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How the Well-Being Function Varies with Age: The Importance of Income, Health, and Social Relations over the Life Cycle *

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Abstract

Previous literature has identified income, poor health and social relationships as the most important predictors of subjective well-being (SWB). In addition, the literature has identified a non-linear relationship between age and SWB, with a dip in SWB in mid-life. Explanations of the non-linear age-SWB relationship include the notion of unmet aspirations and the idea that people's emotional response to the drivers of SWB changes with age. Against this background, we use representative longitudinal data for Germany (1992-2019) with about 570,000 observations for more than 88,000 individuals aged 16-105 years to investigate if and how the association between SWB and its main predictors changes over the life cycle. Using fixed effects estimation to control for cohort effects and unobserved personal characteristics, we find that the marginal effects of income and social relationships vary with age in a wave-like fashion, while the negative marginal effect of poor health increases monotonically and progressively with age. Our results are similar for alternative measures of SWB (life satisfaction and living in misery) and for men and women. The age-related changes in the importance of income and social relationships for SWB found in this paper help to explain the relationship between age and SWB found in previous literature.

Keywords: subjective well-being; life satisfaction; life cycle happiness; income; health; social relations; employment

JEL Classification Numbers: I31; J10; C21; C23

Word Count: 10,000

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1 Introduction

The literature on subjective well-being (SWB) has found robust evidence that people who report higher SWB tend to be in good health, have higher incomes, are in a partnership and are employed (Frijters and Krekel, 2021).¹ Consistent with these findings, there are three broad factors that explain individuals' SWB: health, wealth, and close personal relationships at home and at work (Lamu and Olsen, 2016). In addition to these factors, fixed traits and dispositions (inherited or acquired during childhood) contribute to the SWB of adult individuals (De Neve et al., 2012; Bartels, 2015; Clark et al., 2018).

The SWB literature also agrees on a typical pattern of SWB over the life cycle: SWB decreases from adolescence to midlife and increases thereafter, resulting in a U-shaped age-SWB relationship until old age.² Moreover, there is evidence that SWB begins to decline again at very old ages (Wunder et al., 2013; Ranjbar and Sperlich, 2020; Biermann et al., 2022).

To explain the decline in well-being up to midlife, psychologists have focused on the role of missed opportunities and unfulfilled aspirations (Schwandt, 2016), whereas an explanation for the recovery of well-being thereafter involves the notion that people learn to cope better with unfavourable circumstances (Carstensen, 1995; Lawton, 1996) and that their emotional response to depressing factors decreases with age (Brassen et al., 2012).

Age-related learning to cope with circumstances and age-related changes in the strength of emotional responses suggest the possibility that not only the key factors of well-being – i.e., health, wealth and social relationships – may change over the life cycle, but also the strength with which well-being responds to these factors. For example, income may become less important as a factor in well-being as people adjust their income aspirations to what is reasonably achievable (Campbell et al., 1976). In addition, some factors may change in importance for non-psychological reasons. For example, income may regain importance in old age as people's increasing financial burden of medical treatment and care may cause them distress.

These considerations suggest that the importance of the main predictors of well-being may vary over the life cycle. The present paper examines this question: Does the association between SWB and health, wealth and social relations change over the life course? Or, in other words, does age affect well-being not (only) directly, but as a moderator of other influences, and how does it moderate these influences?

The association between SWB and its main predictors has occasionally, but not systematically, been differentiated by age. Using longitudinal data on individuals aged 50 and over from the English Longitudinal Study of Ageing (ELSA), life satisfaction was found to be significantly and positively related to income, being employed and being married (rather than divorced or widowed), but not to having a disabling long-term illness, for individuals aged 54-64. However, for individuals aged 64 and over, the association between SWB and income, being employed and being married was statistically not significant, and the relationship with having a

¹SWB includes life satisfaction and happiness. In the following, we use the terms (subjective) well-being, (life) satisfaction and happiness interchangeably, unless otherwise stated.

