	0.448***	0.460***	0.372***
Obs: 162620	(0.074)	(0.046)	(0.045)	(0.039)
	Panel A1: Women, age up to 17			
HH income (log)	0.150***	0.151***		0.148***
Obs: 5063	(0.040)	(0.033)		(0.033)
	Panel A2: Women, age 18-25			
HH income (log)	0.256***	0.245***		0.225***
Obs: 19893	(0.052)	(0.041)		(0.039)
	Panel A3: Women, age 26-35			
HH income (log)	0.531***	0.460***		0.355***
Obs: 30366	(0.058)	(0.043)		(0.036)
	Panel A4: Women, age 36-45			
HH income (log)	0.643***	0.536***		0.414***
Obs: 35903	(0.063)	(0.041)		(0.039)
	Panel A5: Women, age 46-55			
HH income (log)	0.716***	0.548***		0.418***
Obs: 36808	(0.077)	(0.046)		(0.040)
	Panel A6: Women, age 56-65			
HH income (log)	0.834***	0.559***		0.435***
Obs: 35315	(0.098)	(0.062)		(0.054)
	Panel A7: Women, age 66-75			
HH income (log)	0.857***	0.527***		0.436***
Obs: 26628	(0.129)	(0.084)		(0.074)
	Panel A8: Women, age above 75			
HH income (log)	0.609***	0.334***		0.283***
Obs: 14956	(0.138)	(0.077)		(0.067)
	Panel B: Men, all ages			
HH income (log)	0.581***	0.460***	0.477***	0.398***
Obs: 184692	(0.060)	(0.035)	(0.036)	(0.031)
	Panel B1: Men, age up to 17			
HH income (log)	0.134**	0.122***		0.119***
Obs: 5045	(0.052)	(0.038)		(0.038)
	Panel B2: Men, age 18-25			
HH income (log)	0.300***	0.290***		0.270***
Obs: 20245	(0.049)	(0.034)		(0.034)
	Panel B3: Men, age 26-35			
HH income (log)	0.516***	0.444***		0.371***
Obs: 31203	(0.052)	(0.036)		(0.028)
	Panel B4: Men, age 36-45			
HH income (log)	0.636***	0.537***		0.425***
Obs: 33440	(0.058)	(0.036)		(0.034)
	Panel B5: Men, age 46-55			
HH income (log)	0.740***	0.614***		0.490***
Obs: 32337	(0.067)	(0.047)		(0.038)
	Panel B6: Men, age 56-65			

HH income (log)	0.850***	0.634***	0.492***
Obs: 29842	(0.081)	(0.049)	(0.043)
	Panel B7: Men, age 66-75		
HH income (log)	0.787***	0.513***	0.430***
Obs: 22149	(0.106)	(0.063)	(0.059)
	Panel B8: Men, age above 75		
HH income (log)	0.695***	0.436***	0.368***
Obs: 10431	(0.117)	(0.076)	(0.069)

Appendix D. Appendix for the Section Results: Country Cross-section

Appendix Table D.1. Gallup cross-section for log GDP per capita and average log real equivalised household income. Country-level.

	(1) No controls	(2) Year FE	(3) Age and sex, year FE	(4) All demographic controls
Panel A: GDP per capita				
GDP per capita (log)	0.769***	0.770***	0.800***	0.671***
	(0.036)	(0.036)	(0.090)	(0.083)
Panel B: Average log household income (equivalence scale)				
Average of log HH income (eq scale)	0.729***	0.730***	0.810***	0.640***
	(0.032)	(0.032)	(0.071)	(0.085)
Panel C: Log of average household income (equivalence scale)				
Log of average HH income (eq scale)	0.775***	0.777***	0.783***	0.623***
	(0.033)	(0.033)	(0.069)	(0.081)
Obs: 1,415				

Notes: Columns 2 to 4 are cross-section regressions with year FEs. The additional controls in Specification 3 are country-year average age, age-squared and the share of women. The controls in Specification 4 are country-year age, age-squared, the share of women, unemployed, degree holders, married or partnered respondents and the share of respondents who reported health problems. Standard errors in parentheses are clustered at the country level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Appendix Table D.2. Full results of Table 3.4 Specification 1.

	All countries	Low	Lower-middle	Upper-middle	High
GDP per capita (log)	0.753***	0.631***	0.348*	0.362**	1.201***
	(0.037)	(0.116)	(0.191)	(0.169)	(0.372)
Constant	-1.601***	-0.604	2.014	2.140	-6.245
	(0.343)	(0.908)	(1.759)	(1.746)	(3.999)
R^2	0.602	0.257	0.038	0.047	0.232
Observations	1467	405	403	283	376
Countries	157	45	44	28	40

Appendix Table D.3. Full results of Table 3.4 Specification 2.

	All countries	Low	Lower-middle	Upper-middle	High
GDP per capita (log)	0.754***	0.636***	0.348*	0.366**	1.199***
	(0.037)	(0.118)	(0.202)	(0.173)	(0.385)
Constant	-1.454***	-0.441	2.188	2.340	-6.273
	(0.345)	(0.921)	(1.828)	(1.811)	(4.097)
R^2	0.605	0.287	0.049	0.055	0.238
Observations	1467	405	403	283	376
Countries	157	45	44	28	40

Appendix Table D.4. Full results of Table 3.4 Specification 3.

	All countries	Low	Lower-middle	Upper-middle	High
GDP per capita (log)	0.750***	0.663***	0.592***	0.394**	1.289***
	(0.093)	(0.116)	(0.216)	(0.185)	(0.417)
Average age	-0.177	-0.492***	-0.062	0.238	-0.016
	(0.113)	(0.137)	(0.212)	(0.445)	(0.173)
Average age-squared	0.204*	0.664***	0.001	-0.261	0.054
	(0.115)	(0.169)	(0.239)	(0.457)	(0.176)
Share of women	-1.835	-2.652	7.033	-2.064	-0.315
	(1.684)	(3.209)	(5.083)	(5.161)	(2.635)
Constant	2.690	8.154***	-1.296	-1.338	-7.586
	(1.913)	(2.125)	(4.965)	(9.013)	(6.331)
R^2	0.610	0.341	0.096	0.069	0.281
Observations	1467	405	403	283	376
Countries	157	45	44	28	40

Appendix Table D.5. Full results of Table 3.4 Specification 4*a*.

	All countries	Low	Lower-middle	Upper-middle	High
GDP per capita (log)	0.614***	0.524***	0.259	0.329***	1.235***
	(0.087)	(0.103)	(0.241)	(0.095)	(0.406)
Average age	-0.254**	-0.687***	-0.002	-0.308	0.055
	(0.105)	(0.132)	(0.230)	(0.214)	(0.190)
Average age-squared	0.281**	0.828***	-0.017	0.335	-0.027
	(0.112)	(0.161)	(0.251)	(0.232)	(0.196)
Share of women	-0.087	-2.786	8.985*	3.714	-0.835
	(1.683)	(2.964)	(4.661)	(3.972)	(2.962)
Unemployed share	-4.654***	-2.809*	-2.097	-7.795**	-3.258
	(1.028)	(1.602)	(1.611)	(2.845)	(2.490)
Degree share	0.885	4.134***	0.884	0.436	0.236
	(0.651)	(1.451)	(1.427)	(1.866)	(0.873)
Married share	-0.569	0.621	-1.135	-0.873	-1.051
	(0.558)	(0.667)	(0.891)	(1.521)	(1.101)
Health problems share	-2.563***	-0.549	-4.165***	-8.584***	1.590
	(0.602)	(0.554)	(1.038)	(1.514)	(1.722)
Constant	5.747***	13.404***	0.496	9.620*	-7.623
	(1.933)	(2.058)	(5.284)	(4.824)	(6.125)
R^2	0.658	0.421	0.274	0.415	0.314
Observations	1467	405	403	283	376
Countries	157	45	44	28	40

Appendix Table D.6. Full results of Table 3.4 Specification 4*b*.

