DISCUSSION PAPER SERIES

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ABSTRACT

Explaining Happiness Trends in Europe*

In Europe differences among countries in the overall change in happiness since the early 1980s have been due chiefly to the generosity of welfare state programs— increasing happiness going with increasing generosity and declining happiness with declining generosity. This is the principal conclusion from a time series study of ten Northern, Western, and Southern European countries with the requisite data. In the present study cross-section analysis of recent data gives a misleading impression that economic growth, social capital, and / or quality of the environment are driving happiness trends, but in the long-term time-series data these variables have no relation to happiness. *Significance*: Over the past five decades happiness has emerged as a subject of social science research and a potential goal of public policy. But how can a country's happiness be increased? On this, there is a conflict between a number of policy alternatives – promote economic growth, increase social capital, improve the environment, expand welfare state programs. Each of these has point-of-time (cross-section) evidence supporting its claim, but there are very few long-term time-series studies. This article presents newly available time-series evidence that supports the importance of welfare state policies.

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Introduction

What principally determines long-run changes in a country's well-being? The answer typically advanced by economists is economic growth (1). A runner-up, pioneered by sociologist Robert Putnam, is social capital (2). A third, favored by political scientists, is welfare state policies (3). A more recent entry promoted by ecologists is quality of the environment (4). The evidence offered in support of these conclusions is typically based on point-of-time (*cross-section*) data relating happiness to the favored variable (5).

This article presents a test of these arguments with *time-series* data covering 1981-82 to 2017-18 for ten major Northern, Western, and Southern European countries for which newly-published longitudinal data on the generosity of welfare state polices have recently become available (6).

Variables and Method

Well-being, the dependent variable, is measured here by answers to the question in the European Values Study (EVS) "All things considered, how satisfied are you with your life as a whole these days?," with integer response options from 1(=Dissatisfied) to 10 (= Satisfied). The earliest EVS survey was in 1981-82; the most recent, 2017-18, providing a time span of 36-37 years for the study of long-run change in a country's well-being or, as we shall call it here, for simplicity, happiness. The EVS is chosen in preference to the Eurobarometer, because the country coverage in early years is better, and the Eurobarometer surveys only Europeans and thus omits the growing share of non-Europeans in the total population, as much as 15 per cent or more in recent years in some countries.

Our independent variables comprise four possible determinants of happiness — 1) economic conditions, indexed here by two measures, real GDP per capita and the unemployment rate; 2) social capital, as commonly measured by responses to a query on "trust in others;" 3) government welfare policies, as approximated by two summary measures, the generosity of social welfare programs and government spending on such programs; and, finally, 4) quality of the environment, as reflected in air pollution

exposure, PM 2.5, which measures fine particulate matter that poses the greatest risk to health. A limitation of air pollution data is that they typically become available in 1990 and do not directly correspond with the full period; however, we supplement the time-series analysis with fixed-effects analysis that exploits multiple corresponding periods as discussed below.

The generosity measure covers three types of social welfare programs — unemployment insurance, pensions, and sickness insurance. It is distinct from spending measures; it depends upon *policies*, on the *rights* to benefits. Developed by Lyle Scruggs (7), it is based on detailed and painstaking study of the legislation and regulations relating to each of these social insurance programs in each country. Generosity increases with program characteristics such as a higher benefit replacement rate (the ratio of the after-tax cash benefit to after-tax wages), longer duration of benefits, and greater ease of qualification. Based on such characteristics a generosity index is developed for each of the three programs, and these indexes are then combined to obtain a total generosity index, the measure used here (8). A limitation of the Scruggs generosity index is that it does not cover all types of social welfare programs.

Changes in the generosity index can affect the happiness of a person whether or not that person actually collects benefits. Employed persons, for example, are not collecting unemployment insurance, but knowing that such support is available if they lose their jobs removes a source of anxiety and makes them happier (9).