²See Blanchflower (2021) for cross-national evidence and Blanchflower and Graham (2022) for a comprehensive review of the literature.

limiting long-standing illness was significantly negative (Clark et al., 2018).³ In a cross-section of individuals aged 12-94 from Germany, reported life satisfaction was found to be negatively correlated with poor health and financial worries and positively correlated with partnership. However, the negative association with poor health was stronger for younger than for older people, while the negative association with financial worries was strongest for people aged 50-69. (Karwetzky et al., 2022).

While the longitudinal data used by Clark et al. (2018) make it possible to control for time-invariant confounders (such as individuals' birth cohort and stable psychological traits) and to examine how changes in life satisfaction are related to changes in circumstances, their data are limited to people at older ages and do not allow for the study of dynamic relationships over the life cycle. In contrast, the study by Karwetzky et al. (2022) covers the whole life cycle (from adolescence), but the study design has other limitations. First, the data are not representative of the German population and carry the risk of selection bias, since the study design involved voluntary participation via the Internet. Second, the cross-sectional nature of the data makes it impossible to distinguish life-cycle effects from cohort effects (since an individual's age and year of birth are perfectly collinear).⁴ Third, cross-sectional data prevent the use of person fixed effects to control for unobserved heterogeneity.

Apart from these studies, there appear to be no other papers that focus on the relationship between SWB and its main predictors at different stages of the life cycle. In our paper, we address the limitations of these studies by using representative longitudinal data for individuals at all stages of the (adult) life cycle. By using person-fixed effects, we are able to control for cohort effects. In addition, person-fixed effects mitigate the risk of endogeneity by controlling for the possibility that “genuinely” happier individuals have better health, higher income, better social relationships and higher life expectancy.⁵ This allows us to examine how within-person changes in SWB are associated with income, health and social relationships, and to see if and how these associations vary over the life course.

Our empirical analysis is based on about 570,000 observations for more than 88,000 individuals (aged 16-105) from the German Socio-Economic Panel (SOEP), one of the few panel data sets worldwide with a long time span and indeed one of the most widely used data sets in the SWB literature. We use a fixed effects estimation, regressing life satisfaction on income, poor health and indicators of social relationships, a polynomial function of age, and interaction terms of income, poor health and social relationships with the age polynomial. Our empirical analysis shows that the marginal effects of income and social relations vary with age in a wave-like fashion. Specifically, the importance of income for SWB increases until people's mid-forties, then decreases and starts to increase again in the early eighties. Similarly, the importance of social

³Within-person changes over an 8-year interval in income, employment and marital status were insignificant for both age groups (54-64 and over 64), whereas a new long-standing illness was significant only for those aged over 64 (Clark et al., 2018).

⁴Hidden cohort effects imply that what appears to be the effect of ageing is actually due to people being born at different times (De Ree and Alessie, 2011). Cohort effects can arise because individuals of a particular generation may react similarly to circumstances due to shared beliefs and life experiences (Parry and Urwin, 2017).

⁵Endogeneity of life expectancy, referred to as “survival of the happy” (Segerstrom et al., 2016), can lead to biased results. To address this issue, we also present robustness checks with data restricted to individuals under the age of 70.

relationships (or the lack of them) increases until mid-age, then decreases and increases again in old age. In contrast, the importance of poor health increases monotonically and progressively with age. Our results are similar for alternative measures of SWB (life satisfaction and misery) and for men and women.

The remaining parts of the paper are organised as follows. Section 2 reviews the relevant literature. Sections 3 and 4 describe the data and the econometric approach. Section 5 presents and discusses the results and section 6 concludes.

2 Background Literature

There are a number of reviews of the economic literature on the factors associated with SWB (Dolan et al., 2008; Frijters and Krekel, 2021). The latter reference is a book-length comprehensive account of the history, frameworks, metrics, data and methodologies related to SWB. It states that the most important factors for SWB – especially life satisfaction – are good health, high income and close contacts and relationships at home and at work. Specifically, while no more than 20 per cent of the individual-level variation in life satisfaction can be explained by observable factors, most of this 20 per cent is accounted for by health (61 per cent), followed by having a partner (15 per cent), income (10 per cent) and not being unemployed (8 per cent) (Frijters and Krekel, 2021). As income levels are typically controlled for in life satisfaction regressions that include unemployment, the (negative) association between life satisfaction and not being employed is assumed to be due to reduced social relationships rather than the lower income associated with unemployment.⁶ Other determinants of adult SWB include fixed individual characteristics and dispositions (inherited or acquired in childhood) and age. The main predictors of well-being are discussed in turn below.