	All countries	Low	Lower-middle	Upper-middle	High
GDP per capita	0.617***	0.520***	0.232	0.325***	1.144**
(log)	(0.095)	(0.103)	(0.257)	(0.092)	(0.483)
Average age	-0.293***	-0.696***	-0.038	-0.327	-0.085
	(0.109)	(0.131)	(0.265)	(0.249)	(0.187)
Average age-squared	0.321***	0.838***	0.010	0.358	0.128
	(0.115)	(0.161)	(0.286)	(0.270)	(0.184)
Share of women	-2.194	-2.872	9.940*	4.036	-3.691
	(2.467)	(2.995)	(4.969)	(4.518)	(6.533)
Unemployed share	-5.020***	-2.609	-2.830*	-7.294**	-6.011*
	(1.067)	(1.615)	(1.520)	(2.651)	(3.094)
Degree share	1.464*	4.010***	1.525	0.585	0.506
	(0.763)	(1.387)	(1.372)	(1.961)	(1.094)
Married share	-0.383	0.639	-0.672	-0.720	-0.494
	(0.567)	(0.675)	(1.042)	(1.528)	(1.231)
Health problems share	-2.817***	-0.528	-4.676***	-8.810***	0.138
	(0.632)	(0.559)	(1.204)	(1.530)	(2.123)
Constant	7.526***	13.610***	0.973	9.835*	-2.411
	(2.028)	(2.078)	(5.849)	(5.514)	(6.931)
R^2	0.680	0.405	0.324	0.421	0.384
Observations	1306	391	347	259	309
Countries	148	45	40	27	36

Appendix Table D.7. Full results of Table 3.4 Specification 5.

	All countries	Low	Lower-middle	Upper-middle	High
GDP per capita	0.349***	0.365***	0.002	0.092	0.215
(log)	(0.091)	(0.128)	(0.221)	(0.098)	(0.212)
Average age	-0.211**	-0.638***	0.199	-0.129	0.041
	(0.098)	(0.126)	(0.226)	(0.153)	(0.106)
Average age-squared	0.236**	0.778***	-0.225	0.065	-0.023
	(0.101)	(0.141)	(0.238)	(0.161)	(0.098)
Share of women	-3.351	-7.320***	6.382	7.849*	-5.249
	(2.132)	(2.426)	(4.319)	(4.035)	(4.130)
Unemployed share	-2.253**	-1.042	-0.450	-3.075	-2.000
	(1.017)	(1.667)	(1.299)	(2.109)	(2.249)
Degree share	1.188**	3.039**	1.256	-0.670	0.856
	(0.582)	(1.416)	(1.525)	(1.108)	(0.778)
Married share	-0.637	0.946	-1.524	0.177	-0.418
	(0.497)	(0.602)	(0.905)	(1.134)	(0.633)
Health problems	-1.341**	0.291	-2.930**	-1.734	0.295
share	(0.555)	(0.581)	(1.126)	(1.252)	(1.214)
Social support	1.735***	1.608***	1.310*	4.468***	4.626***
	(0.400)	(0.414)	(0.653)	(1.388)	(1.219)
Healthy life	0.029***	0.002	0.023	0.117***	0.024
expectancy at birth	(0.011)	(0.011)	(0.016)	(0.021)	(0.023)
Freedom to make	1.277***	0.531	2.184***	2.187***	-0.114
life choices	(0.336)	(0.428)	(0.563)	(0.713)	(0.706)
Generosity	0.581**	0.404	-0.168	-0.099	1.430***
	(0.270)	(0.363)	(0.362)	(0.500)	(0.471)
Perceptions of	-0.371	-0.089	0.899	-0.996	-0.581
corruption	(0.304)	(0.449)	(0.534)	(0.839)	(0.384)
Constant	4.792**	13.961***	-4.837	-6.676*	0.460
	(2.042)	(2.507)	(4.313)	(3.707)	(3.108)
R^2	0.760	0.477	0.530	0.753	0.706
Observations	1306	391	347	259	309
Countries	148	45	40	27	36

Appendix Table D.8. Replication of Table 3.4 for countries with at least 10 years of observations.

	(1)	(2)	(3)	(4)	(5)
	All countries	Low	Lower-middle	Upper-middle	High
Specification 4*a*: All demographic controls.					
GDP per capita (log)	0.667***	0.590***	0.230	0.357***	1.456**
	(0.115)	(0.172)	(0.244)	(0.090)	(0.560)
Countries:	106	24	30	24	28
Specification 4*b*: All demographic controls, countries with WHR information.					
GDP per capita (log)	0.659***	0.588***	0.166	0.352***	1.307**
	(0.127)	(0.169)	(0.248)	(0.088)	(0.583)
Countries:	101	24	26	23	28
Specification 5: Gallup: 2009-2019, 143 countries + WHR variables					
GDP per capita (log)	0.388***	0.626**	0.084	0.114	0.170
	(0.112)	(0.238)	(0.288)	(0.101)	(0.252)
Countries:	101	24	26	23	28

Notes: Specifications 4 to 5 are cross-section regressions with year FEs. The controls in Specification 4 are country-year age, age-squared, the share of women, unemployed, degree holders, married or partnered respondents and the share of respondents who reported health problems. Specification 5 includes the controls from Specification 4 and WHR variables (Social support, Healthy life expectancy at birth, Freedom to make life choices, Generosity, Perceptions of corruption, Confidence in national government). Standard errors in parentheses are clustered at the country level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Appendix Table D.9. Extension of Table 3.4 with specifications adding one WHR variable at a time.

	All countries	Low	Lower-middle	Upper-middle	High
Specification 4*b*: All demographic controls, countries with WHR information					
GDP per capita (log)	0.617***	0.520***	0.232	0.325***	1.144**
	(0.095)	(0.103)	(0.257)	(0.092)	(0.483)
Specification 4*b* + Social support					
GDP per capita (log)	0.475***	0.367***	0.058	0.277***	0.568*
	(0.090)	(0.114)	(0.207)	(0.094)	(0.299)
+ Healthy life expectancy at birth					
GDP per capita (log)	0.397***	0.360***	-0.130	0.221**	0.533*
	(0.088)	(0.123)	(0.196)	(0.092)	(0.310)
+ Freedom to make life choices					
GDP per capita (log)	0.343***	0.375***	-0.047	0.088	0.386
	(0.091)	(0.123)	(0.208)	(0.088)	(0.296)
+ Generosity					
GDP per capita (log)	0.354***	0.357***	-0.048	0.076	0.439*
	(0.088)	(0.119)	(0.209)	(0.101)	(0.253)
+ Perceptions of corruption: Specification 5					
GDP per capita (log)	0.349***	0.365***	0.002	0.092	0.215
	(0.091)	(0.128)	(0.221)	(0.098)	(0.212)
Observations	1306	391	347	259	309
Countries	148	45	40	27	36

Notes: Specifications 4 to 5 are cross-section regressions with year FEs. The controls in Specification 4*a* are country-year age, age-squared, the share of women, unemployed, degree holders, married or partnered respondents and the share of respondents who reported health problems. Standard errors in parentheses are clustered at the country level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Appendix Table D.10. Country cross-section. Literature

Author	Outcome measure	Income measure	Controls	Data	Coefficient
Deaton (2008)	Average country life satisfaction (0 to 10)	Log of per capita GDP	No controls	Gallup (2006)	0.84
Sacks *et al.* (2010)	Standardised: Ladder Question (GWP and Pew), Life satisfaction (WVS) [Comparable coefficients]	Log of per capita GDP	[c1] No controls [c2] Age and sex	Gallup World Poll, World Values Survey and Pew Global Attitudes Survey (until 2007)	[c1] Gallup: 0.36 [0.85] WVS: 0.36 [0.82] Pews: 0.21 [c2] Gallup: 0.38 [0.80] WVS: 0.36 [0.82] Pews: 0.23

Notes: The standard deviations of country-average wellbeing scores used in Sacks *et al.* (2010) are 0.49 in the WVS, 0.39 in EB and 0.47 in Gallup. The SD for WVS and EB scores are retrieved from the data kindly provided by Daniel Sacks. The SD of the scores in Gallup are estimated using the data over the comparable period.
The comparable coefficients are those from the analysis of the country-level averages of standardised scores, divided by the SD of country-level averages of standardised scores and multiplied by the SD of country-level averages of non-standardised scores. The coefficients are comparable with the results presented in the paper.

Appendix E. Individual panel analysis.

We analyse the panel relationship between income and wellbeing using data from what are probably the three main panel surveys used in social science: the UK Household Longitudinal Survey (UKHLS), the Household, Income and Labour Dynamics in Australia (HILDA) and the German Socio-Economic Panel (SOEP). The dependent variable in this analysis is life satisfaction.

