

Analytical report on subjective well-being

2016 edition



**Analytical report on
subjective well-being** | 2016 edition

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Abstract

The analysis attempts to explain variations in subjective well-being using a range of variables included in Eurostat's Quality of Life framework and employing multivariate regression analysis as method. Three analytical models are used. The first one contains only socio-demographic variables (sex, age, citizenship, etc.), while in the second one objective variables (e.g.: income, health status) included in each dimension of the Quality of life framework are added, in order to test their impact. In the third model the effect of additional variables measuring subjective evaluations or perceptions (e.g. mental well-being, trust) is tested. The impact of different types of potential well-being drivers is therefore evaluated and described, while controlling for the effect of the others. The second part of the paper presents results of applying the models on different population subgroups (such as gender or particular age groups). A third section of the paper discusses the influences of country level variables (e.g.: inequality, level of economic development) on life satisfaction.

The final part presents country patterns of the most influential drivers that have been identified according to the models applied in the previous sections.

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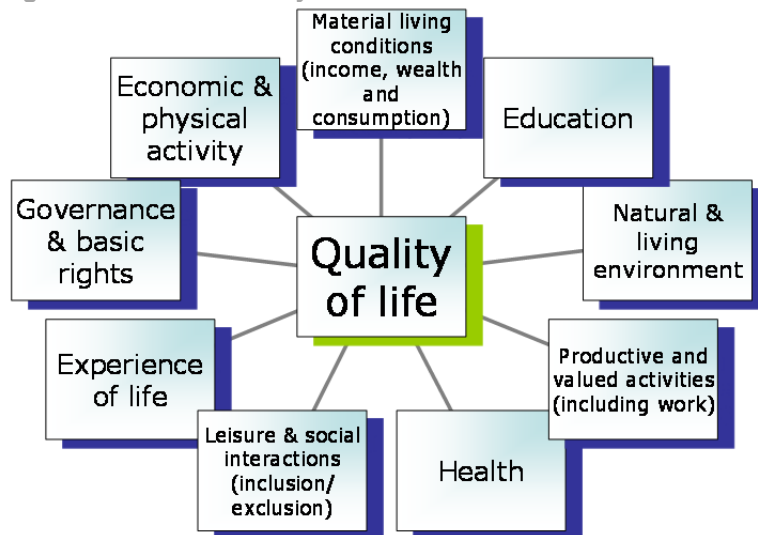
Introduction

This paper is written as part of the Tender *'Quality of Life'* commissioned by Eurostat. The project aims to produce a set of accepted and trusted key indicators of 'quality of life' on the basis of the EU-SILC ad-hoc module on well-being from 2013. Quality of life consists of several domains including key indicators which aim at illuminating the answer to the question on how European societies as a whole are doing. More information about the measures can be found on the *Eurostat* webpage⁽¹⁾. The objective of the project is to achieve a set of key indicators from Official Statistics supplementing GDP to help people understand and monitor progress and well-being across Europe.

The selection of the key indicators mainly followed the recommendations of the **'Eurostat Sponsorship Group on Measuring Progress, Well-being and Sustainable Development'**⁽²⁾ which operationalised the main conclusions of the Stiglitz-Sen-Fitoussi Commission⁽³⁾ for the European Statistical System.

This paper focuses on quality of life as a whole, the ten dimensions of which are illustrated in Figure 1. Within these, life satisfaction plays a particular role as it can be interpreted as the overall evaluation of all domains taken together.

Figure 1: Eurostat Quality of Life Framework



Source: Eurostat

⁽¹⁾ <http://ec.europa.eu/eurostat/web/gdp-and-beyond/quality-of-life/data>

⁽²⁾ <http://ec.europa.eu/eurostat/web/ess/about-us/measuring-progress>

⁽³⁾ <http://www.stiglitz-sen-fitoussi.fr/en/index.htm>

1

Subjective wellbeing

The literature on subjective well-being typically distinguishes between an affective component and an evaluative component (e.g. Michalos 1985) of subjective well-being. This paper focuses on the evaluative component, i.e. respondents are expected to provide a more cognitively influenced judgement, weighting up different aspects of their lives without fixing a tight time frame. This aspect is often assessed by life satisfaction judgments (cf., Diener et al. 1985). Satisfaction is 'an evaluative appraisal of something' says Veenhoven (1994). 'The term refers to both 'contentment' and 'enjoyment''. The same author (Veenhoven 1991, 3) notes that 'life satisfaction is conceived as the degree to which an individual judges the overall quality of his/her life-as-a-whole favourably'. This is in line with Pavot and Diener (2008, 137) who define life satisfaction as a 'distinct construct representing a cognitive and global evaluation of the quality of one's life as a whole'. Bradley & Corwyn (2004) add to this that the concept reflects both the extent to which basic needs are met and the extent to which a variety of other goals are seen as achievable.

Thus, life satisfaction is a subjective measure which as such is not directly measurable (as for example income), but must be understood as the product of an active construction process which is influenced by various factors: The mood of the respondent, the order of the questions asked before, social desirability of certain answers and normative expectations such as general answering tendencies (e.g. tendency to avoid extreme alternatives) and not least social ideas and opinions of what it means to be satisfied with the own life all influence a person's evaluation of her or his overall life satisfaction (e.g. Diener & Tov 2011, Tinkler & Hicks 2011, Oguz et al. 2013 u.v.a). Subjective evaluations of life satisfaction also implicitly entail relative effects, as satisfaction is likely to be judged against expectations. There is a risk that someone reporting being satisfied is only doing so, because s/he has low expectations. A whole bunch of literature deals with this phenomenon of so called adaptive preferences (e.g. Burchardt 2003, Teschl & Comim 2005, Barber 2007).

While life satisfaction has a long tradition in empirical research with first publications dating back to the 1960s (cf e.g. Gurin et al. 1960, Bradburn 1969 and later Allard 1975 or Glatzer & Zapf 1984), official statistics has long time abstained from calculating subjective indicators. European statistics so far contributed to the understanding of objective factors influencing people's quality of life whereas subjective well-being has been broadly considered to lie outside the scope of official statistics. Meanwhile, reservation was overcome and ultimately the view prevailed that subjective measures cannot be ignored when it comes to the evaluation of progress and wealth of a country as a whole. Following Recommendation 10 from the Stiglitz-Sen-Fitoussi Commission report (2009), the ESS Sponsorship Report (Eurostat 2011, 21) explicitly states that 'on European level, priority should be given to introducing every year, in EU-SILC, a question on overall life satisfaction'.

The main motivation for the European Statistical System to consider subjective indicators was to close the increasing gap between standard economic indicators (such as GDP growth or inflation) on one side and the people's individual perception of well-being and progress on the other side, which is undermining public confidence in official statistics. Furthermore, subjective indicators gain importance for policy purposes as the improvement of present and future well-being has recently reached the political agenda. Official statistics has therefore to provide the public with 'reliable, timely and trusted indicators of well-being, which can quantitatively and qualitatively assess the present

situation, allow for comparisons across countries and over time, and indicate perspectives for further progress' (Eurostat/INSEE 2011, 8).

In this context, the analysis of both main drivers and inequality of life satisfaction gains further relevance. Previous empirical research on subjective well-being typically focused on the main drivers of life satisfaction (e.g. Kapteyn et al. 2009, Frijns 2010, OECD 2011) or examined specific relationships between life satisfaction and other factors such as income (e.g. Verme 2011), family status (e.g. Waite 1995), migration (e.g. Abdallah & Shah 2012), (un)employment (e.g. Johnson et al. 2008) or educational attainment (e.g. Cárdenas & Mejía 2008).

Another topic being discussed in the literature concerns the influence of reference groups on life satisfaction or other aspects of satisfaction (e.g. Ferrer-i-Carbonell 2005). Following these, life satisfaction is not only influenced by socio-economic factors but also by the level of income of reference groups (how much money do I have compared to my friends, neighbours etc.).

In this paper, we examine the determinants of life satisfaction (multivariate) that can be observed in the EU-SILC AHM 2013. We thereby particularly focus on the relationships with other quality of life key indicators of the Eurostat Quality of Life framework.

2 Methodology

2.1 Method

Looking at the results of a bivariate analysis, it can be tempting to conclude that one variable is directly related to the other. For example, people with higher incomes may have higher life satisfaction values than those in lower income groups. Is it correct to assume that the differences observed in life satisfaction are primarily related to income differences? This conclusion can only be justified if we are able to show that there were no other important differences between the income groups affecting the results. With regression analysis we can do so by holding all the variables in the model equal and measuring the size and strength of the relationship between the two variables in question. The causal direction of the influence can however not be determined: Are people more satisfied the higher their income is or is it that more satisfied people are inclined to earn higher incomes?

In order to further quantify the significance of several determinants of life satisfaction and to check the 'influence' of a variable, OLS regressions are carried out which allow the comparison of relative effect sizes in order to determine which predictors are more important. OLS regressions require continuous data, while the EU-SILC AHM values are discrete, i.e. they can only take on a value between 0 and 10 with no halves in between. The appropriate method to process such data would be ordered probit models. There is however consensus in the literature that the differences between these methods are small applying them to well-being analyses (Ferrer-i-Carbonell & Frijters 2004, Stevenson & Wolfers 2008, Orguz et al. 2013, Fleche et al. 2011). Particularly, if there are more than five levels of the categorical responses and if these are clearly ordered (from 0 to 10 in our case), then OLS may still be reasonably implemented. In the course of the following analysis, we exclusively handle with non-weighted data.