2.1 Health

Studies consistently show a strong relationship between SWB and both physical and psychological health. Psychological health appears to be more important for SWB than physical health, but this is not surprising given the close correspondence between psychological health and SWB (Clark et al., 2018). While some of the association may be due to reverse causation, specific conditions such as heart attack and stroke reduce well-being (Shields and Price, 2005), and the causality here is most likely from the health condition to SWB. The inclusion of specific health conditions also reduces the problems associated with using self-rated health as the health variable, as do fixed effects estimates (provided that personal reporting styles are constant over time). There is evidence that individuals adjust somewhat to disability status, but adjustment is far from complete. A typical finding from longitudinal studies is that three years after disability, the decline in life satisfaction is still

⁶There are estimates of the relative importance of the three main factors of SWB. For example, Lamu and Olsen (2016) estimate that the marginal contribution of health, income and social relations to SWB (as a share of goodness of fit) is 19.3, 7.3 and 50.2 per cent respectively. Their quantile regressions show that the influence of key determinants varies significantly between low and high levels of the SWB distribution, with health and income having a stronger influence among those with relatively lower SWB.

about 60 per cent of the initial effect ([Oswald and Powdthavee, 2008](#)).

2.2 Income

Virtually all studies on the economics of SWB include personal or household income as an important determinant of well-being and find that SWB is positively and significantly related to income. Moreover, the relationships found are typically consistent with the idea of diminishing marginal utility of income. However, it is not clear to what extent income causes well-being. In particular, there may be reverse causation, i.e. personality-related “inherent” happiness may imply higher productivity ([Oswald et al., 2015](#)), or unobserved third factors, such as individual traits, may influence both happiness and productivity ([Dolan et al., 2008](#)). Again, fixed effects estimation is helpful to address these issues.

A more far-reaching finding than diminishing marginal utility is “income satiation”. In a study of 164 countries around the world, life satisfaction saturation was found to occur at an annual income of 95,000 USD, with considerable variation across world regions. For the North American region, the saturation point of life satisfaction was 105,000 USD ([Jebb et al., 2018](#)).⁷ Important factors explaining satiation are relative income effects (income comparisons) – if everyone’s income rises, it has little effect on well-being – and hedonic adaptation ([Clark et al., 2008](#)).

2.3 Employed Status

With regard to unemployment, virtually every study of subjective well-being that has taken labour force status into account has found that people who are unemployed experience significantly lower levels of SWB than people who have a job. This holds even when income levels are controlled for ([Dolan et al., 2008](#)). This implies that the effect of unemployment on SWB is due to psychological and social factors, including the loss of relationships at work, rather than the loss of income associated with unemployment ([Feather, 1990](#)). In quantitative terms, an early study of unemployment and SWB (for Britain) concluded that “joblessness depressed well-being more than any other single characteristic, including divorce and separation” ([Clark and Oswald, 1994](#), p.655), and this has been confirmed in many other data sets.

As with health and income, there is a question of causality: does unemployment make people unhappy, or do unhappy people have a higher risk of being made redundant? The latter may be the case because unhappy people may not perform well, making them more likely to lose their jobs. However, looking at the evolution of life satisfaction over time shows that people who later become unemployed do not start with low life satisfaction, but experience a drop in satisfaction when they are made redundant ([Lucas et al., 2004](#)). This suggests that the dominant causality runs from unemployment to unhappiness rather than vice versa. The drop in life satisfaction also refutes the claim that unemployment is voluntary: If unemployment is chosen over employment, it

⁷A study applying quantile regression techniques to US data found that emotional well-being is significantly positively related to income above 100,000 USD, unless individuals belong to the bottom 20 per cent of the happiness distribution ([Killingsworth et al., 2023](#)).

should lead to a higher level of well-being.