The UKHLS, combined with the British Household Panel Survey (BHPS), has life-satisfaction information annually from 1996 to 2019 (apart from 2001). Dropping observations with missing values yields an annual sample of approximately 11,500 for the BHPS and 33,500 for the UKHLS.[22] The HILDA survey covers the period from 2001 to 2019, and includes an average of 12,000 yearly observations.[23] Last, we analyse West-German respondents in the SOEP, producing information on 14,000 adults in each year between 1985 and 2019.[24]

Each of three datasets includes **life satisfaction** information. In the UKHLS and BHPS, life satisfaction is measured on a 1 to 7 scale. Respondents are asked: *How dissatisfied or satisfied are you with your life overall?* To facilitate the comparability of results between the three datasets, we adjust this scale to run from 0 to 10 (by taking the score on the 1-7 scale, subtracting one and multiplying the result by 10/6). Average life satisfaction on this new scale is 7 with a standard deviation of 2.4 (the corresponding figures on the original scale are 5.2 and 1.4). HILDA respondents are asked *How satisfied are you with your life*, with responses on a 0 to 10 scale, where 0 is totally dissatisfied and 10 is totally satisfied. Average life satisfaction in HILDA is 7.9 with standard deviation of 1.5. The SOEP life satisfaction is on the same 0-10 scale, from the following question: *We would like to ask you about your satisfaction with your life in general, please answer according to the following scale: 0 means completely dissatisfied and 10 means completely satisfied: How satisfied are you with your life, all things considered?* Average life satisfaction in the SOEP is 7.25 with a standard deviation of 1.76. The distributions of life satisfaction in the three datasets are depicted in **Appendix Figure E.1**.

[22] In all three datasets we drop respondents under age 18, corresponding to an average of 518 observations per wave in the BHPS and 1,171 in the UKHLS. We also drop proxy respondents, an average of 490 respondents per BHPS wave and 2,609 per UKHLS wave, and those with missing life-satisfaction data, an average of 441 per BHPS and 3,795 per UKHLS wave. Removing observations without recorded education drops an average of 197 and 308 observations in the BHPS and UKHLS per wave respectively. We also remove observations without health data, 605 and 58 per respective BHPS and UKHLS wave. In the final merged BHPS/UKHLS dataset 3,315 observations are dropped due to zero or missing income. We last dropped the 17,958 respondents who only appear in one wave.

[23] We dropped an average of 46 respondents aged under 18 per wave. We also drop respondents without life-satisfaction information (on average 10 per wave), and respondents under age 18 (729 per wave). We also remove observations without health data, 1,554 per wave, which is mostly due to missing self-completion questionnaires. In the final dataset that includes all waves we removed 828 observations that did not record income. We also dropped 5,185 observations of the respondents who only appeared in the dataset once.

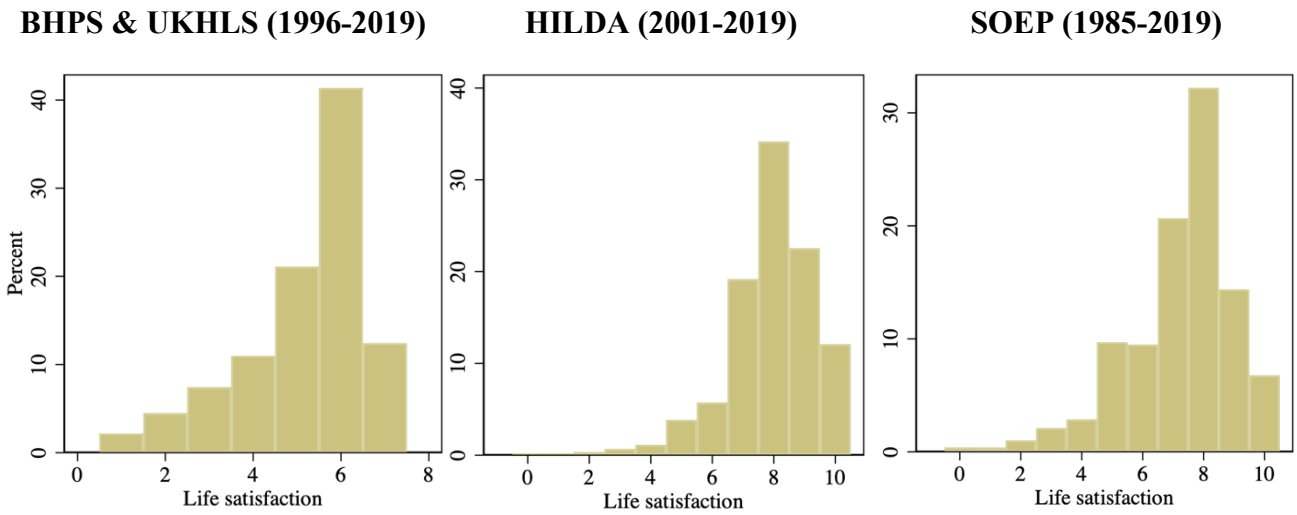
[24] We removed an average of 372 respondents under 18 per wave. We drop respondents for whom we do not have wellbeing data, on average 164 per wave (out of which 104 per wave due to the question not being included in the version of the survey). We also remove observations without education data – 497 per wave, marital status 110 per wave and health 1260 per wave. In the final dataset that includes all waves we removed 31,866 observations that did not record income. We also dropped 17,228 observations of the respondents who only appeared in the dataset once.

As in the individual-level analysis in Section 3.1, we use data on equivalised real gross household income (in 2019 currency units) adjusted using the OECD equivalence scale.[25] **Appendix Figure E.2** shows the distribution of income in the bottom 90% of the income distribution for all three countries. The summary statistics for wellbeing, income and all of the other variables that are used in the analysis appear in **Appendix Table E.1**.

Appendix Table E.1. Summary statistics

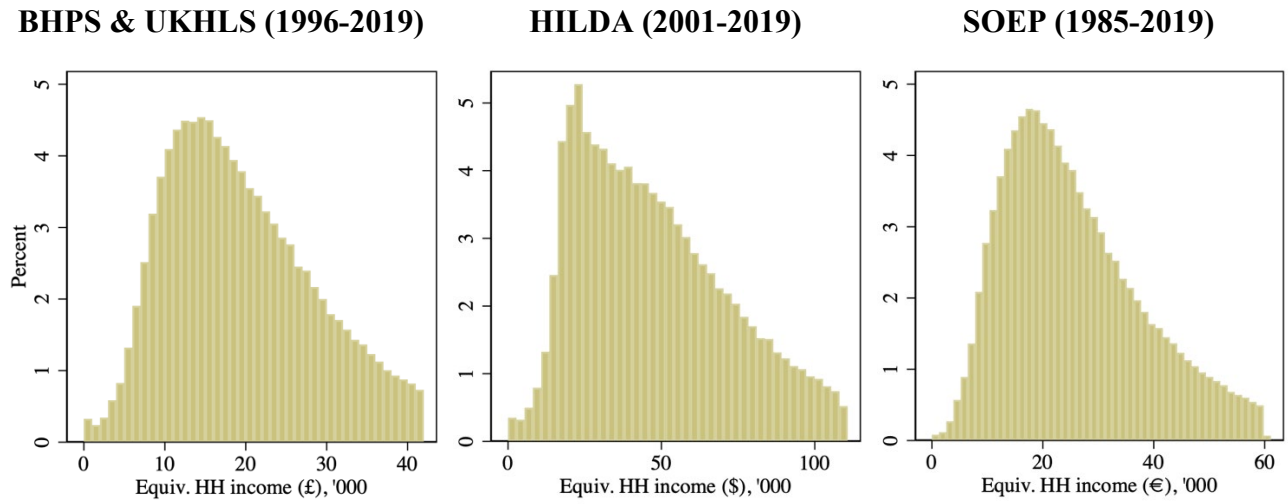
	BHPS & UKHLS		HILDA		SOEP	
	Mean	SD	Mean	SD	Mean	SD
Life satisfaction	6.97	2.38	7.92	1.45	7.25	1.75
Equiv. HH income (£ / AUS$ / €)	23257	16791	59246	55978	30124	27947
HH income (log)	9.85	0.68	10.73	0.72	10.11	0.63
Age	48.93	17.69	46.73	17.79	47.07	16.99
Female	0.56	0.50	0.53	0.50	0.53	0.50
Unemployed	0.04	0.20	0.03	0.17	0.04	0.20
Education (degree or above)	0.34	0.47	0.25	0.43	0.18	0.38
Partnered / Married	0.67	0.47	0.67	0.47	0.63	0.48
Health limits activities/ Disabled	0.25	0.43	0.19	0.39	0.11	0.31
Observations	508,011		238,421		459,975	

Appendix Figure E.1. The distribution of life satisfaction in the BHPS/UKHLS, HILDA and SOEP.



Appendix Figure E.2. Distribution of equivalised real household income in the BHPS/UKHLS, HILDA and SOEP: Bottom 90%.

[25] We have replicated the analysis with net income in from the HILDA and SOEP datasets. The results are qualitatively unchanged. The net-income series is not consistent across the BHPS and the UKHLS, so we cannot carry out this exercise for the UK data.



Note: Household income is equivalence-scale adjusted real annual household income in the local currency.