2.2 Models

Multivariate regression analysis provides indication of the individual contribution of any single factor and possibly identifies dominant patterns. Typically, the method assumes that the variation of a specific item can be decomposed and attributed to a partial relationship with the predictor variable. The characteristics which are thought to contribute to the outcome need hence be specified in a well-formulated model. For convenience we restrict the analysis to life satisfaction only and disregard possible interactions. The main results of the regression are estimates on the difference a certain factor makes, after controlling for all other factors. Once the model is developed, the same set of variables is used in all regressions. This includes the following:

Table 1: Driver Analysis Models

	Model 1	Model 2	Model 3
	Core variables	Complete model (including domain variables)	Complete model (extension)
Socio-economic variables:	Age (both age and age2)	Age (both age and age2)	Age (both age and age2)
	Sex	Sex	Sex
	Income (log income)	Income (log income)	Income (log income)
	Educational attainment	Educational attainment	Educational attainment
	Household type	Household type	Household type
	Labour market status	Labour market status	Labour market status
	Citizenship	Citizenship	Citizenship
	Degree of urbanisation	Degree of urbanisation	Degree of urbanisation
Domain variables	-	Severe material deprivation	Severe material deprivation
	-	Unexpected expenses	Unexpected expenses
	-	Physical insecurity	Physical insecurity
	-	Air / water pollution	Air / water pollution
	-	Supportive relationships	Supportive relationships
	-	Self-perceived health status	Self-perceived health status
	-	Trust in institutions	Trust in institutions
	-	Trust in others	Trust in others
Further subjective variables			SF36 Mental well-being

The explanatory power of the regression models used here is relatively high ranging from an adjusted R² of 13.5% for Model 1, 31.2% for Model 2 and 42.5% for Model 3. Indeed, the amount of variance explained by the main model (Model 3) is higher than that of other reported regression analysis of similar design applied to life satisfaction. On the country level the adjusted R² value of Model 3 varies from 29.6% for Malta to 47.5% for Denmark. However, it is important to note that a higher proportion of the variance cannot easily be measured by survey questionnaires (e.g. genetic factors, psychological dispositions, other personality factors). Depending on the control variables and drivers included, typical model R² values of OLS estimates of life satisfaction vary between 3% and 15% (Clark & Senik 2011). Boarini et al. (2012), who calculated models on two waves of Gallup World Poll data⁽⁴⁾ obtained R² values for life satisfaction evaluations of 35%. In the OECD Guidelines on measuring SWB⁽⁵⁾ (p.221f) several other sources are named: 'Fleche, Smith and Sorsa (2011) report cross-country comparisons of key life satisfaction drivers over two to three waves of data (from the World Values Survey 1994-2008) for 32 different countries and find R² squared values ranging from 0.40 in New Zealand to 0.14 in Turkey, with an OECD average of 0.22. In Helliwell, Barrington-Leigh, Harris and Huang's (2010) analysis of data from a global sample of between 50 000 and 140 000 respondents in 125 countries, income plus a range of social and

⁽⁴⁾ 2009 and 2011 – from all OECD countries for a large number of classical key drivers

⁽⁵⁾ <http://www.oecd.org/statistics/oecd-guidelines-on-measuring-subjective-well-being-9789264191655-en.htm>

squared values ranging from 0.40 in New Zealand to 0.14 in Turkey, with an OECD average of 0.22. In Helliwell, Barrington-Leigh, Harris and Huang's (2010) analysis of data from a global sample of between 50 000 and 140 000 respondents in 125 countries, income plus a range of social and cultural variables explained between 30 and 45% of the individual-level variance in life evaluations.'

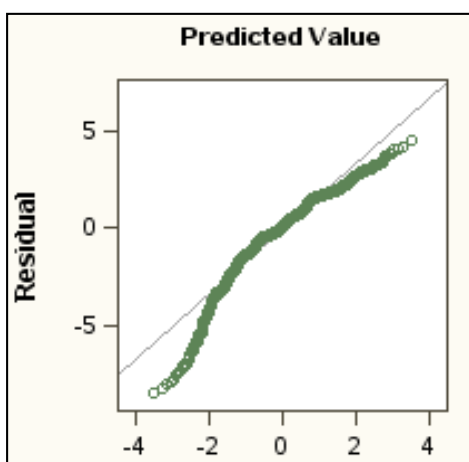
Note: Model Conditions

Applying OLS regression requires specific tests to be performed: Analysis of a) the residuals and b) the parameter coefficients / fit / etc. such as compliance to the conditions of linearity / normality / homoscedasticity / independence. For analysis on SWB items, however, these preconditions are generally not seen as strictly as for other kind of regression analysis as the main aim is to get insights into the impact / relation of specific variables on life satisfaction (controlling for others). Anyway, OLS regressions can be seen as the standard method of SWB impact analysis. It is however important to note that the model is only approximatively valid.

- a) Residuals: The distribution of residuals is skewed in this kind of analysis as life satisfaction itself (or other SWB items) has a skewed distribution as well.
- b) Multicollinearity: Can theoretically provoke problems. In practice, however, this is not relevant, unless identical information is represented in various variables (e.g. 'at-risk-of-poverty and disposable income). Multicollinearities are not seen as a problem as far as the tolerances (=variance which is not explained by other variables) don't exceed a value of 0.1. There is no clear-cut criterion for evaluating multicollinearity of linear regression models. Correlation coefficients of independent variables may be computed, but high correlation coefficients do not necessarily imply multicollinearity. A judgment can be made by checking related statistics, such as the tolerance values or variance inflation factor (VIF), Eigenvalue, and condition number. In the SAS REG procedure, TOL, VIF, COLLIN options of the MODEL statement produces such statistics. Note that the COLLIN option is for eigenvalues and condition numbers. SAS follows the Belsley-Kuh-Welsch approach (1980). The tolerance value is calculated as $1-R^2_k$. Variance inflation factor (VIF) is just the reciprocal of a tolerance value, thus low tolerances correspond to high VIF. VIF shows how 'inflated' the variance of the coefficient is, compared to what it would be if the variable were uncorrelated with any other variable in the model (Allison 1999: 48-50). Multicollinearity is not seen as a problem as far as tolerance values are less than 0.1 or VIF greater than 10, which would roughly indicate significant multicollinearity.

Model Validity: For the EU-SILC 2013 data both the normal distribution curve as well as the residual fit spread plot fulfil the requirements. The q-q plot below expresses that overall life satisfaction has a predefined scope (0-10) and is therefore cut (as distinguished from the normal distribution).

Figure 2: Q-Q-Plot



Source: Eurostat, EU-SILC 2013

3

Results

In the following chapter the relationship between life satisfaction and other socio-demographic and quality of life indicators will be examined. The main drivers of life satisfaction were identified by running multivariate regression models as described above including — beside demographic variables — at least one variable per QOL domain⁽⁶⁾. The overall model with all relevant demographic variables (sex, age, age2, partnership, country of birth, income) and a reasonable number of domain items including mental well-being available in the EU-SILC 2013 AHM explains 42.8% of the variance.

3.1 Main drivers of life satisfaction in the EU-28

3.1.1. Influence of demographic factors

According to the results of the descriptive analysis (Eurostat 2015), we included the variables age, sex, household type, labour market status, citizenship and degree of urbanisation as core socio-demographic variables in our model. All of these variables contribute significantly to the explanation of variance in all models (Table 2). Following former studies (e.g. Abdallah et al. 2013, Oguz et al. 2013) we also included age squared in order to consider non-linear effects of age.

Although no significant effects of gender were found in the bivariate analysis, the regression models show that women are more satisfied on average than men eliminating the effects of other variables. This effect is even stronger when including the SF36 mental well-being index (MHI-5) as can be seen from the results of Model 3. Previous findings are ambivalent. Inglehart (1990) for instance notes that there are no differences between women and men regarding life satisfaction, but that women are happier than men on average. Boarini et al. (2012) on the other hand report a significant positive influence of female gender on life satisfaction.

The linear effect of age on life satisfaction is statistically significant. If one considers the linear effect of age only, it can be said that the younger a person is the more satisfied s/he tends to be. When taking into account the core variables only (Model 1), the regression estimates a decrease of life satisfaction by 1.3 when age increases by 20 years. This effect decreases when including further variables (Models 2 and 3). However, previous research found a U-shaped relationship between subjective well-being and age (e.g. Dolan et al 2008), i.e. life satisfaction is highest among younger and older people and lowest among people in their middle age. This result is confirmed by the EU-

⁽⁶⁾ The key indicator 'at risk of poverty or social exclusion is a particular case here. We decided to include the item 'severe material deprivation' instead of including the whole indicator (incl. at-risk-of-poverty and 'work intensity') in order to avoid logical inter-correlations with variables of employment status and income.

SILC 2013 when taking the significant effect of age square into account. After controlling for all other factors, the coefficient of age square has a positive sign in all models (see Table 2).

Regression further confirms the effect of specific household types on life satisfaction. A strong negative effect is associated with single parent households slightly decreasing with the inclusion of other variables. Effects for other household types (living alone, household with children, and number of children) are quite small but still highly significant in all models. In Model 3 the significance of both effects (living alone and with children) disappears. Curiously, the coefficient of children living in the household (as compared to households without children) is negative, while an increasing number of children is positively (though weakly) associated with life satisfaction.

Next, we examined the impact of citizenship. To this backdrop, culture-dependent answering behaviour needs to be taken into account (Suh et al. 1998). The differences may in part be due to what is known as 'cultural bias' because people from different countries / cultures may interpret the question scales differently or may also be more likely to give more extreme ratings. The contrasts may also reflect genuine differences of general living conditions between the groups. It is however difficult to separate out effects of answering behaviour or to estimate to what extent data errors are represented in this rather than real differences of how people perceive their life satisfaction. In all three models, citizenship turns out to be highly significant. The finding suggests that Non-EU citizenships is a source of lower life satisfaction also after controlling for factors that are typically associated with the socio-economic situation of migrants such as low income or low formal education.