Our second, but less-preferred, measure of welfare programs is government spending on such programs. Although useful for some purposes, spending measures can be misleading with regard to happiness effects. Spending can increase without any change in policy or effect on happiness simply because of an increase in the number of persons collecting the benefit (e.g., more unemployed, or more retirees). We try to control for such influences by using a social spending measure that controls for the unemployment rate and percentage of people over age 65.

Our statistical procedure is simple. First we compute for each country the overall change between 1981-82 and 2017-18 in happiness and each of the variables described

above and explore via regression analysis which factors are most closely linked to the change in happiness over the 36-year period. Fixed-effects regressions are then run to test the robustness of our results. Finally, we demonstrate that point-of-time (cross-section) analysis of the current data gives a misleading impression of each determinant's importance and suggest why this is so. The basic data are given in Supplementary Material Table S1.

Results

The change in happiness over the 36 years since 1981-82 varied considerably among the ten countries. At one extreme was Spain where, on a scale of 1-10, happiness increased by close to a full point. On the other, were Denmark and Sweden with decreases of about a third of a point (Figure 1).

Figure 1. Change in Life Satisfaction, by Country, 1981-82 to 2017-18
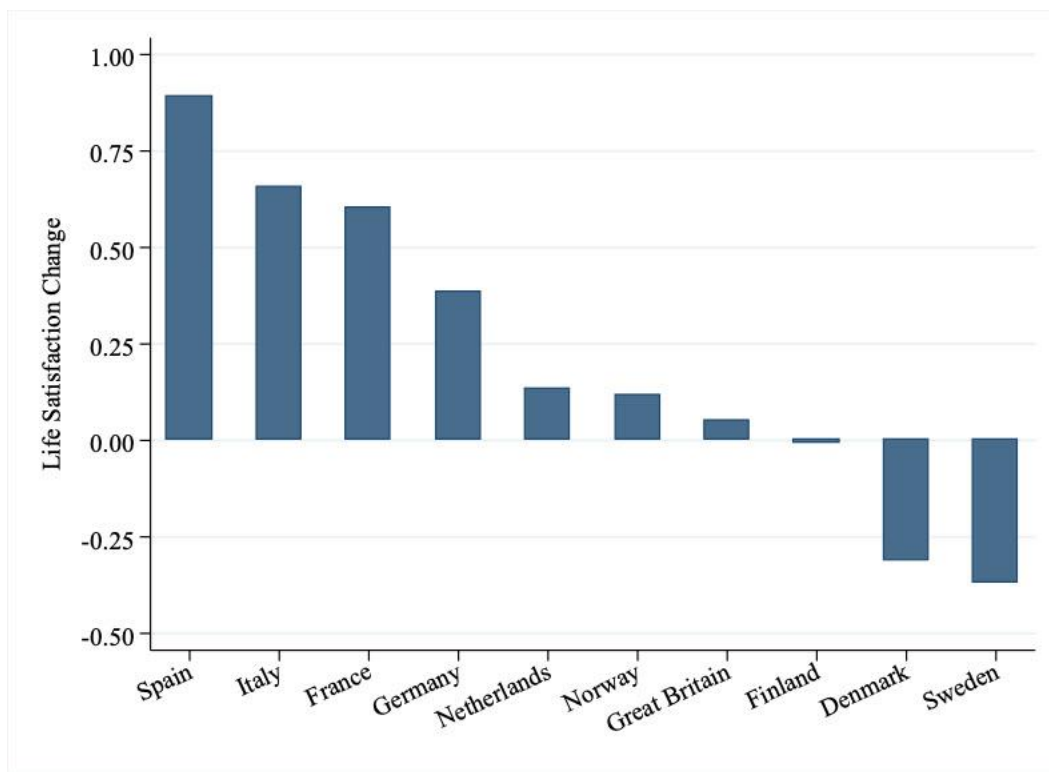
Source: EVS Waves 1 and 5 (12), and for Finland 1981, World Values Survey Wave 1 (13).

The question of interest here is which of our independent variables, if any, is most associated with differences in the change of happiness—economic conditions, social capital, welfare state programs, and/or quality of the environment.