Results

We begin by estimating cross-section regressions, pooling the individual data from all years within each dataset and regressing individual life satisfaction on log equivalent household income without any other controls. The results are presented in column 1 of **Appendix Table E.2**. The coefficient on the logarithm of equivalised household income is 0.347 in the UK, 0.122 in Australia and 0.443 in Germany. This is equivalent to 0.146 standard deviations of life satisfaction in the UK, 0.084 SD in Australia and 0.253 SD in Germany.[26]

For comparability reasons, we can restrict the analysis for all three panels to the same time period (2001-2019): this restriction overall makes little difference to the estimated coefficients.

These figures are higher than those in the pooled dataset of individuals in high-income countries from the Gallup sample (**Table 3.2**), which was 0.584 or 0.301 SD of wellbeing. Both the countries and years covered are not the same: there are far more countries in the Gallup sample, but also fewer years (2009-2019). With respect to the time period, if we constrain the analysis in **Appendix Table E.2** to cover the Gallup 2009-2019 period only, the estimated coefficients on the logarithm of household income is 0.401 in the UK, 0.144 in Australia and 0.399 in Germany: see **Appendix Table E.3**: corresponding to 0.164 standard deviations of life satisfaction in the UK, 0.101 SD in Australia and 0.235 SD in Germany. These numbers are not materially different to those for all of the available panel data years in **Appendix Table E.2**: the difference between **Appendix Table E.2** and the Gallup results may well then reflect the different countries that appear in the datasets rather than the different years that they cover.

[26] In unreported results, we have estimated the specifications in columns (1) and (2) using the US General Social Survey, which is repeated cross-section. The estimated coefficient on equivalised household income for the GSS is around 0.4, similar to the values in **Appendix Table E.2**. for the UK and Germany.

Appendix Table E.2. BHPS/UKHLS, HILDA and SOEP. Individual-level. Pooled and Panel Life Satisfaction Regressions

	(1) Pooled No controls	(2) Pooled Year dummies	(3) Panel Year dummies	(4) Panel Age, year dummies	(5) Panel All demographic controls
			BHPS & UKHLS (1996-2019)		
HH income (log)	0.347***	0.359***	0.078***	0.083***	0.063***
Obs: 508,011	(0.008)	(0.008)	(0.007)	(0.007)	(0.007)
SD 2.38	0.146	0.151	0.033	0.035	0.026
			HILDA (2001-2019)		
HH income (log)	0.122***	0.125***	0.070***	0.075***	0.061***
Obs: 238,421	(0.004)	(0.009)	(0.006)	(0.006)	(0.006)
SD 1.45	0.084	0.086	0.048	0.052	0.042
			SOEP (1985-2019)		
HH income (log)	0.443***	0.455***	0.208***	0.215***	0.191***
Obs: 469,575	(0.004)	(0.009)	(0.008)	(0.009)	(0.008)
SD 1.75	0.253	0.260	0.119	0.123	0.109

Notes: Life satisfaction is on a 0-10 scale in all datasets. Columns 3 to 5 are panel regressions with individual and year fixed effects. The additional controls in Specifications 4 to 5 include indicators for missing age, country-year averages are imputed to missing age and country-year modes for missing sex. Standard errors in parentheses are clustered at the individual level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Appendix Table E.3. BHPS/UKHLS, HILDA and SOEP. Restricted to the years of the Gallup Survey (2009-2019). Pooled and Panel Life Satisfaction Regressions. Standardised coefficients in grey.

	(1) Pooled No controls	(2) Pooled Year dummies	(3) Panel Year dummies	(4) Panel Age, year dummies	(5) Panel All demographic controls
			BHPS & UKHLS (2009-2019)		
HH income (log)	0.401***	0.402***	0.073***	0.073***	0.055***
Obs: 369,202	(0.010)	(0.010)	(0.008)	(0.008)	(0.008)
SD 2.451	0.164	0.164			
			HILDA (2009-2019)		
HH income (log)	0.144***	0.143***	0.056***	0.059***	0.049***
Obs: 153,323	(0.005)	(0.010)	(0.007)	(0.007)	(0.007)
SD 1.423	0.101	0.100			
			SOEP (2009-2019)		
HH income (log)	0.399***	0.399***	0.111***	0.117***	0.103***
Obs: 202,612	(0.006)	(0.011)	(0.012)	(0.012)	(0.012)
SD 1.696	0.235	0.235			

Notes: Columns 3 to 5 are panel regressions with individual and year dummies. The additional controls in Specifications 4 to 5 include indicators for missing age, country-year averages are imputed to missing age and country-year modes for missing sex. Standard errors in parentheses are clustered at the individual level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

The second comparability analysis between Gallup and the three large panels is to restrict the Gallup data to the UK, Australia and Germany. The results from doing so appear in **Appendix Table E.4** below. This produces figures that are mostly lower than the 0.584 estimate for all high-income countries, but still look to be different from those in the single-country panels. We suspect that these differences reflect sampling procedures and composition between the different surveys.

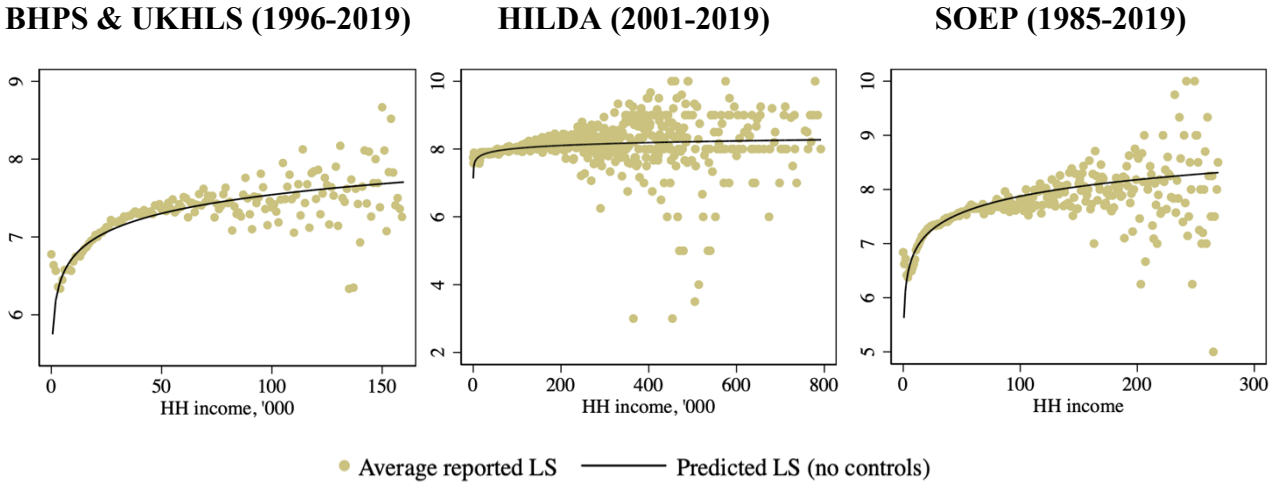
Appendix Table E.4. Gallup. 2009-2019. Individual-level. Pooled Life Satisfaction Regressions

	(1) No controls	(2) Year dummies
	United Kingdom	
HH income (log)	0.234***	0.237***
Obs: 25,694	(0.016)	(0.016)
SD 1.824	0.128	0.130
	Australia	
HH income (log)	0.352***	0.360***
Obs: 8,800	(0.032)	(0.032)
SD 1.710	0.206	0.211
	Germany	
HH income (log)	0.587***	0.591***
Obs: 30,303	(0.022)	(0.022)
SD 1.795	0.327	0.329

Note: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

As in Section 3.1, we plot the raw life satisfaction scores against the values predicted by our simple model that only controls for the logarithm of income. **Appendix Figure E.3** presents the results for the bottom 99.9% of income distribution.

Appendix Figure E.3. Predicted and reported life satisfaction for different levels of income in the BHPS/UKHLS, HILDA and SOEP: Bottom 99.9% of the income distribution.



Note: Average reported life satisfaction is presented in bins by thousands of the local currency.

Column 3 of **Appendix Table E.2** takes advantage of the panel nature of the three datasets and shows estimates from panel regressions with both individual and year fixed effects: the estimated coefficients here refer to the income-wellbeing relationship within the same individual over time.

The estimated coefficients on log equivalised household income are much smaller in the panel regressions in column 3 than in their cross-section counterparts in column 2: 0.078 for the UK, 0.070 for Australia and 0.208 for Germany.

Column 4 also controls for the age group.[27] The resulting estimated income coefficients barely change (0.083 for the UKHLS, 0.075 for the HILDA and 0.215 for the SOEP).