The effect of the degree of urbanisation is quite small in all models. People who live in big cities are on average less satisfied with their lives than the reference group. This effect remains significant at the 0.01 level in all three models however is very small in Model 3.

Table 2: Result of regression analysis: socio-demographic items (regression coefficients)

Independent variables	Model 1	Model 2	Model 3
	Unstandardised regression coefficients		
Demography			
Age2	0.00036	0.00029	0.00016
AGE	-0.046	-0.033	-0.022
Female	0.071	0.083	0.172
2 adults without children (Ref.)			
Living alone	-0.374	-0.260	-0.200
2 adults with children	-0.035	-0.031	0.012
other	-0.324	-0.208	-0.191
Single parent household	-0.651	-0.398	-0.266
Number of children			
National (Ref.)			
EU-28 citizen	-0.008	-0.092	-0.017
Non EU-28 citizen	-0.389	-0.163	-0.219
Rural areas (Ref.)			
Cities	-0.139	-0.110	-0.067
Towns, suburbs	-0.013	-0.025	-0.003

Source: Eurostat, EU-SILC 2013. Linear regression with unweighted data (weight included as predictor). Yellow: $p < 0.01$, orange: $p < 0.05$, dark orange: $p < 0.1$, grey: not significant.

3.1.2. Material living conditions and housing

The core measure of the domain 'material living conditions' is the net-disposable household income (Model 1). The analysis of the relationship between income and life satisfaction has a long tradition in empirical research of well-being. First papers date back to the 1970's. The empirical relationship between income and life satisfaction is common ground today, both regarding the individual and the country level. Increasing income is generally accompanied by increasing life satisfaction up to a certain point (rule of diminishing utility, e.g. Sacks et al. 2010). It is of course difficult to interpret what the coefficients mean in reality. One way is to use the impact of a given change in income as the basis for our comparison. This is why generally logged information is used to analyse the relationship between SWB and income. Logged values are sensitive to differences in orders of magnitude. There is an order of magnitude change between 1 and 10, then not again until one gets to 100, not again until one gets to 1.000, and so on. The distance between each of these markers grows consecutively larger. Naturally, the effect of income on life satisfaction goes down when including further variables. Severe material deprivation has the second strongest negative effect on life satisfaction of the whole Model 2 (-0.8) (after unemployment).

Housing also turns out to be important for the overall life satisfaction. The core variable included is the status of the dwelling. The impact of damp walls etc. on well-being is negative as expected but decreases.

Table 3: Result of regression analysis: Material living conditions and housing (regression coefficients)

Independent variables	Model 1	Model 2	Model 3
	Unstandardised regression coefficients		
Material Living Conditions & Housing			
Log HH income	0.445	0.176	0.157
Severely materially deprived		-0.827	-0.568
Damp wall, rots in windows etc.		-0.210	-0.124

Source: Eurostat, EU-SILC 2013. Linear regression with unweighted data (weight included as predictor). Yellow: $p < 0.01$, orange: $p < 0.05$, dark orange: $p < 0.1$, grey: not significant.

3.1.3. Productive activities and work

The results shown in Table 4 indicate that being unemployed is the factor which has the highest negative effect on life satisfaction in Model 1. Holding other factors equal, unemployed people rate life satisfaction more than 1 point lower on average than full-time employed people (reference group) (considering core demographic variables only (Model 1)). Indeed, there is evidence from other studies that being involuntarily out of work may decrease people's well-being level drastically (e.g. Clark & Oswald 1994; Winkelmann 2009). The fact that unemployment has a very strong effect on life satisfaction even after controlling for income, trust and mental well-being shows that further non-observed factors are at play. Prolonged unemployment, particularly of young people also has a negative overall effect on a person's sense of self-worth and might provoke self-doubt but also in the future ability to improve skills and hence, to find a job (e.g. Bell & Blanchflower 2011 or Strandth et al. 2014), . This vicious circle may shade an individual's sense of optimism and hope for the future.

Table 4: Regression results: Productive activities at work

Independent variables	Model 1	Model 2	Model 3
	Unstandardised regression coefficients		
Productive or Main Activity			
Full-time employed (Ref.)			
Self employed	0.010	-0.001	-0.007
Part-time employee	0.117	0.009	0.059
Unemployed	-1.167	-0.723	-0.536
In training	0.390	0.214	0.104
Retired	-0.104	0.082	0.038

Source: Eurostat, EU-SILC 2013. Linear regression with unweighted data (weight included as predictor). Yellow: p<0.01, orange: p<0.05, dark orange: p<0.1, grey: not significant.

People in training or education on the other hand had significant higher values of life satisfaction than full-time employed in all models. Holding all else equal, there was negative association between retirement and life satisfaction in Model 1 compared to full-time employees, which turned however positive in Model 2 and 3 after controlling for other influential factors. Part-time employment has a positive sign in Models 1 and 3, though the effect is minimal and turns 'not significant' in Model 2.

3.1.4. Health

Numerous studies (e.g. Tinkler & Hicks 2011) confirmed the importance of health among the things that really matter to individual well-being in general. Previous publications have also highlighted a very clear positive relationship between self-reported health and life satisfaction. The regression analysis enables us to go further and look at the size and strength of the relationship between health items and personal well-being when other factors are held equal.

The results confirm that self-reported health has a statistically significant impact on life satisfaction, after controlling for all other factors. The impact is particularly strong when comparing people who reported bad or very bad health with those being in a very good or good condition. As compared to the latter, they rate their life satisfaction 1.5 points lower on average (Model 2).

Table 5: Regression results: Health

Independent variables	Model 1	Model 2	Model 3
	Unstandardised regression coefficients		
General Health			
Very good or good (Ref.)			
Fair		-0.611	-0.317
Bad or very bad		-1.534	-0.872

Source: Eurostat, EU-SILC 2013. Linear regression with unweighted data (weight included as predictor). Yellow: p<0.01, orange: p<0.05, dark orange: p<0.1, grey: not significant.

3.1.5. Educational attainment

Education is not only an economic resource enabling people to obtain satisfying and better paid jobs. Many people see education as a value in itself. So it would not be surprising if higher educational levels turned out to be positively related with life satisfaction. However, scientific studies draw a

diverse picture on that. Some researchers found a positive relationship between educational attainment and life satisfaction on the individual level (e.g. Cárdenas & Mejía 2008, Salinas-Jiménez et al. 2010, Cuñado & Pérez de Gracia 2012), while others found a negative relationship particularly for the older population (Gon get al. 2011). On the aggregated level, Cheung & Chang (2009) provided evidence that life satisfaction is higher in countries with a higher level of educational attainment.

EU-SILC data indicate that people with higher educational attainment are more satisfied with their lives than people with low levels of formal education. Statistically significant findings emerged when comparing those with higher level qualifications to those with lower secondary level qualifications. For example, those with tertiary education rate 0.6 points higher on average than those with low levels when controlling for socio-demographic factors only (Model 1). Additionally, those with the upper secondary qualifications rated life satisfaction 0.30 points higher on average than all those with lower educational attainment. The differences between the groups 'lower secondary education', 'upper secondary education' and 'tertiary education' are statistically significant. The positive effects of educational attainment diminish to a very small effect size with the inclusion of further subjective variables. The fact that they remain highly significant after controlling especially for income and labour-market related aspects indicates, however, that the level of education is as such of importance for life satisfaction and hence an important aspect of the quality of life in general.

Table 6: Result of regression analysis: Education

Independent variables	Model 1	Model 2	Model 3
	Unstandardised regression coefficients		
Education			
Lower secondary education (Ref.)			
Tertiary education	0.620	0.143	0.058
Upper secondary education	0.306	0.082	0.038

Source: Eurostat, EU-SILC 2013. Linear regression with unweighted data (weight included as predictor). Yellow: p<0.01, orange: p<0.05, dark orange: p<0.1, grey: not significant.

3.1.6. Supportive relationships

Supportive relationships are operationalised as 'people indicating they have no one to rely upon for help'. This item was included in Models 2 and 3 and is negatively associated with life satisfaction for those who don't have social support compared to those who report that they can rely on help when needed. People who cannot rely on help rate life satisfaction 0.70 lower on average than socially integrated people (Model 2). The effects remains significant at the 0.01 level even after controlling for mental well-being and trust in others.

Table 7: Result of regression analysis: Leisure and social interaction

Independent variables	Model 1	Model 2	Model 3
	Unstandardised regression coefficients		
Leisure & Social interaction			
Having no one to rely on help		-0.711	-0.243

Source: Eurostat, EU-SILC 2013. Linear regression with unweighted data (weight included as predictor). Yellow: p<0.01, orange: p<0.05, dark orange: p<0.1, grey: not significant.

3.1.7. Economic and physical insecurity

The dimension of economic and physical safety relates to security and the vulnerability of one's situation. Former research has shown the negative effects of arrears or debts on mental health. But also non-economic factors of unsafety such as the feeling of living in unsafe areas or the perception of physical unsafety play a crucial role in well-being.

In the complete model (2), both of the included items on safety show a significant negative impact on life satisfaction, with the inability to face unexpected expenses having the strongest impact (-0.46). After controlling for all other factors, crime, vandalism or violence in the living environment has still a highly significant but very weak impact (-0.03), as is indicated by the regression results in Table 8. In Model 3, on the other hand, the negative impact of 'crime, violence or vandalism in the area' nearly disappears and the coefficients of the inability to face unexpected expenses decreases.

Table 8: Result of regression analysis: Economic and physical safety

Independent variables	Model 1	Model 2	Model 3
	Unstandardised regression coefficients		
Economic and physical safety			
Inability to face unexpected expenses		-0.470	-0.338
Crime, violence or vandalism in the area		-0.119	-0.033

Source: Eurostat, EU-SILC 2013. Linear regression with unweighted data (weight included as predictor). Yellow: $p < 0.01$, orange: $p < 0.05$, dark orange: $p < 0.1$, grey: not significant.