The answer, based on regression analysis, is the generosity of welfare state programs—increases in generosity going with increases in happiness, and decreases, with reduced happiness. If one compares the regression coefficients from bivariate regressions of the change in happiness on the change in each of the independent variables, only the coefficient in the happiness-generosity regression is significant, $p < 0.05$ (Table 1, row 1). Typically, in Spain and other countries with a sizeable growth in happiness, the generosity of welfare programs increased substantially, while in Sweden and Denmark, where happiness decreased there was a substantial pull back.

Table 1. Bivariate Regression Coefficient of Life Satisfaction on Specified Independent Variable

Independent Variable

Model	Generosity	Soc. Exp. Adj.	ln(GDPpc)	Unempl.	Trust	Air Pollution
TS	0.051**	0.047	0.294	0.027	-2.167	0.352
	(0.046)	(0.186)	(0.694)	(0.466)	(0.104)	(0.938)
FE	0.033*	0.038	0.859	-0.010	0.221	-0.052
	(0.072)	(0.133)	(0.158)	(0.578)	(0.754)	(0.493)
CS	0.019	0.022	1.379***	-0.034*	1.273***	-0.050**
	(0.237)	(0.424)	(0.004)	(0.058)	(0.000)	(0.012)

Number of observations: 10 in TS and CS regressions, and 49 in FE regressions; p-values in parentheses; Standard errors are robust in the TS and CS regressions and clustered by country in the FE regressions.
* $p<0.10$ ** $p<0.5$ *** $p<0.01$

TS: time-series regression of the variable changes from 1981-82 to 2017-18, except GDPpc and Air pollution, which use the ratio of end of period divided by beginning of period values.
FE: fixed effects regression of the full sample from 1981-2018; includes fixed effects by country (i.e., country dummies) and wave dummies. Variable values are in levels. GDPpc uses the natural log of GDPpc.
CS: cross section, EVS wave 5, 2017-18. Variable values are in levels. GDPpc uses the natural log of GDPpc.

Each entry in this table is the regression coefficient from a bivariate regression of life satisfaction on the specified variable. The basic data are in Supplementary Table S1; the full statistics for each regression are given in the Supplementary Information Tables S2 and S3, which also includes 2017-18 regression results when the number of observations is 13, i.e. includes all countries for which there are end-of-period Generosity data, and FE regressions including all independent variables simultaneously (excluding Soc. Exp. Adj.).

Sources: See Materials and Methods.

To test the robustness of this result we ran a set of fixed-effects regressions on the pooled observations from all five EVS surveys. The results confirm that generosity is the key variable linked to happiness changes—it remains the only significant variable, though now significance drops to the next lower level, $p<0.10$ (Table 1, row 2). The estimated relations are interpreted similarly to the time-series relations. As is well known, fixed-effects regressions include dummy variables for each country and yield relations for within-country changes in the variables over time. The main differences from the

estimation technique in row 1 is the period of change and number of observations. The row 1 results apply to changes over approximately 36 years, while the fixed-effects relations apply to multiple periods of approximately nine years (10). The total observations in the fixed-effects regressions is 49 (Norway was not surveyed in EVS wave 3).

Cross-section analysis gives a misguided answer as to the variables linked to the trends in happiness. A set of regressions with wave 5 data (2017-18) point to the importance of all of the other variables – economic conditions, social capital, and quality of the environment (Table 1, row 3). GDP per capita and trust in others especially have highly significant bivariate relationships with happiness. On the other hand, welfare state programs are only significant in an expanded sample of 13 countries, shown in Table S3 in the Supplementary Material.

Further analysis shows broadly consistent results. Two regressions that included all independent variables simultaneously (excluding social expenditures) were run using the fixed-effects model. Generosity maintains nearly the exact same relationship, as shown in Supplementary Material Table S2. This analysis could only be performed using the fixed-effects sample, because of the small number of observations in the time-series and cross-section samples. However, for each model we were able to perform separate tri-variate regressions that pair the other control variables one-by-one with generosity. The results indicate generosity is generally significant in the time-series and fixed-effects regressions and insignificant in the cross-sectional regressions, presented in Supplementary Material Table S4. Of the eight additional tri-variate time-series and fixed-effects regressions, there is only one exception, specifically the times-series regression pairing generosity with trust, and even in this case, the magnitude on generosity is fairly similar.