Column 5 then adds variables that may mediate or confound the effect of income on subjective wellbeing: unemployment, education, marital status and physical health. We do find some change in the estimated coefficients with their introduction, although this is only small in size. The coefficient in this specification is reduced to 0.063, 0.061 and 0.191 for the UKHLS, HILDA and SOEP respectively.[28]

The income coefficients that we find for the UK and Germany are higher than those in Clark *et al.* (2018). However, the specifications they use are very different, including a more-detailed set of individual characteristics (including mental health), many of which may mediate the relationship between income and wellbeing. Their panel coefficients on income are 0.04 and 0.08 in the UKHLS and the SOEP. Even though we do not control for mental health, our estimate for HILDA is similar to that in Clark *et al.* (2018).

The panel income coefficients are positive and significant in all of the three large panel datasets. They are systematically smaller than the pooled estimates in the same datasets, and the pooled estimated income coefficient in Gallup. The panel income coefficient ranges from 0.06 to 0.2, and is 20-50% of the analogous pooled coefficient.

As for the analysis of the Gallup data, we can trim the top and bottom 1% of the income distribution to account for possible outliers. As was the case for the Gallup data in Section 3.1, trimming leads to larger estimated coefficients on equivalised household income. While the percentage change in the panel coefficients is sometimes large, these remain fairly small in absolute value (being 0.11, 0.08 and 0.21 in the trimmed version of column 5 of **Appendix Table E.2**).

We have also considered age and sex differences in the estimated income coefficient. These are illustrated in **Appendix Figure F.1** to **Appendix Figure F.3**. These different estimated coefficients come from separate regressions by age and sex subsamples. The income coefficients in pooled regressions differ notably by age group, with smaller coefficients at younger and older ages and higher coefficients in mid-life; the coefficients are a little higher for women, but broadly similar across the sexes (**Appendix Figure F.1**). Panel estimation produces smaller coefficients, as noted above, but the same conclusions hold (**Appendix Figure F.2**). Last, adding controls to the panel regressions reduces the size of the coefficients somewhat but retains the same patterns by age and sex (**Appendix Figure F.3**).

[27] We obtain similar estimates when we use age and age-squared instead of the age group.

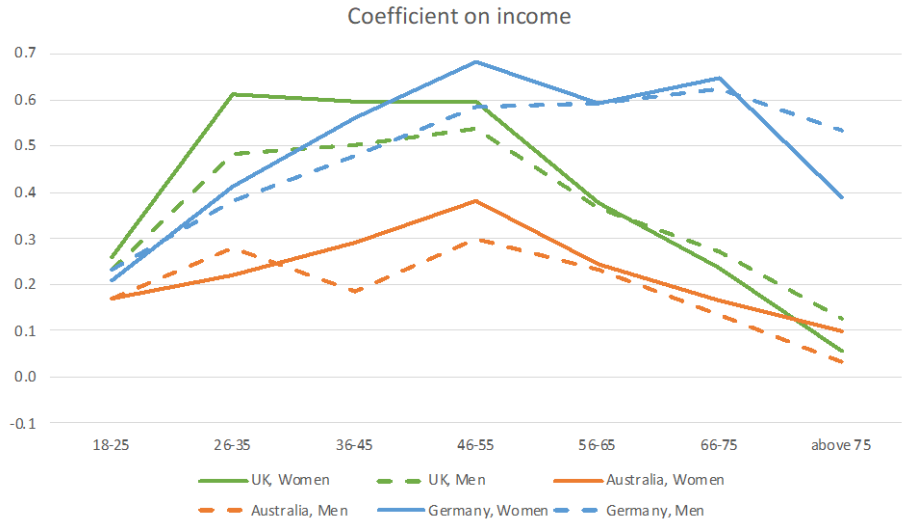
[28] Health may be considered as a perhaps obvious mediator of the relationship between income and life satisfaction. However, excluding health from the controls in column (5) makes only a marginal difference to the estimated coefficients.

To conclude, the pooled estimation from the three large panel surveys produces coefficients that are not overly dissimilar to those from Gallup. In **Appendix Table E.2**, column 2 (controlling for the survey year), the unstandardised coefficients are .359, .125 and .455 (corresponding to 0.15, 0.086 and 0.26 of a standard deviation of life satisfaction). In **Table 3.2** of the main text, the corresponding estimated coefficient for high-income countries with country and year dummies only was 0.451 (0.232 standardised).

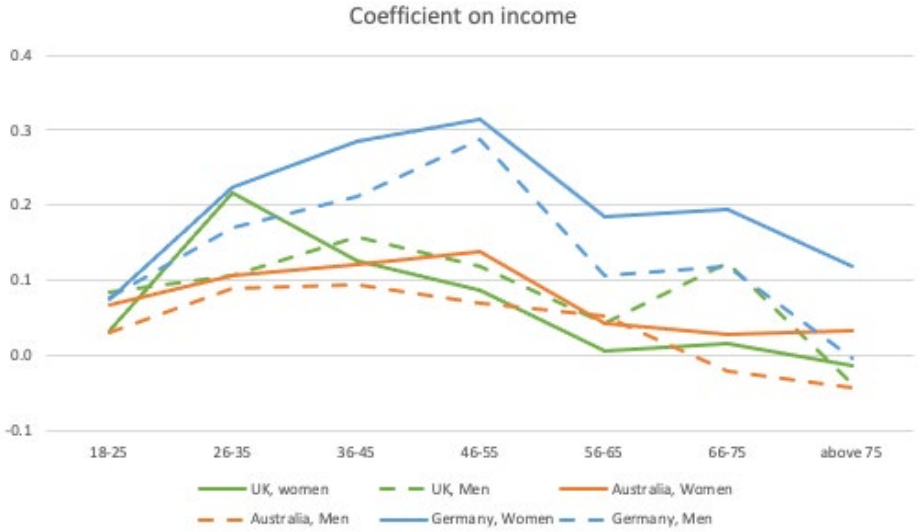
Panel estimation, as is common, produces smaller estimated coefficients on log equivalised household income that are between one quarter and one half of those from pooled estimation of the same data.

Appendix F. Separate analyses by gender and age for Appendix E.

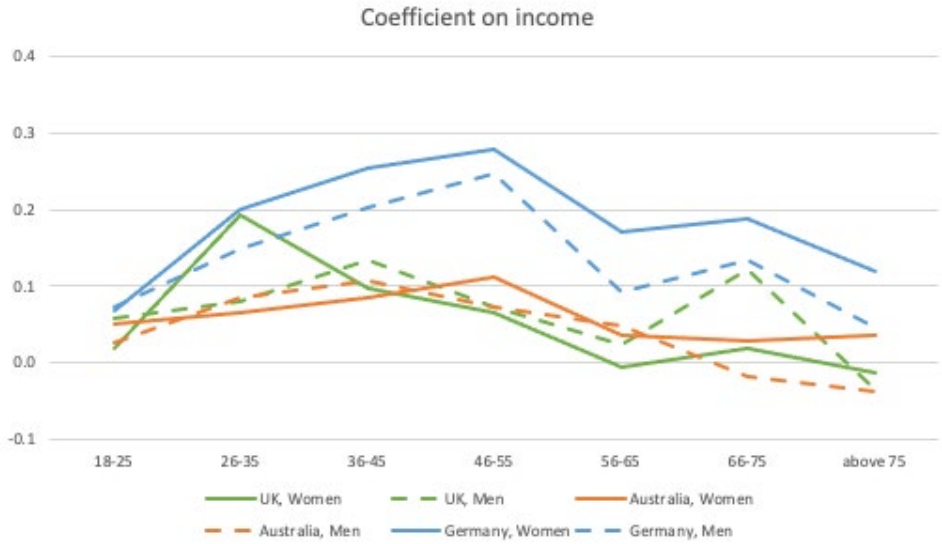
Appendix Figure F.1. Income coefficients for women and men of different ages. Pooled regressions with year dummies.



Appendix Figure F.2. Income coefficients for women and men of different ages. Panel regressions with year dummies.



Appendix Figure F.3. Income coefficients for women and men of different ages. Panel regressions with all demographic controls.



Appendix Table F.1. BHPS & UKHLS (1996-2019). Pooled and Panel Results for different sexes / ages.