It has also been investigated whether there are adjustment effects in the relationship between unemployment and well-being. It was found that individuals who have been unemployed for more than a year have a more negative reaction to unemployment, and that previous experience of unemployment does not reduce the damage of current unemployment. Moreover, there is a “scarring” effect, as individuals do not return to their pre-unemployment level of life satisfaction once unemployment has ended (Clark et al., 2001). Rather, any period of unemployment in the last 10 years has a negative impact on well-being (Louis and Zhao, 2002). It has also been suggested that the impact may depend on the extent to which individuals can substitute other activities for work and belong to non-work based social networks (Dolan et al., 2008), underlining the role of social relationships as an important channel through which employment promotes well-being.

Specific employment issues include late-life work and retirement. Research has shown that late-life work has a positive effect on well-being, while involuntary retirement decreases well-being in the US (Bender, 2012), Germany (Bonsang and Klein, 2012) and Australia (Atalay and Barrett, 2022). Using data for several European countries and the US, it was found that late-life workers in voluntary part-time or full-time arrangements have higher well-being than retirees, while there is no well-being premium for involuntary late-life work compared to retirement (Nikolova and Graham, 2014).

2.4 Social Relations

In terms of social relationships outside the workplace, being alone goes with less SWB than being part of a partnership. Whether people are alone is not usually measured directly, but by marital status. A consistent finding is that people who live with a partner – especially those who are married – are the most satisfied, followed by singles, widowed and divorced people, and those who are separated from a partner. This ranking was found to hold true for a set of more than 40 European societies, even when differences in normative climate were taken into account (Verbakel, 2012). The importance of being in a partnership for well-being holds even when reverse causality is taken into account, i.e. people with high levels of well-being choose to be in a partnership (Dush and Amato, 2005; Stutzer and Frey, 2006). Because the studies control for income, the well-being benefits of not living alone are not due to financial economies of scale from living in a larger household.

2.5 Individual Traits and Dispositions

In addition to the variable factors discussed so far, twin studies and genetic association studies suggest that inherited (genetic) traits contribute to the variation in SWB (De Neve et al., 2012; Bartels, 2015). In addition, adult SWB depends on predetermined “childhood outcomes”, such as intellectual and emotional characteristics and behavioural dispositions (Clark et al., 2018).

Fixed characteristics (genetically inherited and acquired in childhood) have been the backbone of the so-called set-point theory of happiness, which holds that after changes in circumstances, well-being returns to

a baseline level that is partly determined by genetic dispositions and personality (Diener and Lucas, 1999). In particular, changes in health, wealth and social relations were thought to have only transitory effects on well-being. Longitudinal analyses, however, have disproved set-point theory in its strictest form. Using data from Germany, for example, it has been shown that after changes in circumstances, people remain above or below their average level of well-being for much longer than can be explained by set-point theory, and some do not return to their previous average level at all (Headey and Muffels, 2018). Examples of induced long-term changes in well-being are the “scarring effect” of unemployment discussed above. In addition, personal and economic choices have been found to affect well-being in longitudinal data from Australia, Britain and Germany (Headey et al., 2013).

While well-being is malleable even in the long run, contrary to what set-point theory predicts, fixed traits and dispositions explain about a third of the overall variation in well-being (De Neve et al., 2012; Bartels, 2015).

2.6 Age

Studies consistently find a negative relationship between age and SWB and a positive relationship between age squared and SWB (Dolan et al., 2008). This implies an age-SWB curve with higher levels of well-being at younger and older ages and the lowest levels of life satisfaction occurring in middle age, between the mid-30s and mid-50s, depending on the study. A recent paper looking at repeated cross-sectional data for people under 70 found such a U-shape relationship in 145 countries (Blanchflower, 2021).