Across all time-series and fixed-effects regressions, generosity is the only variable for which we find a significant relationship with the trend in happiness, which strongly suggests it is relatively more important than the other prominently discussed variables. The magnitude is not small either. A one standard deviation increase in the long-run

change in generosity is associated with a 0.26-point increase in life satisfaction, based on a standard deviation of 5.14 (Suppl. Mat. Table S1) and a coefficient of 0.051 (Table 1). This standard deviation is similar to the increase of generosity in Italy, which experienced a 0.66-point increase in life satisfaction.

Discussion

The present results suggest the importance of the generosity of welfare state programs in determining happiness trends. The results are based on a limited set of European countries, the only ones with sufficient long-period data, but provide informative results nonetheless. In the present analysis cross-section regressions give almost diametrically opposite results to the time series. In the time-series results, changes in generosity better predict changes in happiness than economic conditions, social capital, and air quality. Generous welfare programs are the apparent key to happiness.

It is likely that the cross-section regression result pointing to GDP as a prime mover of happiness, and possibly the other significant cross-section variables, is a statistical artifact. Long-term increases in GDP per capita are the product of economic growth; in happiness, of welfare state policies. There is a century or more difference in the onset of economic growth and the start of the adoption of welfare state policies, which suggests a lack of causal connection between the two. But the two share in common a very similar pattern of geographic diffusion – starting in Northern and Western Europe and spreading from there southward and eastward across the face of Europe and then throughout the world. Hence, essentially the same set of countries — the leaders — are currently high on both GDP per capita and happiness, and the same, though different set of countries — the followers – are low. Consequently, in a current point-of-time regression based on country observations, a significant positive correlation between GDP per capita and happiness emerges. This positive cross-section association, however, may not be due to a causal connection, but to a similar pattern of geographic diffusion leading to a similar ordering of countries on both variables (11). This geographic pattern of diffusion is common to many historical phenomena in the epoch of modern economic growth. In

contrast, time-series analyses are not subject to the same statistical artifact. Because time-series studies assess changes within a country, they abstract from historical influences that are reflected in fixed-differences between countries. Clearly, more time-series rather than cross-section studies are needed.

Materials and Methods

The data sources and adjustments made, if any, are as follows.

Life satisfaction is obtained from the European Values Study (12). For Finland in wave 1 these data were supplemented with World Values Survey data (13).

The Generosity Index was obtained from the Comparative Welfare Entitlements Project (7). Generosity in Spain is extrapolated from 1985 back to 1982 using an earlier version of the data (14).

Social protection expenditures as percent of GDP are based on the series for General Government from the International Monetary Fund (15) and extended using data from the International Labor Organization (16), Organization for Economic Cooperation and Development (OECD) (17), and other IMF series (Central Government including social security funds). They have also been adjusted to exclude the influence of the unemployment rate and elderly population using data from the World Development Indicators (18). Social expenditures for Germany, Greece, Netherlands, and Sweden start from 1985.

GDP per capita is based on the Penn World Tables (19) and then extended forward and backward as needed using real GDP per capita growth rates from World Development Indicators (18) and Maddison (20).

Unemployment is the percentage of the labor force seeking work. The variable is based on national estimates that are reported in the World Development Indicators (18) and extended forward or backward as needed using the International Labor Organization estimates that are also reported in the World Development Indicators. The 1981-82 figure for Germany uses the reported value in 1983.

Trust is the proportion of respondents that replied most people can be trusted, in response to the question "Generally speaking would you say that most people can be trusted or that you can't be too careful in dealing with people?". Responses are obtained from the same surveys used for Life Satisfaction (12)(13).