	Pooled No controls	Pooled Year dummies	Panel Year dummies	Panel Age, year dummies	Panel All demographic controls
			Panel A: Women, all ages		
HH income (log)	0.364***	0.380***	0.078***	0.083***	0.065***
Obs: 283057	(0.012)	(0.012)	(0.009)	(0.009)	(0.009)
			Panel A1: Women, age 18-25		
HH income (log)	0.255***	0.262***	0.033		0.018
Obs: 30160	(0.025)	(0.025)	(0.023)		(0.023)
			Panel A2: Women, age 26-35		
HH income (log)	0.609***	0.612***	0.216***		0.194***
Obs: 44885	(0.024)	(0.024)	(0.025)		(0.025)
			Panel A3: Women, age 36-45		
HH income (log)	0.594***	0.598***	0.125***		0.097***
Obs: 53561	(0.025)	(0.026)	(0.024)		(0.025)
			Panel A4: Women, age 46-55		
HH income (log)	0.584***	0.597***	0.087***		0.066***
Obs: 52533	(0.027)	(0.028)	(0.022)		(0.022)
			Panel A5: Women, age 56-65		
HH income (log)	0.319***	0.378***	0.007		-0.006
Obs: 44919	(0.025)	(0.025)	(0.022)		(0.022)
			Panel A6: Women, age 66-75		
HH income (log)	0.161***	0.236***	0.016		0.018
Obs: 34922	(0.032)	(0.033)	(0.036)		(0.036)
			Panel A7: Women, above 75		
HH income (log)	0.063	0.056	-0.014		-0.012
Obs: 22077	(0.043)	(0.044)	(0.040)		(0.040)
			Panel B: Men, all ages		
HH income (log)	0.328***	0.337***	0.079***	0.083***	0.061***
Obs: 283057	(0.012)	(0.012)	(0.010)	(0.010)	(0.010)
			Panel A1: Men, age 18-25		
HH income (log)	0.227***	0.232***	0.085***		0.058**
Obs: 24428	(0.027)	(0.028)	(0.027)		(0.027)
			Panel A2: Men, age 26-35		
HH income (log)	0.477***	0.483***	0.106***		0.079***
Obs: 33429	(0.027)	(0.027)	(0.028)		(0.028)
			Panel A3: Men, age 36-45		
HH income (log)	0.502***	0.504***	0.157***		0.133***
Obs: 41557	(0.027)	(0.027)	(0.025)		(0.025)
			Panel A4: Men, age 46-55		
HH income (log)	0.528***	0.537***	0.118***		0.074***
Obs: 41854	(0.030)	(0.031)	(0.025)		(0.024)
			Panel A5: Men, age 56-65		
HH income (log)	0.341***	0.367***	0.042**		0.023
Obs: 36643	(0.025)	(0.026)	(0.020)		(0.020)
			Panel A6: Men, age 66-75		
HH income (log)	0.206***	0.273***	0.123***		0.123***
Obs: 30153	(0.032)	(0.032)	(0.037)		(0.037)
			Panel A7: Men, above 75		
HH income (log)	0.083*	0.128***	-0.038		-0.036
Obs: 16890	(0.046)	(0.048)	(0.056)		(0.056)

Appendix Table F.2. HILDA (2001-2019). Pooled and Panel Results for women / men of different ages.

	Pooled No controls	Pooled Year dummies	Panel Year dummies	Panel Age, year dummies	Panel All demographic controls
			Panel A: Women, all ages		
HH income (log)	0.138***	0.143***	0.084***	0.088***	0.066***
Obs: 127261	(0.012)	(0.012)	(0.008)	(0.008)	(0.008)
			Panel A1: Women, age 18-25		
HH income (log)	0.176***	0.172***	0.066***		0.052***
Obs: 17270	(0.022)	(0.023)	(0.020)		(0.019)
			Panel A2: Women, age 26-35		
HH income (log)	0.216***	0.221***	0.107***		0.066***
Obs: 22573	(0.023)	(0.023)	(0.022)		(0.022)
			Panel A3: Women, age 36-45		
HH income (log)	0.283***	0.291***	0.122***		0.085***
Obs: 23569	(0.028)	(0.029)	(0.024)		(0.024)
			Panel A4: Women, age 46-55		
HH income (log)	0.366***	0.380***	0.139***		0.113***
Obs: 22785	(0.028)	(0.028)	(0.022)		(0.021)
			Panel A5: Women, age 56-65		
HH income (log)	0.219***	0.246***	0.042**		0.035**
Obs: 18765	(0.025)	(0.025)	(0.018)		(0.018)
			Panel A6: Women, age 66-75		
HH income (log)	0.143***	0.167***	0.028		0.030
Obs: 13267	(0.030)	(0.030)	(0.022)		(0.022)
			Panel A7: Women, above 75		
HH income (log)	0.080**	0.098***	0.033		0.035
Obs: 9032	(0.033)	(0.033)	(0.027)		(0.027)
			Panel B: Men, all ages		
HH income (log)	0.110***	0.110***	0.055***	0.061***	0.057***
Obs: 111160	(0.013)	(0.013)	(0.008)	(0.008)	(0.008)
			Panel A1: Men, age 18-25		
HH income (log)	0.179***	0.171***	0.030		0.026
Obs: 15356	(0.026)	(0.026)	(0.024)		(0.025)
			Panel A2: Men, age 26-35		
HH income (log)	0.279***	0.279***	0.088***		0.085***
Obs: 19598	(0.028)	(0.028)	(0.024)		(0.023)
			Panel A3: Men, age 36-45		
HH income (log)	0.190***	0.184***	0.094***		0.106***
Obs: 20462	(0.028)	(0.028)	(0.026)		(0.025)
			Panel A4: Men, age 46-55		
HH income (log)	0.285***	0.298***	0.070***		0.073***
Obs: 20385	(0.029)	(0.029)	(0.022)		(0.021)
			Panel A5: Men, age 56-65		
HH income (log)	0.211***	0.232***	0.053***		0.048***
Obs: 16678	(0.025)	(0.025)	(0.018)		(0.018)
			Panel A6: Men, age 66-75		
HH income (log)	0.109***	0.135***	-0.022		-0.017
Obs: 11771	(0.029)	(0.030)	(0.019)		(0.020)
			Panel A7: Men, above 75		
HH income (log)	0.019	0.033	-0.042*		-0.038
Obs: 6910	(0.039)	(0.039)	(0.023)		(0.023)

Appendix Table F.3. SOEP (1985-2019). Pooled and Panel Results for women / men of different ages.

	Pooled No controls	Pooled Year dummies	Panel Year dummies	Panel Age, year dummies	Panel All demographic controls
			Panel A: Women, all ages		
HH income (log)	0.466***	0.477***	0.228***	0.237***	0.214***
Obs: 242748	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)
			Panel A1: Women, age 18-25		
HH income (log)	0.202***	0.211***	0.075***		0.069***
Obs: 26038	(0.021)	(0.021)	(0.024)		(0.024)
			Panel A2: Women, age 26-35		
HH income (log)	0.375***	0.414***	0.224***		0.201***
Obs: 42679	(0.021)	(0.021)	(0.024)		(0.024)
			Panel A3: Women, age 36-45		
HH income (log)	0.521***	0.561***	0.286***		0.255***
Obs: 53348	(0.022)	(0.022)	(0.028)		(0.028)
			Panel A4: Women, age 46-55		
HH income (log)	0.659***	0.684***	0.314***		0.279***
Obs: 46045	(0.025)	(0.025)	(0.031)		(0.031)
			Panel A5: Women, age 56-65		
HH income (log)	0.573***	0.592***	0.184***		0.170***
Obs: 33782	(0.025)	(0.026)	(0.029)		(0.029)
			Panel A6: Women, age 66-75		
HH income (log)	0.661***	0.650***	0.194***		0.187***
Obs: 25174	(0.036)	(0.037)	(0.048)		(0.047)
			Panel A7: Women, above 75		
HH income (log)	0.422***	0.390***	0.118*		0.119*
Obs: 15682	(0.060)	(0.060)	(0.062)		(0.061)
			Panel B: Men, all ages		
HH income (log)	0.421***	0.434***	0.182***	0.190***	0.165***
Obs: 217227	(0.013)	(0.013)	(0.012)	(0.012)	(0.012)
			Panel A1: Men, age 18-25		
HH income (log)	0.214***	0.232***	0.077***		0.073***
Obs: 24883	(0.024)	(0.024)	(0.027)		(0.027)
			Panel A2: Men, age 26-35		
HH income (log)	0.358***	0.381***	0.171***		0.148***
Obs: 36021	(0.023)	(0.023)	(0.025)		(0.024)
			Panel A3: Men, age 36-45		
HH income (log)	0.439***	0.478***	0.211***		0.202***
Obs: 45280	(0.025)	(0.025)	(0.032)		(0.032)
			Panel A4: Men, age 46-55		
HH income (log)	0.544***	0.586***	0.288***		0.247***
Obs: 42833	(0.027)	(0.028)	(0.036)		(0.035)
			Panel A5: Men, age 56-65		
HH income (log)	0.578***	0.593***	0.106***		0.092***
Obs: 32557	(0.026)	(0.027)	(0.027)		(0.027)
			Panel A6: Men, age 66-75		
HH income (log)	0.623***	0.626***	0.118***		0.134***
Obs: 23439	(0.034)	(0.034)	(0.041)		(0.041)
			Panel A7: Men, above 75		
HH income (log)	0.549***	0.534***	-0.003		0.047
Obs: 12214	(0.057)	(0.058)	(0.068)		(0.069)

Appendix G. Appendix for the Country Panel Results.