The result should be seen in the context that in general life satisfaction positively correlates with material living conditions such as income or job and that these again are positively related to safer living environments.

3.1.8. Quality of the social organisation

Eurofound (2012) reported on the basis of the 3rd European Quality of Life Survey that trust in public institutions, political commitment and satisfaction with the functioning of the democratic structures are all related to a certain degree with life satisfaction. In most OECD countries trust in national governments has ultimately declined (OECD 2013) to the backdrop of the economic crisis and austerity policies across Europe.

The EU-SILC ad-hoc module collected some information on this topic. Trust in institutions is a synthetic measure averaging the mean level of trust in three major institutions represented by the police, the legal and the political systems. Additionally, the AHM also asked for trust in other people. On this basis we approximately examined, how the individual perception of the societal quality in terms of trust in institutions and trust in other people impacts on life satisfaction. Only trust in institutions was included in Model 2, while both variables were tested in Model 3. For both variables the impact on life satisfaction is significant but quite small: A rise of one point in 'trust in institutions' is related to an increase of 0.12 in life satisfaction, while a one-point rise of trust in others is on average associated with only 0.11 additional life satisfaction (Model 3). Further variables such as the quality of public services and the evaluation of it would be needed to shed more light into this domain.

Table 9: Regression results: Governance

Independent variables	Model 1	Model 2	Model 3
	Unstandardised regression coefficients		
Governance			
Trust in institutions		0.2118	0.117
Trust in others			0.113

Source: Eurostat, EU-SILC 2013. Linear regression with unweighted data (weight included as predictor). Yellow: $p < 0.01$, orange: $p < 0.05$, dark orange: $p < 0.1$, grey: not significant.

3.1.9. Natural living environment

Environmental problems such as grime, dust, pollution or noise can have severe negative effects on health and the quality of life of people. EU-SILC depicts both issues in the key indicators 'pollution in the living environment' and 'noise from neighbours or from the street'. People who do not report having pollution, grime or other environmental problems are also more satisfied with their life on average.

In the models, we only included 'pollution' as reference indicator for the dimension. The results show however that the effects of pollution are only statistically significant in Model 2 and are quite small. This might be seen in analogy to 'physical insecurity' as mentioned above: People with low incomes tend to live in places with environmental problems compared to people with higher incomes. Furthermore, the self-reported health status is highly correlated with self-reported environmental problems and is yet explaining much of the variance.

Table 10: Result of regression analysis: Natural and living environments

Independent variables	Model 1	Model 2	Model 3
	Unstandardised regression coefficients		
Natural & Living environment			
Pollution, grime or other environmental problem		-0.082	-0.012

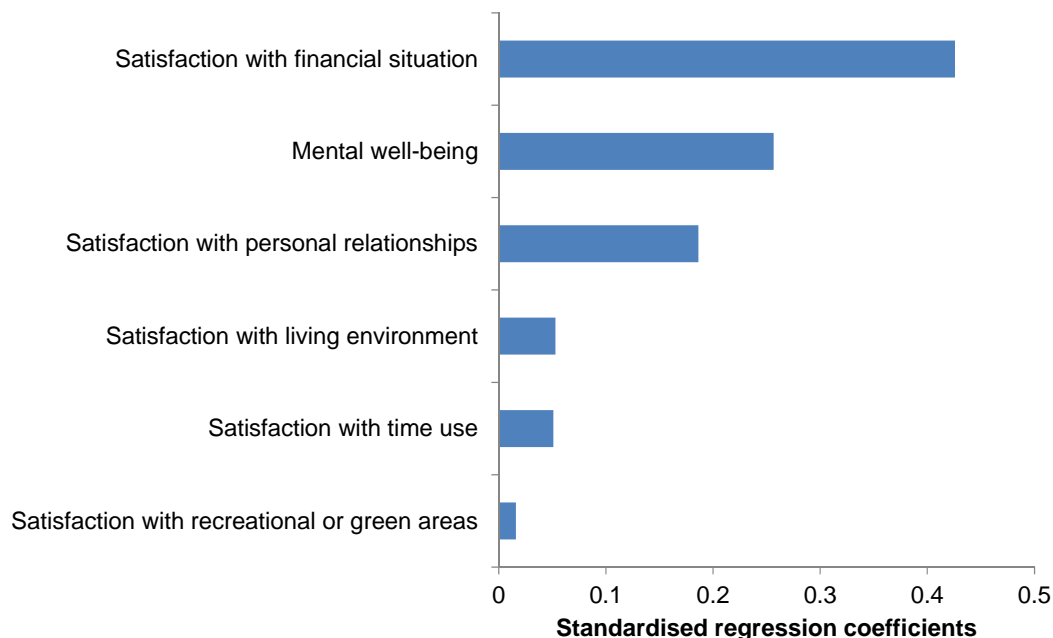
Source: Eurostat, EU-SILC 2013. Linear regression with unweighted data (weight included as predictor). Yellow: $p < 0.01$, orange: $p < 0.05$, dark orange: $p < 0.1$, grey: not significant.

3.1.10. Overall experience of life

It is of course of limited value to explain subjective variables with other subjective items. Life satisfaction is highly correlated with domain satisfactions such as financial satisfaction or satisfaction with personal relationships. Nonetheless, it is worth looking at the interlinkage of various SWB items. Figure 2 shows the results of a regression, which examines the relative effect size of domain satisfactions and mental well-being on life satisfaction after controlling for the other variables. By far the strongest subjective driver of overall life satisfaction is the satisfaction with the financial situation of the household (0.43), followed by mental well-being (0.26) and the satisfaction with the personal relationships (0.19). At the bottom, the association of satisfaction with time use and the satisfaction with recreational and green areas with life satisfaction is quite negligible. This result confirms once more the dominant role of material aspects for overall life satisfaction which was also observed in

Model 2 where material deprivation turned out to be one of the strongest predictors of life satisfaction (Table 3).

Figure 3: Relative effect sizes of various SWB items on life satisfaction



Source: Eurostat, EU-SILC 2013. Standardised regression coefficients

While the inclusion of a satisfaction-item in the regression analysis would provoke more noise than clarification, we decided to include a mental well-being score (based on the 5 affect items) in Model 3. Such measure though subjective in nature, is apt to give indication on the interlinkage of affects and moods with the more reflected, stable and evaluative measure of life satisfaction. The score of 'mental well-being' synthesizes the AHM-2013 items on happiness, depression, calmness, nervousness and discouragement ('feeling down in the dumps') over a four-week period. It is based on the concept of the SF-36, a set of 'generic, coherent, and easily administered quality-of-life measures'⁽⁷⁾. These measures rely upon respondents' self-reporting and are today widely utilized by care organisations for routine monitoring and assessment of care outcomes in adult patients.

How is the score computed? First, precoded numeric values are recoded per the scoring key given. All items are scored so that a high score defines a more favourable well-being state. In addition, each item is scored on a 0 to 100 range with the lowest and highest possible scores being set at 0 and 100, respectively. Following, items in the same scale are averaged together to create the scale scores. Hence, scale scores represent the average for all items in the scale.

Unsurprisingly, mental well-being is significantly associated with life satisfaction (Table 11). The results of Table 11 are to be read as follows: An increase of 10 points in mental well-being is related to a rise of 0.37 in life satisfaction on average. This means that compared to people who report a mental well-being score of 40, those with a score of 80 rate their life satisfaction 1.5 points higher on average than the former.

(7) http://www.rand.org/health/surveys_tools/mos/mos_core_36item.html

Table 11: Result of regression analysis: Overall experience of life

Independent variables	Model 1	Model 2	Model 3
	Unstandardised regression coefficients		
Overall experience of life			
SF36 Mental well-being index			0.370

Source: Eurostat, EU-SILC 2013. Linear regression with unweighted data (weight included as predictor). Yellow: $p < 0.01$, orange: $p < 0.05$, dark orange: $p < 0.1$, grey: not significant.

3.2 Differences across various groups

The analysis carried out in this chapter acknowledges the fact that the relationship between subjective well-being and its various determinants might be different for different sub-groups of the population. Therefore, Model 3 (extended model) is repeated in this chapter for specific groups. In particular, Table 12 shows the results for regression models for men, women, people aged 65+ and people of working age between 20 and 64 with life satisfaction as dependent variable.

When comparing the results for men and women we see that the predictors of life satisfaction are grossly the same for both sexes. There are only a few items where the regression coefficients differ largely. In some cases this is associated with a variable not being significant for one or the other. The most pronounced differences in the socio-demographic area are for separated / divorced people (compared to married people) where the coefficient is larger for women than for men and for single parents households where it is the other way around. Living alone has a negative impact on the life satisfaction for both men and women, though the effect is quite small. Looking at the domains, the strongest differences can be observed for self-employment and unemployment (compared to full-time employment). While self-employment is negatively related to the life satisfaction of men, the coefficient has a positive sign for women (though only at the 0.05 level). Unemployment, on the other hand, has a more negative impact on men's than on women's well-being. Another case in which the sign switches between the sexes is retirement with a slight negative effect on the life satisfaction of men (though not significant) and a slight positive one on that of women. Finally, educational attainment is more important for male than for female life satisfaction: Compared to men with lower secondary education, the life satisfaction of those with tertiary education is significantly higher at the 0.01 level, while there is no significant difference between these education types for women.

In general what can be seen, is that for most items for which a strong overall association between subjective well-being and the outcome is known (income, living conditions, health, social relations, etc.), the results are similar (in terms of sign and significance) for both sexes.