Air pollution exposure is PM2.5, fine particulate matter that poses the greatest risk to health: mean annual exposure, micrograms per cubic meter. The data are obtained from the World Development Indicators for the period 1990 to 2017. Missing years were linearly interpolated within country and the values for 2017 were used for 2018 when necessary (18).

References

1. A. Deaton, Income, Health, and Well-being around the World, *Jour. Econ. Persp*.,22(2), 53-72(2008).

2. J. F. Helliwell, R. D. Putnam, The Social Context of Well-being, *Phil. Trans. R. Soc. Lond. B, 359*, 1435-1446 (2004).

3. A. Pacek, B. Radcliffe, Welfare Policy and Subjective Well-Being Across Nations: An Individual Level Analysis, *Soc. Ind. Res*., 89, 179-191 (2007).

4. H. Welsch, Environment and Happiness: Valuation of Air Pollution Exposure Using Life Satisfaction Data, *Ecological Econ*., 58(4), 801-813 (2006).

5. While most of the early empirical studies in the happiness literature have been cross-sectional (see note 11), there are a growing number of time-series and causal studies. For related time-series studies, see: 1) on economic growth, R. A. Easterlin and K. J. O'Connor, The Easterlin Paradox, in Handbook of Labor, Human Resources and Population Economics. Edited by Klaus F. Zimmermann. Switzerland: Springer Nature (2022), and references therein; 2) on social capital, S. Bartolini, F. Sarracino, Happy for how long? How social capital and economic growth relate to happiness over time. *Ecological Econ* 108:242–256 (2014); and 3) on environmental conditions, H. Welsch,

Environment and Happiness: Valuation of Air Pollution Exposure Using Life Satisfaction Data, *Ecological Econ*. 58(4), 801-813 (2006). For a list of generally causal relations, see Table 1 of P Frijters, A. E. Clark, C. Krekel, R. Layard, A happy choice: wellbeing as the goal of government, *Behav Public Policy*, 1-40 (2020). Note, however, that causal studies typically assess shorter periods in particular contexts and therefore have limited generalizability. In both types of studies, time-series and causal, there are very few that assess the role of welfare state *policies*. One time-series study that assesses welfare state expenditures, not policies, is: F. Sarracino, K. J. O'Connor, Economic growth and well-being beyond the Easterlin paradox, in *A Modern Guide to the Economics of Happiness*. Edited by Luigino Bruni, Alessandra Smerilli, and Dalila De Rosa. Edward Elgar (2021).

6. L. A. Scruggs, G. Ramalho Tafoya, Fifty Years of Welfare State Generosity, *Soc. Pol. & Admin*., 1-17 (2022). Available at https://doi.org/10.1111/spol.12804

7. L.A. Scruggs, The Generosity of Social Insurance, 1971-2002, *Oxford Rev. Econ. Pol*. 22(3), 349-364 (2006); and Comparative Welfare Entitlements Project Data Set-Version 2022-01 (2022). Available at http://cwep.us/

8. For details of index construction see fn. 6 above.

9. R. Di Tella, R. J. MacCulloch, A. J. Oswald, The Macroeconomics of Happiness, *Rev. Econ. & Stat*. 85 (4), 809-827 (2003).

10. Nine years is too short to capture long-run trends. Short periods are more likely to be dominated by short-run fluctuations that reflect only a portion of the business cycle. Whereas longer periods are more likely to include both economic expansion and contraction. See the following for a discussion of the differences between long- and short- run relations: R. A. Easterlin and K. J. O'Connor, The Easterlin Paradox, in Handbook of Labor, Human Resources and Population Economics. Edited by Klaus F. Zimmermann. Switzerland: Springer Nature (2022).

11. R. A. Easterlin, Cross Sections Are History, *Pop. Dev. Rev*. 38, 302-308 (2012).

12. EVS, European Values Study Longitudinal Data File 1981-2008 (EVS 1981-2008). GESIS Data Archive, Cologne. ZA4804 Data file Version 3.0.0, doi:10.4232/1.12253

(2015); and EVS, European Values Study 2017: Integrated Dataset (EVS 2017). GESIS Data Archive, Cologne. ZA7500 Data file Version 3.0.0, doi:10.4232/1.13511 (2020).