Appendix Table G.1. Full result for **Table 3.5**. Specification 2.

	All countries	Low	Lower-middle	Upper-middle	High
GDP per capita	0.618***	0.890**	1.877**	0.553***	1.209
(log)	(0.106)	(0.322)	(0.765)	(0.060)	(0.787)
Constant	-0.379	-2.451	-11.177	-0.488	-6.156
	(0.856)	(2.573)	(6.923)	(0.644)	(8.574)
R^2	0.902	0.676	0.778	0.847	0.887
Observations	1131	256	321	255	299
Countries	106	24	30	24	28

Appendix Table G.2. Full result for **Table 3.5**. Specification 3.

	All countries	Low	Lower-middle	Upper-middle	High
GDP per capita	0.615***	0.976***	1.708**	0.594***	1.212
(log)	(0.109)	(0.342)	(0.733)	(0.066)	(0.833)
Average age	-0.059	-0.256*	-0.335	0.373	0.019
	(0.072)	(0.126)	(0.206)	(0.237)	(0.080)
Average age-squared	0.081	0.403***	0.320	-0.258	-0.033
	(0.066)	(0.141)	(0.217)	(0.218)	(0.070)
Share of women	-2.536	-8.671***	1.759	-6.934*	-0.322
	(2.160)	(3.052)	(4.447)	(3.882)	(3.493)
Constant	1.824	4.477	-3.363	-6.644	-6.063
	(2.111)	(3.148)	(8.783)	(6.039)	(10.319)
R^2	0.903	0.704	0.785	0.857	0.887
Observations	1131	256	321	255	299
Countries	106	24	30	24	28

Appendix Table G.3. Full result for **Table 3.5**. Specification 4*a*.

	All countries	Low	Lower-middle	Upper-middle	High
GDP per capita	0.591***	0.822***	1.324*	0.593***	0.701
(log)	(0.069)	(0.291)	(0.719)	(0.040)	(0.743)
Average age	-0.110*	-0.256*	-0.304	0.196	-0.063
	(0.066)	(0.138)	(0.196)	(0.162)	(0.095)
Average age-squared	0.119*	0.412***	0.285	-0.132	0.034
	(0.061)	(0.146)	(0.208)	(0.153)	(0.080)
Share of women	-2.777	-9.855***	0.007	-7.960*	1.534
	(1.942)	(2.850)	(4.294)	(4.409)	(2.578)
Unemployed share	-4.307***	-2.378	-4.519**	-6.086***	-3.378**
	(0.866)	(1.705)	(1.713)	(1.577)	(1.421)
Degree share	0.257	5.154	-0.514	1.630	0.835
	(0.740)	(3.106)	(1.138)	(1.436)	(0.681)
Married share	0.025	-0.465	-0.891	0.402	0.854
	(0.381)	(1.287)	(0.524)	(0.871)	(0.644)
Health problems share	-0.554	-1.102	0.168	0.156	-1.269**
	(0.514)	(0.715)	(1.057)	(0.899)	(0.553)
Constant	3.804**	6.761**	1.374	-0.725	0.347
	(1.846)	(3.075)	(8.645)	(4.387)	(9.627)
R^2	0.910	0.720	0.801	0.881	0.898
Observations	1131	256	321	255	299
Countries	106	24	30	24	28

Appendix Table G.4. Full result for **Table 3.5**. Specification 4*b*.

	All countries	Low	Lower-middle	Upper-middle	High
GDP per capita	0.607***	0.818**	2.337***	0.588***	0.574
(log)	(0.077)	(0.353)	(0.569)	(0.038)	(0.549)
Average age	-0.068	-0.260*	-0.162	0.159	-0.034
	(0.075)	(0.145)	(0.239)	(0.146)	(0.106)
Average age-squared	0.095	0.416**	0.164	-0.083	0.004
	(0.069)	(0.158)	(0.244)	(0.132)	(0.092)
Share of women	-4.459**	-9.702***	0.359	-9.023*	3.835
	(2.050)	(2.956)	(4.396)	(4.444)	(2.979)
Unemployed share	-4.124***	-2.368	-2.523	-5.867***	-4.605***
	(0.949)	(1.793)	(1.532)	(1.621)	(1.565)
Degree share	0.487	5.722*	-0.340	1.894	0.386
	(0.723)	(3.220)	(1.225)	(1.555)	(0.828)
Married share	0.036	-0.380	-1.002	0.690	0.366
	(0.424)	(1.376)	(0.679)	(0.877)	(0.665)
Health problems share	-0.288	-0.581	0.182	0.618	-0.469
	(0.531)	(0.632)	(1.134)	(1.013)	(0.599)
Constant	3.437*	6.577*	-13.188	0.201	0.279
	(1.871)	(3.318)	(7.868)	(4.008)	(7.569)
R^2	0.916	0.714	0.821	0.887	0.926
Observations	1000	245	271	233	251
Countries	101	24	26	23	28

Appendix Table G.5. Full result for **Table 3.5**. Specification 5.

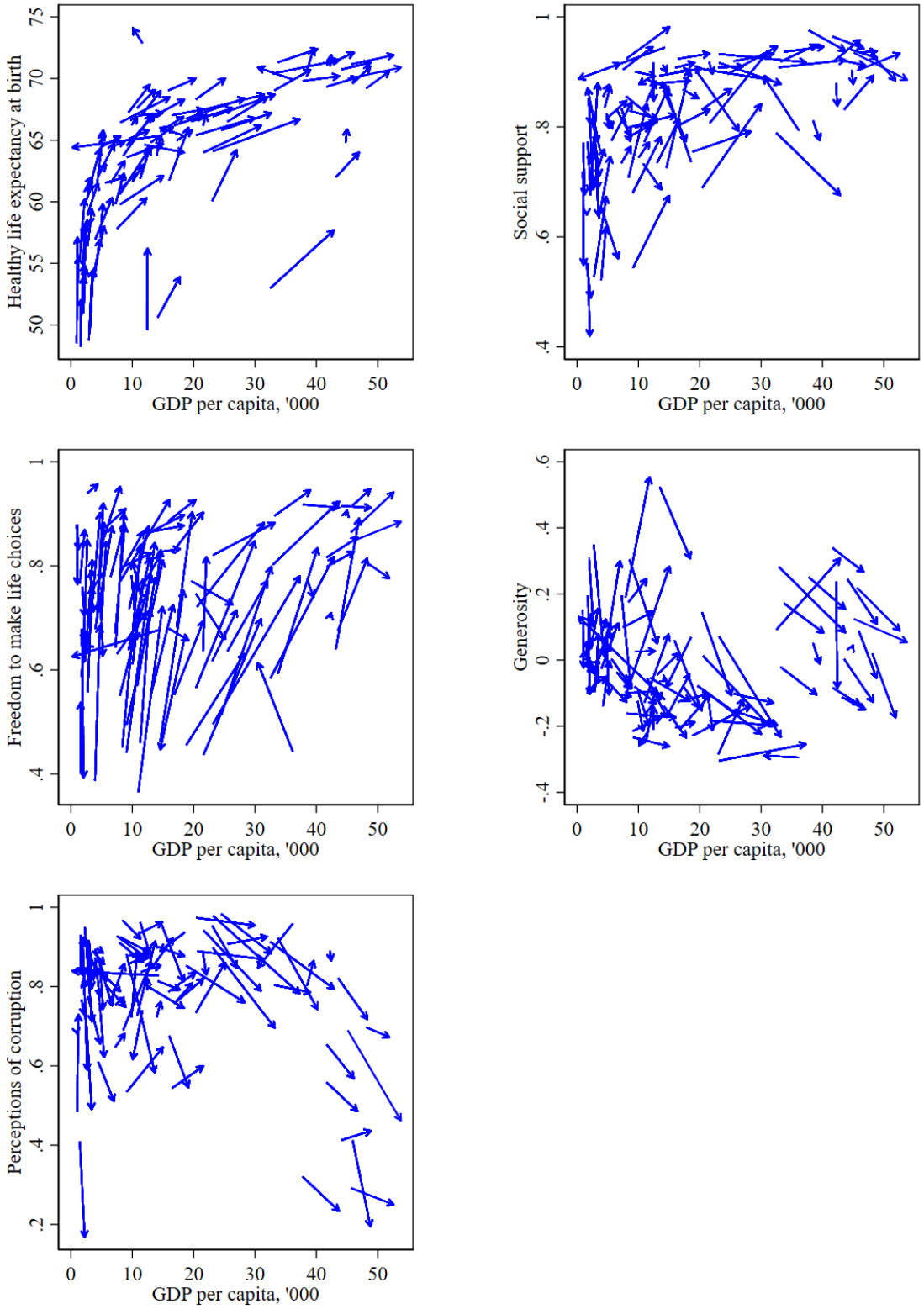
	All countries	Low	Lower-middle	Upper-middle	High
GDP per capita	0.568***	1.085**	2.339***	0.373***	0.268
(log)	(0.083)	(0.453)	(0.611)	(0.093)	(0.448)
Average age	-0.107	-0.439***	-0.145	0.082	-0.086
	(0.070)	(0.145)	(0.183)	(0.111)	(0.090)
Average age-squared	0.118*	0.590***	0.144	-0.056	0.043
	(0.065)	(0.162)	(0.188)	(0.101)	(0.077)
Share of women	-4.476**	-8.966***	0.175	-5.397**	1.449
	(1.729)	(2.610)	(3.679)	(2.373)	(2.591)
Unemployed share	-3.374***	-1.919	-1.161	-4.499***	-3.692***
	(0.893)	(1.795)	(1.364)	(1.395)	(1.056)
Degree share	0.277	4.036	-0.647	1.016	0.102
	(0.655)	(3.163)	(1.017)	(1.302)	(0.689)
Married share	0.007	-0.561	-1.092*	0.378	0.736
	(0.418)	(1.206)	(0.536)	(0.635)	(0.589)
Health problems share	0.312	0.259	0.886	-0.874	-0.214
	(0.503)	(0.738)	(1.055)	(0.864)	(0.701)
Social support	1.925***	0.889	2.553**	3.071***	1.974***
	(0.449)	(0.767)	(0.982)	(0.791)	(0.589)
Healthy life expectancy at birth	-0.027	-0.137*	0.042	0.040	0.033
	(0.036)	(0.069)	(0.064)	(0.050)	(0.083)
Freedom to make life choices	0.633**	0.235	0.331	1.916**	1.618**
	(0.299)	(0.424)	(0.444)	(0.749)	(0.601)
Generosity	0.431	0.670	0.253	0.084	-0.258
	(0.260)	(0.513)	(0.517)	(0.398)	(0.347)
Perceptions of corruption	-0.736**	-0.526	-1.094**	-1.239*	-0.606
	(0.307)	(0.625)	(0.423)	(0.604)	(0.483)
Constant	4.546*	13.933***	-17.496*	-2.032	1.284
	(2.404)	(3.983)	(8.709)	(4.042)	(6.863)
R^2	0.925	0.741	0.845	0.919	0.939
Observations	1000	245	271	233	251
Countries	101	24	26	23	28