Table 12: Regression results: life satisfaction among different sub-groups

Domain	Independent Variable	Men	Women	Aged 65+	People of Working Age 20-64
Demography	age2	0.0002	0.0001	-0.0005	0.0005
	AGE	-0.023	-0.020	0.064	-0.047
	Female	-	-	0.151	0.183
	2 adults without children (Ref.)				
	Living alone	-0.241	-0.151	-0.144	-0.216
	2 adults with children	0.019	-0.006	-0.190	0.051
	other	-0.173	-0.207	-0.228	-0.172
	Single parent household	-0.254	-0.264	-0.534	-0.258
	Number of children	0.035	0.029	0.023	0.041
	Nationals (Ref.)				
	EU-28 citizen	-0.042	0.002	0.075	-0.028
	Non EU-28 citizen	-0.219	-0.218	-0.148	-0.222
	Rural areas (Ref.)				
	Cities	-0.061	-0.075	-0.054	-0.077
Towns, suburbs	-0.013	0.001	0.011	-0.012	
Material Living Conditions & Housing	Log HH income	0.128	0.181	0.200	0.149
	Severe material deprivation	-0.496	-0.610	-0.525	-0.588
	Damp walls, rot in windows etc.	-0.123	-0.126	-0.067	-0.142
Productive or Main Activity	Full-time employed (Ref.)				
	Self-employed	-0.096	0.040	0.029	-0.019
	Part-time employed	0.042	0.060	0.159	0.047
	Unemployed	-0.701	-0.384	0.191	-0.555
	In training	0.075	0.128	-0.496	-0.002
Retired	-0.008	0.085	-0.006	-0.025	
Health	Very good or good general health (Ref.)				
	fair	-0.360	-0.313	-0.331	-0.310
	bad or very bad	-0.841	-0.868	-0.886	-0.816
Education	Lower secondary education (Ref.)				
	Tertiary education	0.113	0.019	0.084	0.045
	Upper secondary education	0.055	0.026	0.069	0.024
Leisure & Social interaction	Having no one to rely on help	-0.237	-0.245	-0.242	-0.236
Economic and physical safety	Inability to face unexpected expenses	-0.325	-0.347	-0.310	-0.352
	Crime, violence or vandalism in the area	-0.036	-0.031	-0.032	-0.036
Governance	Trust in institutions	0.119	0.114	0.133	0.114
	Trust in others	0.109	0.117	0.125	0.108
Natural & living env.	Pollution, grime or other environmental problem	-0.024	-0.006	-0.027	-0.006
Overall experience of life	SF-36 Mental well-being score	0.372	0.368	0.373	0.368
	Observations	133,015	160,980	71,386	212,455
	Adj. R2	44.42	42.83	41.65	42.88

Source: Eurostat, EU-SILC 2013. Linear regression with unweighted data (weight included as predictor). Yellow: $p < 0.01$, orange: $p < 0.05$, dark orange: $p < 0.1$, grey: not significant.

Additionally, Table 12 compares the population in retirement age (65+) with the working age population (20-64). These two groups show significant differences in the socio-demographic domain as well as in other domains: The importance of work-related effects disappears with increasing age; none of the variables show a highly significant impact on elderly people's well-being. Having a tertiary education has a strong significant positive effect for the well-being of the retirement group, but is not that important for the working age group.

The importance of health problems or social connections for the overall life satisfaction is on the other hand comparable in both groups.

3.3 Macro-level impacts

So far we have looked at the relationship between life satisfaction and drivers at the individual level. This is of interest as it sheds light into the association of micro-economic conditions and the prevalence of low/high well-being. Against the backdrop of the economic and financial crisis of the past six years, it is however also highly relevant to examine dynamics at the aggregate level. This is essential in order to observe the relative effects of macro-economic and other macro-level indicators on life satisfaction which are at the centre of policy making at EU level such as GDP, economic growth, the unemployment rate or public debt.

At the individual level unemployment is for instance clearly negatively associated with life satisfaction as was shown above. At the aggregate level, however, questions of the following type arise: How does the dispersion of unemployment affect the average level of life satisfaction in a country? Is the level of life satisfaction associated with the general economic situation of a country? What is the role of institutional and interpersonal trust? Does economic inequality in a country have an impact on the average well-being?

In order to further examine the association of unemployment with life satisfaction at aggregated level, several macro-level indicators were selected which are considered as key indicators of economic performance, public finance, social performance, governance and societal quality as presented in Table 13.

Table 13: Macro-level indicators

Topic	Indicator	Unit	Source
Economic Performance	GDP per capita	purchasing power parity	Eurostat
	Real GDP growth rate	annual rate of change	Eurostat
	Inflation	annual rate of change (HCPI)	Eurostat
	Unemployment rate	population % aged 15-74	Eurostat
Public Finance	Government expenditure	% of GDP	Eurostat
	Social Protection Expenditure	% of GPP	Eurostat
	Governmental debt	% of GDP	Eurostat
	Public deficit	% of GDP	Eurostat
	Long-term interest rate	%	Eurostat
Social performance	At-risk-of-poverty	population %	Eurostat
Governance	Control of Corruption	scale 0-10	World Bank
	Government Efficiency	scale 0-10	World Bank
Societal quality	GINI coefficient	scale 0-100	Eurostat

As was shown in the recent publication Quality of Life – Facts and Figures (Eurostat 2015) for most countries there seems to be a positive association between GDP and overall life satisfaction. Most of the countries with lower life satisfaction were in the near past, and still are characterised by a low level of income (as indicated for example by PPS adjusted GDP per capita).

What can be seen from Table 13 is that there are actually strong correlations with GDP per capita (0.58), while real GDP growth turns out to be very weakly related to the mean level of life satisfaction. Actually, real GDP growth in 2013 was highest in Baltic countries and Romania, all of which had satisfaction levels below the EU average.

Both the social expenditure (0.52) and the unemployment rate (-0,517) are quite strongly and significantly correlated with life satisfaction (at 0.01 level). The highest correlations, however, are observed between mean life satisfaction and the GINI of the equivalised disposable household income (the higher the GINI, the lower life satisfaction). This is a clear indication that the quality of the societal organisation as measured in terms of income inequality is related to the overall level of well-being in a country, a result which is also in line with research having found 'income inequality to have a consistent, negative and significant effect on life satisfaction world wide' (Verme 2011, p128).

Governmental debt or public deficit is – on the other hand – very weakly and not significantly correlated with life satisfaction. Neither does control of corruption nor governmental efficiency significantly correlate to mean life satisfaction at country level.

Once the correlations between life satisfaction and other macro-indicators are identified, we wish to assess the degree of consistency between them in a multivariate regression model so that the additional impact of each variable after controlling for the others can be examined. For this purpose we first included all macro-level indicators as predictors in the model (with mean life satisfaction as dependent variable). From the analysis of correlations we already have some indication, which of the indicators will have little predictive power. Nonetheless, a first step was to check if any of them explained some of the variation even at a low level of significance. The final model includes four predictors: GDP per capita, real GDP growth, social protection expenditure and the GINI. The GINI coefficient was significant at 0.01 level, while social protection and GDP p.c. were significant at 0.05 level. All variables indicate expected negative or positive relationship (e.g. negative impact of inequality, positive impact of social protection expenditure). The standardised coefficients of all four independent variables are compared in Figure 3.

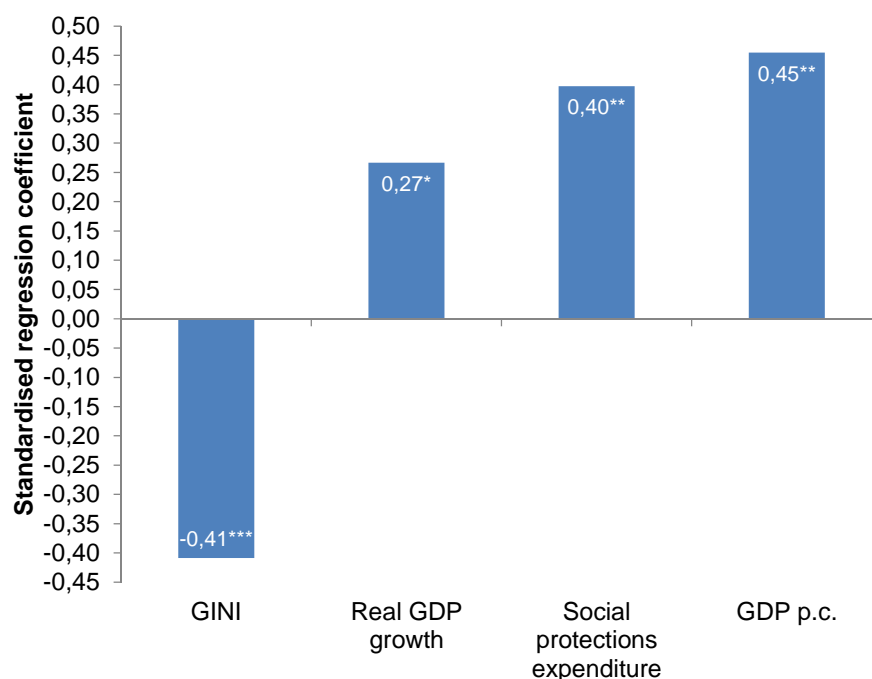
Table 14: Correlations of macro level indicators