13. R. Inglehart, C. Haerpfer, A. Moreno, C. Welzel, K. Kizilova, J. Diez-Medrano, M. Lagos, P. Norris, E. Ponarin and B. Puranen et al. (eds.). World Values Survey (2018).

14. L. A. Scruggs, D. Jahn, and K. Kuitto, Comparative Welfare Entitlements Dataset 2. Version 2017-09, University of Connecticut & University of Greifswald (2017).

15. International Monetary Fund, Government Finance Statistics (GFS), Expenditure by Function of Government, updated June 27, 2020 (2020). Available at https://data.imf.org/.

16. International Labor Organization, Table B.16. Public social protection expenditure, 1995 to latest available year (percentage of GDP) (2014). Available at http://www.social-protection.org/gimi/gess/RessourceDownload.action?ressource.ressourceId=54614.

17. OECD, Social Expenditure - Aggregated data. Accessed October 2018 (2018). Available at https://stats.oecd.org/Index.aspx?DataSetCode=SOCX_AGG#.

18. World Bank, World Development Indicators, (2020). Available at https://datatopics.worldbank.org/world-development-indicators/.

18. Feenstra, Robert C., Robert Inklaar, and Marcel P. Timmer. 2015. "The Next Generation of the Penn World." American Economic Review 105 (10): 3150–82. www.ggdc.net/pwt.

20. J. Bolt, R. Inklaar, H. de Jong, and J. L. van Zanden, Maddison Project Database, Version 2018 (2018). Available at https://www.rug.nl/ggdc/historicaldevelopment/maddison/research.

Supplementary Information for
Explaining Happiness Trends in Europe

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Table S1. Basic data for specified variable, 1981-82 and 2017-18

Country	Life Satisfaction			Generosity			Social Expenditures (Adj)			GDPpc			Unemployment		
	1981-82	2017-18	Change	1981-82	2017-18	Change	1980, 1985	2017-18	Change	1981-82	2017-18	Ratio	1981-82	2017-18	Change
Austria		7.87		32.60	37.74	5.14	8.70	9.31	0.60	18317	52515	2.87	2.06	4.85	2.79
Denmark	8.21	7.90	-0.31	41.41	33.82	-7.59	9.07	10.53	1.46	21906	49607	2.26	9.20	5.83	-3.37
Finland	7.91	7.90	-0.01	26.74	33.99	7.26	7.47	11.05	3.58	19826	42902	2.16	5.04	8.64	3.60
France	6.66	7.26	0.60	33.52	35.93	2.41	6.38	10.61	4.23	22084	41646	1.89	7.54	9.02	1.48
Germany	7.25	7.63	0.39	35.06	33.83	-1.23	8.25	7.67	-0.58	19668	49141	2.50	6.45	3.75	-2.70
Great Britain	7.66	7.71	0.05	28.04	26.16	-1.89	2.16	4.49	2.33	19201	42445	2.21	10.40	4.00	-6.40
Greece		6.17			23.81		2.81	2.22	-0.59	13912	25376	1.82	3.42	21.49	18.07
Italy	6.62	7.28	0.66	25.49	30.78	5.29	3.60	6.04	2.44	19588	39862	2.03	8.28	10.61	2.33
Netherlands	7.70	7.84	0.13	40.18	37.97	-2.21	9.27	4.93	-4.34	23022	50024	2.17	7.92	4.84	-3.08
Norway	7.89	8.01	0.12	41.77	45.14	3.37	4.96	9.42	4.46	24191	58435	2.42	1.70	3.80	2.10
Spain	6.60	7.49	0.89	32.70	36.33	3.62	0.18	2.02	1.85	13535	37233	2.75	14.17	17.22	3.05
Sweden	8.01	7.64	-0.37	45.86	36.52	-9.34	11.57	7.49	-4.08	21335	47892	2.24	3.14	6.72	3.58
Switzerland		8.02		35.91	36.89	0.98	1.33	2.51	1.18	31417	62927	2.00	0.20	4.80	4.60
Summary for 10 sample countries (excluding Austria, Greece, and Switzerland)															
Mean	7.45	7.67	0.22	35.08	35.05	-0.03	6.29	7.43	1.13	20436	45919	2.26	7.38	7.44	0.06
Standard Dev.	0.62	0.26	0.41	7.04	4.90	5.43	3.55	3.04	3.17	2931	6262	0.24	3.59	4.19	3.59