Appendix Table G.6. Extension of Table 3.5 with specifications that add one WHR variable at a time.

	All countries	Low	Lower-middle	Upper-middle	High
Specification 4*b*: All demographic controls, countries with WHR information					
GDP per capita (log)	0.618***	0.890**	1.877**	0.553***	1.209
	(0.106)	(0.322)	(0.765)	(0.060)	(0.787)
Specification 4*b* + Social support					
GDP per capita (log)	0.578***	0.904**	2.265***	0.513***	0.762
	(0.079)	(0.361)	(0.541)	(0.033)	(0.556)
+ Healthy life expectancy at birth					
GDP per capita (log)	0.585***	1.126**	2.287***	0.485***	0.673
	(0.084)	(0.434)	(0.573)	(0.059)	(0.535)
+ Freedom to make life choices					
GDP per capita (log)	0.535***	1.083**	2.213***	0.369***	0.532
	(0.079)	(0.431)	(0.607)	(0.062)	(0.386)
+ Generosity					
GDP per capita (log)	0.576***	1.081**	2.262***	0.373***	0.476
	(0.082)	(0.442)	(0.607)	(0.089)	(0.427)
+ Perceptions of corruption: Specification 5					
GDP per capita (log)	0.568***	1.085**	2.339***	0.373***	0.268
	(0.083)	(0.453)	(0.611)	(0.093)	(0.448)
Observations	1000	245	271	233	251
Countries	101	24	26	23	28

Notes: Specifications 4 to 5 are panel regressions with country and year FEs. The controls in Specification 4 are country-year age, age-squared, the share of women, unemployed, degree holders, married or partnered respondents and the share of respondents who reported health problems. Specification 5 includes the controls from Specification 4 and WHR variables (Social support, Healthy life expectancy at birth, Freedom to make life choices, Generosity, Perceptions of corruption, Confidence in national government). Standard errors in parentheses are clustered at the country level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Appendix Figure G.1. The relationship between the change in the WHR variables and GDP per capita growth: first to last observation over the 2009-2019 period. Bottom 90% of the global GDP per capita distribution.



Appendix Table G.7. Country panel. Literature

Author	Outcome measure	Income measure	Controls	Data	Coefficient
Sacks *et al.* (2010)	Standardised: Ladder Question (GWP), Life satisfaction (EB) [Comparable coefficients]	Log of per capita GDP	No controls	World Values Survey and Eurobarometer (until 2007)	WVS: 0.51 [1.16] EB: 0.17 [0.49]

Notes: The standard deviations of country-average wellbeing scores used in Sacks *et al.* (2010) are 0.49 in the WVS, 0.39 in EB and 0.47 in Gallup. The SD for WVS and EB scores are retrieved from the data kindly provided by Daniel Sacks. The SD of the scores in Gallup are estimated using the data over the comparable period.
The comparable coefficients are those from the analysis of the country-level averages of standardised scores, divided by the SD of country-level averages of standardised scores and multiplied by the SD of country-level averages of non-standardised scores. The coefficients are comparable with the results presented in the paper.

Appendix H. The WHR-5 Variables: Mediation and Confounding

Introducing the WHR-5 variables in column (5) of Table 3.3 sharply reduces the estimated coefficient on GDP from that in column (4*b*). Which of these two estimated coefficients should we prefer? The answer depends on the causal relationship between the WHR-5 variables and income. Take, for example, the variable Freedom to make life choices, which we call F below. There are two possible causal relationships.

i) F is a mechanism. In this case GDP → F → H. Freedom is one of the reasons why higher income brings greater wellbeing. Controlling for F turns this mechanism off, and produces an (incorrect) smaller estimated coefficient on GDP.

ii) F is a confounder. Greater freedom makes economies more productive, and individuals value freedom independently of its effect on income.

In this case, part of the correlation between GDP and happiness reflects the independent contribution of freedom. Controlling for F in the regression addresses this confounding and produces the correct correlation between GDP and H.

Controlling for freedom in case i) will underestimate the true correlation between happiness and GDP, while in case ii) it will produce the correct correlation.

Our first WHR-5 variable is social support, which is measured as having relatives or friends to count on for help. The direction of correlation here is unclear. While richer countries have more developed formal support systems (and therefore rely less on informal support), the question here refers to the *availability* of informal support rather than its use. Nevertheless, the greater mobility in rich countries may reduce the availability of friendship networks. Regarding confounding, informal support networks may contribute to economic growth via their effects on health and consumption (as emphasised for formal social support in Barr (2004)).

It should be noted that the confounding relationship here is based on a positive relationship between social support and GDP, while the mediation analysis rather suggests a negative relationship. In the latter case, holding social support constant should increase the estimated coefficient on GDP. That the estimated coefficient actually falls in Table 3.3 with the introduction of social support is more consistent with social support being a confounder.

The second variable is healthy life expectancy. Here there is an obvious bi-directional relationship, with richer countries being able to afford better healthcare, and at the same time a healthier workforce being more productive.

With respect to freedom, the institutions that protect individual freedoms have been shown to be a catalyst for economic growth, as argued by Acemoglu *et al*. (2001). Conversely, Glaeser *et al*. (2004) suggest that economic growth can enhance institutional quality, leading to a virtuous cycle where growth and freedoms reinforce each other. Again, both mediation and confounding are possible.

Existing literature has underlined that social capital can affect economic growth (Helliwell and Putnam, 1995, and Zak and Knack, 2001). One element of social capital is generosity towards others. In the World Happiness Report, as noted in Table A.5, generosity is defined as the residual from a regression of having donated money to a charity in the past month on log GDP

per capita. As such it is already corrected for GDP, and perhaps unsurprisingly its inclusion in the regression does not change the estimated GDP per capita coefficient in Appendix Table D.9.

The last WHR-5 variable is perceptions of corruption. There is a well-established link between corruption and economic development: see Svensson (2005) for a comprehensive review of the literature and World Bank (1997) for early empirical evidence. Empirical work provides support for causation in both directions: economic development can reduce corruption (Treisman, 2000), while higher perceived corruption can decrease investment and hinder growth (Mauro, 1995, and Treisman, 2000).

A useful recent summary of the links between a variety of institutions and life satisfaction appears in Berggren and Bjørnskov (2023).

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