	Life satisfaction	GDP per capita	Real GDP growth	Inflation rate	Unemployment rate	Government Expenditure	Social Protection Expenditure	Government Debt	Public Deficit	Long-term interest rate	Government Efficiency	Control of Corruption	At-risk-of-poverty	GINI
Life satisfaction	1	.581**	.092	.280	-.517**	.319	.521**	-.082	.187	-.572**	-.044	-.105	-.554**	-.637*
GDP per capita	.581**	1	-.066	.071	-.360	.221	.477*	-.060	.267	-.478*	-.226	-.280	-.362	-.301
Real GDP growth	.092	-.066	1	.248	-.508**	-.626**	-.560**	-.682**	.579**	-.538**	.313	.325	.006	.081
Inflation rate	.280	.071	.248	1	-.456*	-.163	-.133	-.392*	.201	-.351	.068	.020	-.163	-.247
Unemployment rate	-.517**	-.360	-.508**	-.456*	1	.069	-.030	.545*	-.589**	.737**	-.007	.048	.542**	.492*
Government Expenditure	.319	.221	-.626**	-.163	.069	1	.763**	.457*	-.429*	.089	-.232	-.227	-.295	-.447*
Social Protection Expenditure	.521**	.477*	-.560**	-.133	-.030	.763**	1	.549**	-.204	-.179	-.100	-.177	-.408*	-.395*
Government Debt	-.082	-.060	-.682**	-.392	.545*	.457*	.549**	1	-.591**	.547**	.025	.053	.132	.114
Public Deficit	.187	.267	.579**	.201	-.589**	-.429*	-.204	-.591**	1	-.676**	.189	.029	-.216	-.039
Long-term interest rate	-.572**	-.478*	-.538**	-.351	.737**	.089	-.179	.547**	-.676**	1	-.108	-.008	.570**	.463*
Government Efficiency	-.044	-.226	.313	.068	-.007	-.232	-.100	.025	.189	-.108	1	.952**	.201	.129
Control of Corruption	-.105	-.280	.325	.020	.048	-.227	-.177	.053	.029	-.008	.952**	1	.216	.136
At-risk-of-poverty	-.554**	-.362	.006	-.163	.542**	-.295	-.408*	.132	-.216	.570**	.201	.216	1	.859**
GINI	-.637**	-.301	.081	-.247	.492**	-.447*	-.395*	.114	-.039	.463*	.129	.136	.859**	1

** : Correlation is significant at the 0.01 level (2-tailed).

* : Correlation is significant at the 0.05 level (2-tailed).

Figure 4: Effect sizes of macro-level factors on life satisfaction across Europe



Source: Eurostat database and Eurostat EU-SILC 2013, authors' calculation. *** significant at 0.01 level, ** significant at 0.05 level, * significant at 0.1 level

Standardised regression coefficients are compared as the variables are measured in different units (see Table 13) so that the independent effect sizes can be identified. The five predictors which remain significant in all models after controlling for other influences reflect the importance of both stability and the economic level for life satisfaction at an aggregated level as is also confirmed by Welsch (2006) who states that stability 'does not seem to be less important to European citizens than growth and employment'. Stability may naturally be measured in many ways. However, the fact that the GINI coefficient as well as social security expenditures actually have such strong impact indicates that the social quality as such is of utmost importance to global subjective well-being reflecting confidence and reliability as essential social values in the European Union. The positive impact of social protection expenditure can furthermore be taken as indication that the extension of the welfare state is also at play here. Evidence for a link between the welfare state and life satisfaction was for instance provided by Kotakorpi and Laamanen (2010).

Unemployment, on the other hand, seems to be foremost an individual problem, while national unemployment rates don't have a significant impact on life satisfaction. It can therefore be concluded that the unemployed (individually) are worse off than the employed, and by more than their lower income would predict, but that the well-being gap between the unemployed and the employed tends to be lower in high unemployment regions (Oswald 1994) or as Clark (2001, 20) put it 'unemployment always hurts, but it hurt less when there are more unemployed people around'.

3.4 Country Patterns

This section explores the patterns of specific impact factors on life satisfaction across Europe. Comparing well-being impact factors is interesting as it allows identifying the characteristics of well-being structures across countries enabling policy makers and analysts to draw their conclusions. These insights can also be taken to build hypothesis on cultural specificities of well-being or on institutional and / or societal arrangements which mitigate negative or foster positive effects of specific drivers.

Figure 5 illustrates the regression coefficients of gender from Model 3 (extended model). In almost all countries women on average had higher values of life satisfaction after controlling for other variables such as income or labour market participation. An average EU woman rated her life satisfaction 0.18 points higher than her male counterpart; in some countries gender turned out to not be significant (Bulgaria, Lithuania, Malta, Romania). The strongest gender effects were observed for Portugal (0.44), Austria (0.33) and Slovenia (0.30), while gender had almost negligible impact on the life satisfaction of Slovaks, Greeks (both 0.06) or Latvians (0.09).

Figure 5: Impact of gender on life satisfaction across Europe

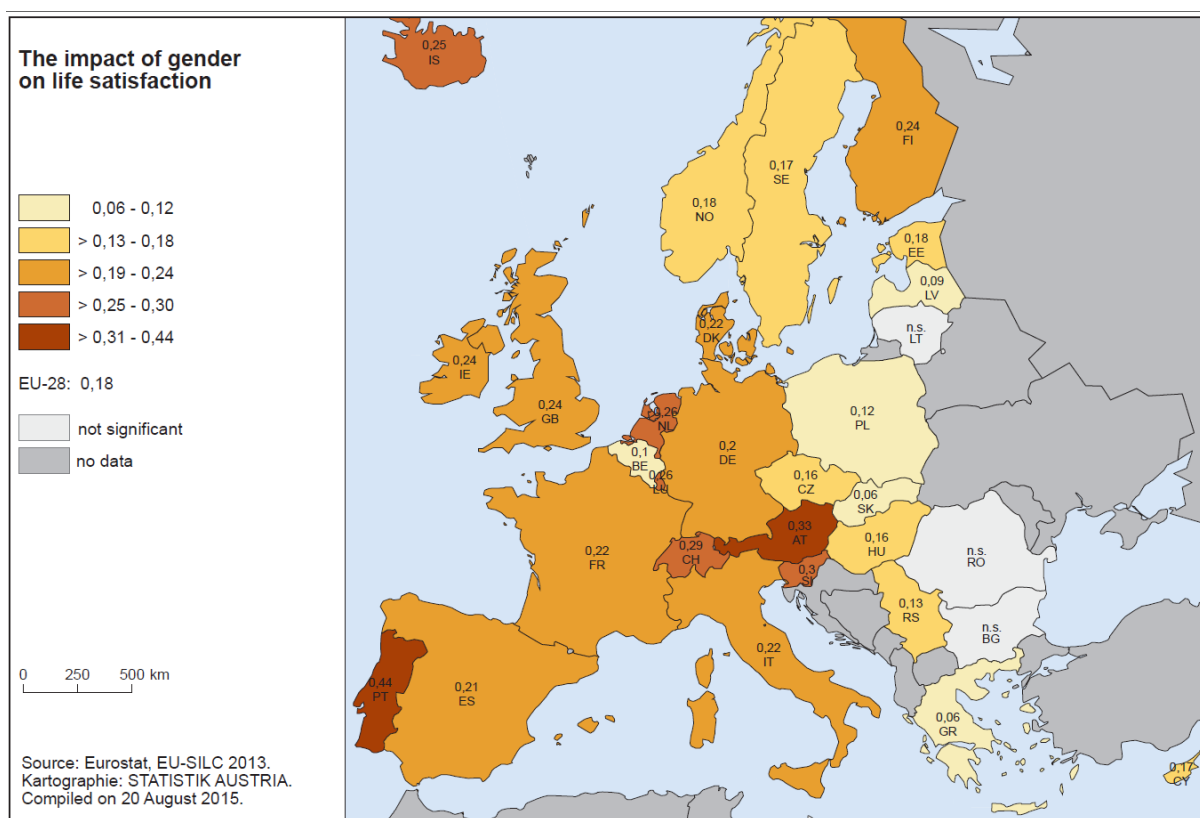
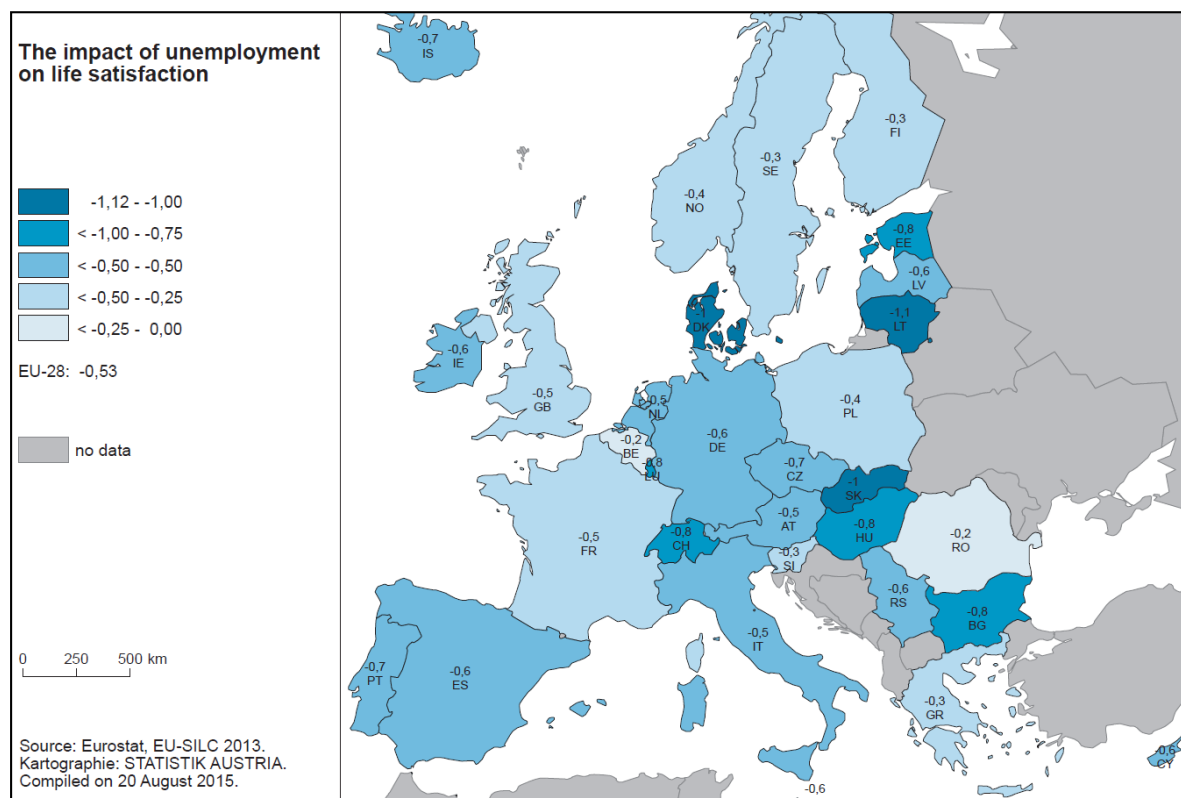