Country	Trust			PM 2.5 Air Pollution		
	1981-82	2017-18	Change	1990	2017-18	Ratio
Austria		0.50		16.87	12.48	0.74
Denmark	0.46	0.74	0.28	13.25	10.03	0.76
Finland	0.57	0.68	0.11	7.41	5.86	0.79
France	0.22	0.26	0.04	15.85	11.81	0.75
Germany	0.26	0.40	0.14	17.02	12.03	0.71
Great Britain	0.42	0.40	-0.02	13.51	10.47	0.78
Greece		0.08		20.64	16.22	0.79
Italy	0.25	0.27	0.02	21.32	16.75	0.79
Netherlands	0.38	0.59	0.21	16.47	12.03	0.73
Norway	0.56	0.72	0.16	9.00	6.96	0.77
Spain	0.32	0.41	0.09	12.21	9.70	0.79
Sweden	0.52	0.63	0.11	7.95	6.18	0.78
Switzerland		0.59		14.23	10.30	0.72
Summary for 10 sample countries (excluding Austria, Greece, and Switzerland)						
Mean	0.40	0.51	0.11	13.40	10.18	0.76
Standard Dev.	0.13	0.18	0.09	4.44	3.30	0.03

Source: see Materials and Methods Section

Table S2. Statistics for TS and FE Regressions of Life Satisfaction on Specified Explanatory Variable, EVS Waves 1 – 5

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
	TS	TS	TS	TS	TS	TS	FE	FE	FE	FE	FE	FE	FE	FE
Generosity	0.051**						0.033*						0.034**	0.030**
	(0.046)						(0.072)						(0.049)	(0.019)
Soc. Exp. Adj.		0.047						0.038						
		(0.186)						(0.133)						
GDPpc			0.294						0.859				0.677	0.825
			(0.694)						(0.158)				(0.261)	(0.109)
Unemployment				0.027						-0.010			-0.005	0.005
				(0.466)						(0.578)			(0.672)	(0.697)
Trust					-2.167						0.221		0.381	0.781
					(0.104)						(0.754)		(0.426)	(0.105)
Air Pollution						0.352						-0.052		-0.044
						(0.938)						(0.493)		(0.456)
Constant	0.217*	0.163	-0.451	0.214	0.461*	-0.054	6.431***	7.271***	-1.363	7.659***	7.469***	8.220***	-0.772	-1.886
	(0.070)	(0.245)	(0.791)	(0.148)	(0.072)	(0.987)	(0.000)	(0.000)	(0.820)	(0.000)	(0.000)	(0.000)	(0.900)	(0.712)
Wave Controls	-	-	-	-	-	-	yes	yes	yes	yes	yes	yes	yes	yes
Cntry Fixed Effects	-	-	-	-	-	-	yes	yes	yes	yes	yes	yes	yes	yes
Observations	10	10	10	10	10	10	49	49	49	49	49	39	49	39
R-squared	0.445	0.127	0.030	0.057	0.221	0.001	0.309	0.248	0.227	0.164	0.156	0.160	0.381	0.408

p-values in parentheses
* p<0.10 ** p<0.05 *** p<0.01

TS: time-series regression of changes in life satisfaction on the changes from 1981-82 to 2017-18. GDPpc and Air Pollution are not in changes but ratios of ending to beginning of period values. Standard errors are robust.

FE: fixed effects regression of the full sample from 1981-2018. GDPpc is the natural log of GDPpc. Standard errors are clustered by country. There are 10 fewer observations in columns 12 and 14 because air pollution data become available in 1990.

Sources: See Materials and Methods

Table S3. Statistics for Cross-section Regressions of Life Satisfaction on Specified Explanatory Variable, EVS Wave 5

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	CS	CS	CS	CS	CS	CS	CS	CS	CS	CS	CS	CS
Generosity	0.019						0.062*					
	(0.237)						(0.076)					
Soc. Exp. Adj.		0.022						0.058				
		(0.424)						(0.303)				
ln(GDPpc)			1.379***						1.968***			
			(0.004)						(0.000)			
Unemployment				-0.034*						-0.075***		
				(0.058)						(0.009)		
Trust					1.273***						2.132***	
					(0.000)						(0.003)	
Air Pollution						-0.050**						-0.096*
						(0.012)						(0.059)
Constant	7.005***	7.499***	-7.126*	7.918***	7.016***	8.175***	5.456***	7.198***	13.500***	8.203***	6.564***	8.629***
	(0.000)	(0.000)	(0.094)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.004)	(0.000)	(0.000)	(0.000)
Observations	10	10	10	10	10	10	13	13	13	13	13	13
R-squared	0.129	0.070	0.513	0.304	0.819	0.409	0.455	0.153	0.825	0.694	0.741	0.416

P-values in parentheses

* p<0.10 ** p<0.5 *** p<0.01

Columns 1 to 6 use the sample of ten countries for which we have full time series data from 1981-82 to 2017-18. Whereas, columns 7 to12 use the full sample of countries for which we have requisite data on EVS life satisfaction and generosity.

Sources: See Materials and Methods

Table S4. Statistics for Tri-variate Regressions of Life Satisfaction on Specified Explanatory Variables

	(1) TS	(2) TS	(3) TS	(4) TS	(5) FE	(6) FE	(7) FE	(8) FE	(9) CS	(10) CS	(11) CS	(12) CS
Generosity	0.051*	0.053**	0.043	0.056**	0.032*	0.034*	0.036**	0.031*	-0.006	0.017*	-0.005	0.006
	(0.052)	(0.026)	(0.139)	(0.017)	(0.071)	(0.052)	(0.042)	(0.077)	(0.633)	(0.059)	(0.648)	(0.654)
Soc. Exp. Adj.												
GDPpc	0.331				0.783				1.520**			
	(0.555)				(0.129)				(0.035)			
Unemployment		-0.006				-0.012				-0.033**		
		(0.776)				(0.236)				(0.037)		
Trust			-1.076				0.662				1.336***	
			(0.315)				(0.125)				(0.000)	
Air Pollution				-3.116				-0.016				-0.046**
				(0.356)				(0.824)				(0.042)
Constant	-0.533	0.217*	0.339*	2.597	-1.668	6.518***	6.022***	6.696***	-8.417	7.299***	7.158***	7.929***
	(0.677)	(0.089)	(0.051)	(0.301)	(0.743)	(0.000)	(0.000)	(0.000)	(0.198)	(0.000)	(0.000)	(0.000)
Wave Controls	-	-	-	-	yes	yes	yes	yes	-	-	-	-
Cntry Fixed Effects	-	-	-	-	yes	yes	yes	yes	-	-	-	-
Observations	10	10	10	10	49	49	49	39	10	10	10	10
R-squared	0.483	0.447	0.490	0.486	0.370	0.324	0.331	0.266	0.522	0.414	0.826	0.420

p-values in parentheses

* p<0.10 ** p<0.05 *** p<0.01

TS: time-series regression of changes in life satisfaction on the changes from 1981-82 to 2017-18. GDPpc and Air Pollution are not in changes but ratios of ending to beginning of period values. Standard errors are robust.

FE: fixed effects regression of the full sample from 1981-2018. GDPpc is the natural log of GDPpc. Standard errors are clustered by country. There are 10 fewer observations in column 8 because air pollution data become available in 1990.

CS: cross section, EVS wave 5, 2017-18. Variable values are in levels. GDPpc uses the natural log of GDPpc.

Sources: See Materials and Methods