Figure 6 illustrates the impact of unemployment across countries compared to full-time employees taken from Model 3. What can be immediately seen is that those countries where unemployment has the most negative effect on life satisfaction (after controlling for other variables) are very different in terms of economic structure and institutional settings. The countries with the most negative impacts of unemployment on life satisfaction are Lithuania, Slovakia and Denmark in all of which unemployed people rated their life satisfaction more than 1 point lower on average than the reference population of full-time employed. This is interesting, as for instance Denmark has very generous income replacement and strong active labour market policies, underlining once more that unemployment is related to life satisfaction through other non-observed factors. Also, the general level of well-being is quite different in these countries. For instance full-time working Danes reported an overall life

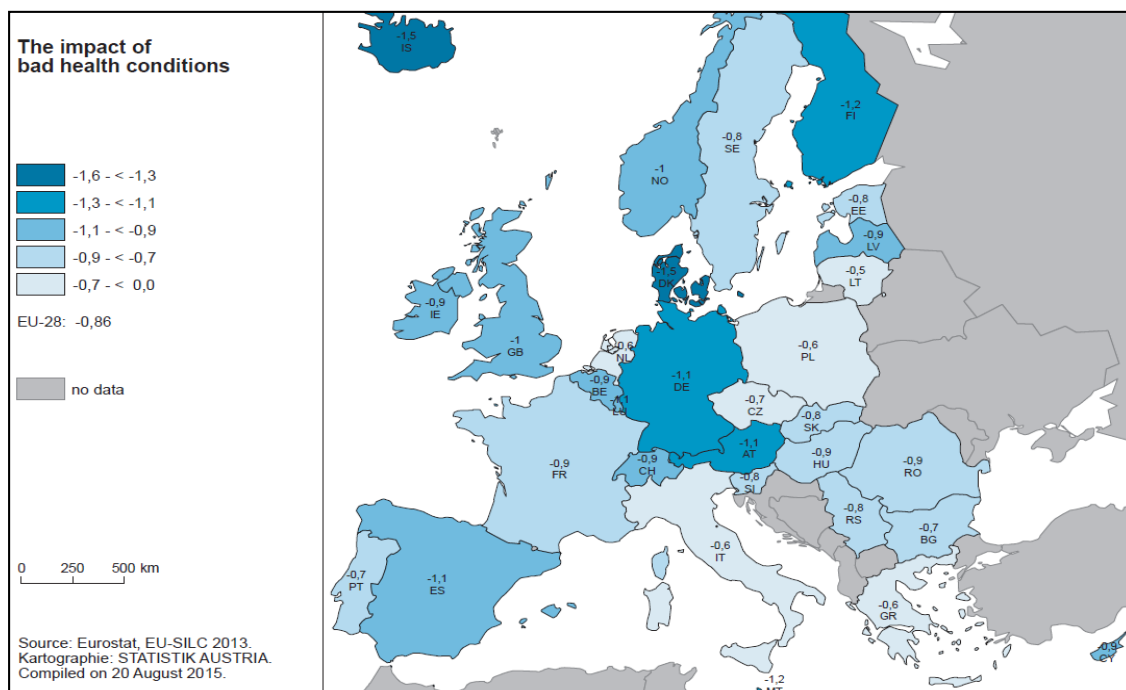
satisfaction of 8.2 and unemployed Danes of 5.7 compared to full-time employed Bulgarians who rated their life satisfaction with 5.5 and unemployed Bulgarians with 3.3 on average. On the other hand, unemployment impacts quite weakly on the well-being of unemployed people in Belgium, Finland and Greece compared to their full-time employed counterparts. Additionally, a group of countries including France, Italy, the Netherlands and the U.K. groups around the EU average of unemployed rating their life satisfaction 0.5 points lower than the reference group after controlling for other factors.

Figure 6: Impact of unemployment on life satisfaction across Europe



Finally, we also examined country patterns of a more subjective predictor, namely the general self-perceived health status (Model 3). The item is significant at the 0.01 level in all countries and is naturally closely linked to the rating of overall life satisfaction as is also shown in Eurostat 2015 (pp. 109). However, to examine the remaining impact of health after controlling for other variables such as mental well-being can give insight into the cultural understanding of good health as compared to life satisfaction. Differences in the predicting power of self-perceived health for life satisfaction might indicate the efficiency of public services such as care-services or public health systems but also cultural factors in mitigating negative health effects (beyond income loss).

Figure 7: Impact of health on life satisfaction across Europe



Bad or very bad health conditions as (compared to very good or good conditions) had the least effects (after controlling for other influences) in Lithuania, Poland and the Netherlands. Highest impacts of bad health conditions on life satisfaction were on the other hand observed for Denmark, Malta and Finland where those who reported a bad or very bad health status, rated their life satisfaction between 1.5 (Denmark) and 1.2 (Finland) points lower on average than those with very good or good health status.

4 Conclusions

It has been the primary objective of this analytical report to examine the determinants of the evaluative concept of subjective well-being. Particularly, the focus was put on the question of what exactly is it about each domain of quality of life which is important for the overall life satisfaction. The various QoL domains used in the Eurostat as well as in many other frameworks are well correlated with life satisfaction. In the complete model (Model 2), each domain has an independent effect on life satisfaction after controlling for the impact of the other dimensions, although the effect sizes become smaller as additional – and particularly more subjective – items are added (such as self-perceived health in Model 2 and mental well-being in Model 3). The multidimensional regression confirms the strongest drivers of well-being identified through descriptive analysis, and are mostly health, having a (good) job, material conditions and social relations.

A further issue raised in this paper was if the impacts of specific drivers differ between socio-demographic groups. In particular, we examined the overall effect of gender and age. Our analysis suggests that the predictors of life satisfaction are grossly the same for both sexes but that there are a few items where the regression coefficients differ largely. The strongest differences were observed for self-employment and unemployment (compared to full-time employment), both of which had a more negative impact on men's than on women's well-being. The second focus was on the difference between people in retirement age and those of working age. For the well-being of the older group, labour market related aspects were obviously not relevant. Having a tertiary education, on the other hand, had a strong impact on the well-being of the retired group, but was not that influential for the life satisfaction of the younger aged group. This suggests that the relationship between education and life satisfaction in the latter age group is mediated by other variables. On the other hand, also general societal trends may be at play as well. A tertiary degree nowadays has become a commodity and as such might have a lower value, including in terms of well-being.

Finally, this paper also examined country patterns in the association between selected predictors and life satisfaction. The analysis showed that gender (after controlling for other influences) has a weak effect on life satisfaction across the EU-28 but that there are substantial differences across countries: The strongest gender effects were observed for Portugal, Austria and Slovenia, while gender was not at all significant for the life satisfaction of people in Bulgaria, Lithuania or Romania. Strong and robust negative effects could on the other hand be shown for unemployment with the most negative impacts on life satisfaction in Lithuania, Slovakia and Denmark.

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Annex

Table A1: Regression Models 1-3

Independent variables	Model 1			Model 2			Model 3		
	Coefficient	p-value	standardised coefficient	Coefficient	p-value	standardised coefficient	Coefficient	p-value	standardised coefficient
Demography									
Age2	0.00036	<.0001	0.32088	0.00029	<.0001	0.25707	0.00016	<.0001	0.14476
AGE	-0.046	<.0001	-0.39368	-0.033	<.0001	-0.28135	-0.022	<.0001	-0.18619
Female	0.071	<.0001	0.01676	0.083	<.0001	0.01986	0.172	<.0001	0.0412
2 adults without children (Ref.)									
Living alone	-0.374	<.0001	-0.06612	-0.260	<.0001	-0.04603	-0.200	<.0001	-0.03563
2 adults with children	-0.035	0.0103	-0.00711	-0.031	0.013	-0.00647	0.012	0.2999	0.00252
other	-0.324	<.0001	-0.06514	-0.208	<.0001	-0.04216	-0.191	<.0001	-0.03893
Single parent household	-0.651	<.0001	-0.05351	-0.398	<.0001	-0.03318	-0.266	<.0001	-0.02251
Number of children									
	0.070	<.0001	0.0335	0.051	<.0001	0.02488	0.033	<.0001	0.01628
National (Ref.)									
EU-28 citizen	-0.008	0.731	-0.00055612	-0.092	<.0001	-0.00617	-0.017	0.3961	-0.00119
Non EU-28 citizen	-0.389	<.0001	-0.02843	-0.163	<.0001	-0.01146	-0.219	<.0001	-0.01564
Rural areas (Ref.)									
Cities	-0.139	<.0001	-0.03166	-0.110	<.0001	-0.02545	-0.067	<.0001	-0.01563
Towns, suburbs	-0.013	0.1531	-0.00265	-0.025	0.0018	-0.00545	-0.003	0.6451	-0.00074852
Material Living Conditions & Housing									
Log HH income	0.445	<.0001	0.19289	0.176	<.0001	0.07615	0.157	<.0001	0.06796
Severely materially deprived				-0.827	<.0001	-0.12171	-0.568	<.0001	-0.08308
Damp wall, rots in windows etc.				-0.210	<.0001	-0.0371	-0.124	<.0001	-0.02206
Productive or Main Activity									
Full-time employed (Ref.)									
Self employed	0.010	0.4635	0.00128	-0.001	0.9136	-0.00017639	-0.007	0.5791	-0.00084029
Part-time employee	0.117	<.0001	0.01284	0.009	0.5088	0.00106	0.059	<.0001	0.00675
Unemployed	-1.167	<.0001	-0.1456	-0.723	<.0001	-0.09117	-0.536	<.0001	-0.06806
In training	0.390	<.0001	0.04175	0.214	<.0001	0.02257	0.104	<.0001	0.01114
Retired	-0.104	<.0001	-0.0223	0.082	<.0001	0.01766	0.038	0.0007	0.00813
General Health									
Very good or good (Ref.)									
Fair				-0.611	<.0001	-0.12726	-0.317	<.0001	-0.06649
Bad or very bad				-1.534	<.0001	-0.22807	-0.872	<.0001	-0.12995
Education									
Lower secondary education (Ref.)									
Tertiary education	0.620	<.0001	0.12401	0.143	<.0001	0.02926	0.058	<.0001	0.01211
Upper secondary education	0.306	<.0001	0.07179	0.082	<.0001	0.01959	0.038	<.0001	0.00913
Leisure & Social interaction									
Having no one to rely on help				-0.711	<.0001	-0.07992	-0.243	<.0001	-0.02744
Economic and physical safety									
Inability to face unexpected expenses				-0.470	<.0001	-0.11031	-0.338	<.0001	-0.07979
Crime, violence or vandalism in the area				-0.119	<.0001	-0.01912	-0.033	0.0002	-0.0054
Governance									
Trust in institutions				0.2118	<.0001	0.23199	0.117	<.0001	0.12817
Trust in others							0.113	<.0001	0.1204
Natural & Living environment									
Pollution, grime or other environmental problem				-0.082	<.0001	-0.01366	-0.012	0.1613	-0.00205
Overall experience of life									
SF36 Mental well-being index							0.370	<.0001	0.34737
Adjusted R2	13.49			31.22			42.54		

Table A2: Regression Models (Men & Women)

Domain	Independent Variable	Men		Women			
Demography	age2	0.0002	<.0001	0.164	0.0001	<.0001	0.120
	AGE	-0.023	<.0001	-0.202	-0.020	<.0001	-0.173
	Female	-	-	-	-	-	-
	2 adults without children (Ref.)						
	Living alone	-0.241	<.0001	-0.041	-0.151	<.0001	-0.028
	2 adults with children	0.019	0.265	0.004	-0.006	0.686	-0.001
	other	-0.173	<.0001	-0.036	-0.207	<.0001	-0.041
	Single parent household	-0.254	<.0001	-0.014	-0.264	<.0001	-0.027
	Number of children	0.035	<.0001	0.017	0.029	<.0001	0.014
	Nationals (Ref.)						
	EU-28 citizen	-0.042	0.165	-0.003	0.002	0.948	0.000
	Non EU-28 citizen	-0.219	<.0001	-0.016	-0.218	<.0001	-0.016
	Rural areas (Ref.)						
	Cities	-0.061	<.0001	-0.014	-0.075	<.0001	-0.017
	Towns, suburbs	-0.013	0.251	-0.003	0.001	0.901	0.000
Material Living Conditions & Housing	Log HH income	0.128	<.0001	0.057	0.181	<.0001	0.076
	Severe material deprivation	-0.496	<.0001	-0.071	-0.610	<.0001	-0.091
	Damp walls, rot in windows etc.	-0.123	<.0001	-0.022	-0.126	<.0001	-0.022
Productive or Main Activity	Full-time employed (Ref.)						
	Self-employed	-0.096	<.0001	-0.009	0.040	0.005	0.006
	Part-time employed	0.042	0.009	0.006	0.060	0.007	0.005
	Unemployed	-0.701	<.0001	-0.094	-0.384	<.0001	-0.046
	In training	0.075	0.002	0.008	0.128	<.0001	0.013
Retired	-0.008	0.617	-0.002	0.085	<.0001	0.018	
Health	Very good or good general health (Ref.)						
	fair	-0.360	<.0001	-0.013	-0.313	<.0001	-0.066
	bad or very bad	-0.841	<.0001	-0.119	-0.868	<.0001	-0.134
Education	Lower secondary education (Ref.)						
	Tertiary education	0.113	<.0001	0.024	0.019	0.116	0.004
	Upper secondary education	0.055	<.0001	0.013	0.026	0.011	0.006
Leisure & Social interaction	Having no one to rely on help	-0.237	<.0001	-0.028	-0.245	<.0001	-0.027
Economic and physical safety	Inability to face unexpected expenses	-0.325	<.0001	-0.076	-0.347	<.0001	-0.082
	Crime, violence or vandalism in the area	-0.036	0.007	-0.006	-0.031	0.012	-0.005
Governance	Trust in institutions	0.119	<.0001	0.134	0.114	<.0001	0.123
	Trust in others	0.109	<.0001	0.117	0.117	<.0001	0.124
Natural & living env.	Pollution, grime or other environmental problem	-0.024	0.065	-0.004	-0.006	0.618	-0.001
Overall experience of life	SF-36 Mental well-being score	0.372	<.0001	0.346	0.368	<.0001	0.347
	Observations	133,015		160,980			
	Adj. R2	42.66		42.59			

Table A3: Regression Models (65+ & 20-64)

Domain	Independent Variable	Aged 65+		People of Working Age 20-64				
Demography	age2	-0.0005	0.000	-0.210	0.0005	<.0001	0.23769	
	AGE	0.064	0.001	0.197	-0.047	<.0001	-0.27897	
	Female	0.151	<.0001	0.035	0.183	<.0001	0.04446	
	2 adults without children (Ref.)							
	Living alone	-0.144	<.0001	-0.031	-0.216	<.0001	-0.03462	
	2 adults with children	-0.190	0.007	-0.008	0.051	<.0001	0.01156	
	other	-0.228	<.0001	-0.036	-0.172	<.0001	-0.03689	
	Single parent household	-0.534	0.003	-0.008	-0.258	<.0001	-0.02406	
	Number of children							
	Nationals (Ref.)							
	EU-28 citizen	0.075	0.209	0.004	-0.028	0.2073	-0.00209	
	Non EU-28 citizen	-0.148	0.013	-0.007	-0.222	<.0001	-0.01731	
	Rural areas (Ref.)							
	Cities	-0.054	0.000	-0.012	-0.077	<.0001	-0.01811	
Towns, suburbs	0.011	0.484	0.002	-0.012	0.1722	-0.00261		
Material Living Conditions & Housing	Log HH income	0.200	<.0001	0.069	0.149	<.0001	0.0686	
	Severe material deprivation	-0.525	<.0001	-0.068	-0.588	<.0001	-0.08844	
	Damp walls, rot in windows etc.	-0.067	0.000	-0.011	-0.142	<.0001	-0.0258	
Productive or Main Activity	Full-time employed (Ref.)							
	Self-employed	0.029	0.707	0.002	-0.019	0.1164	-0.00277	
	Part-time employed	0.159	0.060	0.007	0.047	0.0004	0.00617	
	Unemployed	0.191	0.377	0.003	-0.555	<.0001	-0.08143	
	In training	-0.496	0.345	-0.003	-0.002	0.9355	-0.00015367	
Health	Retired							
	Retired	-0.006	0.912	-0.001	-0.025	0.0908	-0.00361	
	Very good or good general health (Ref.)							
fair	-0.331	<.0001	-0.075	-0.310	<.0001	-0.06128		
bad or very bad	-0.886	<.0001	-0.175	-0.816	<.0001	-0.09985		
Education	Lower secondary education (Ref.)							
	Tertiary education	0.084	<.0001	0.014	0.045	<.0001	0.00983	
	Upper secondary education	0.069	<.0001	0.015	0.024	0.0068	0.00595	
Leisure & Social interaction	Having no one to rely on help	-0.242	<.0001	-0.028	-0.236	<.0001	-0.02649	
Economic and physical safety	Inability to face unexpected expenses	-0.310	<.0001	-0.069	-0.352	<.0001	-0.08423	
	Crime, violence or vandalism in the area	-0.032	0.104	-0.005	-0.036	0.0006	-0.00594	
Governance	Trust in institutions	0.133	<.0001	0.138	0.114	<.0001	0.12717	
	Trust in others	0.125	<.0001	0.128	0.108	<.0001	0.1161	
Natural & living env.	Pollution, grime or other environmental problem	-0.027	0.155	-0.004	-0.006	0.5611	-0.001	
Overall experience of life	SF-36 Mental well-being score	0.373	<.0001	0.348	0.368	<.0001	0.34712	
	Observations	71,386		212,455				
	Adj. R2	41.65		42.88				

Analytical report on subjective well-being

The analysis attempts to explain variations in subjective well-being using a range of variables included in Eurostat's Quality of Life framework and employing multivariate regression analysis as method. Three analytical models are used. The first one contains only socio-demographic variables (sex, age, citizenship, etc.), while in the second one objective variables (e.g.: income, health status) included in each dimension of the Quality of life framework are added, in order to test their impact. In the third model the effect of additional variables measuring subjective evaluations or perceptions (e.g. mental well-being, trust) is tested. The impact of different types of potential well-being drivers is therefore evaluated and described, while controlling for the effect of the others. The second part of the paper presents results of applying the models on different population subgroups (such as gender or particular age groups). A third section of the paper discusses the influences of country level variables (e.g.: inequality, level of economic development) on life satisfaction. The final part presents country patterns of the most influential drivers that have been identified according to the models applied in the previous sections.

For more information

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