While the existence of a local minimum of well-being in midlife is documented in a large body of literature (reviewed by Blanchflower and Graham (2022)), this does not preclude the possibility of a local maximum later in the life course. Psychological theories that may lead to a minimum in midlife and a maximum in old age include a combination of unmet aspirations, aspirational adjustment, changes in emotional response, and the impending death effect.⁸

In order to empirically test the hypothesis of a wave-like age-SWB relationship, several studies have generalised the quadratic specification of the relationship to a cubic one or used semi-parametric approaches (Wunder et al., 2013; Ranjbar and Sperlich, 2020) and applied them to data sets that include individuals over the age of 70.⁹ For example, Wunder et al. (2013) used longitudinal panel data for the UK and Germany and found a

⁸Unmet aspirations may explain why life satisfaction declines throughout young adulthood due to missed goals and opportunities (Schwandt, 2016). This phenomenon peaks in midlife (around age 40-50) for two reasons. First, people adjust their level of aspiration (Easterlin, 2006). Second, as suggested by neurological and psychological studies, an individual’s emotional response to missed opportunities and unfulfilled aspirations decreases with age (Brassen et al., 2012). As a result, people recover from their midlife crisis and well-being begins to rise. Finally, as people reach old age, an impending death effect implies that SWB declines sharply in the years before death (Small and Bäckman, 1997). Importantly, this effect holds even after controlling for deteriorating health status (Small et al., 2003).

⁹In developed economies, people over the age of 70 represent a significant proportion of the population. In Germany, at the end of 2021, the proportion of men aged 70 or older was 13.9 percent of the population, while that of women was 17.9 percent (see Federal Statistical Office (“Statistisches Bundesamt”, Destatis), GENESIS-Online Database, retrieved: May 2023).

common age-specific pattern of life satisfaction for both countries, involving three age stages. In the first and second stages, a U-shaped profile is a good approximation of decreasing and increasing well-being. However, after people reach their late 60s, a decline in well-being is found in the third stage. A similar wave-like pattern has been found in several other studies (Gwozdz and Sousa-Poza, 2010; Baetschmann, 2014; Wooden and Li, 2014; Morgan et al., 2017; Laaksonen, 2018; Biermann et al., 2022).

An important issue to deal with when examining the age-SWB relationship is to account for cohort effects, i.e., to ensure that what appears to be an effect of ageing is not actually due to people being born at different times (De Ree and Alessie, 2011). While Blanchflower (2021) compares older and younger birth cohorts in repeated cross-sections and finds no difference in the age-SWB relationship in the respective subsamples, longitudinal data allow blocks of birth years (such as birth decades) to be included together with age and their respective effects to be estimated. However, since an individual's birth cohort is obviously constant over time, the inclusion of person-specific fixed effects makes it impossible to distinguish cohort effects from the time-constant characteristics of individuals discussed above. One approach to separating the effect of time-constant observables (such as birth cohort) from (unobserved) fixed effects is the correlated random effects technique proposed by Mundlak (1978). Using such an approach, Biermann et al. (2022) found evidence of a wave-like age-SWB pattern with a local minimum in the late 40s and a local maximum around 95. If the aim is to control for cohort effects and unobserved heterogeneity without distinguishing between them, standard fixed effects estimation is appropriate.

3 Data and Variables

The data used in this paper come from the German Socio-Economic Panel (SOEP), one of the most widely used panel data sets in the literature on subjective well-being. The SOEP is a representative panel survey based on a multi-stage random design with annual re-interviews (Wagner et al., 2007).¹⁰ The annual waves of the survey cover more than 20,000 individuals aged 16 and over in about 11,000 households. We use SOEP version 36.

The dependent variable in our well-being regressions is Life Satisfaction (LS), which is obtained from responses to the following question: *“How satisfied are you at present with your life, all things considered? Please respond using the following scale, where ‘0’ indicates not at all satisfied and ‘10’ indicates completely satisfied.”*

The independent variables of main interest are self-rated health, equivalised income, employment status, whether living alone and age. Being employed and living alone are our indicators of social relationships, either at work or at home. The health variable is derived from the following question: *“How would you describe your current health?”* The variable is coded as follows: very good = 1, good = 2, satisfactory = 3, poor = 4, bad = 5. The variable income is defined as the logarithm of equivalised income. This variable is calculated

¹⁰The SOEP has been collecting data on life satisfaction since 1984 (initially for West Germany). There are only two other nationally representative panel data sets that have collected data on subjective well-being over a long period of time, the British Household Panel Survey (BHPS) in the UK and the Household, Income and Labour Dynamics in Australia (HILDA) survey.

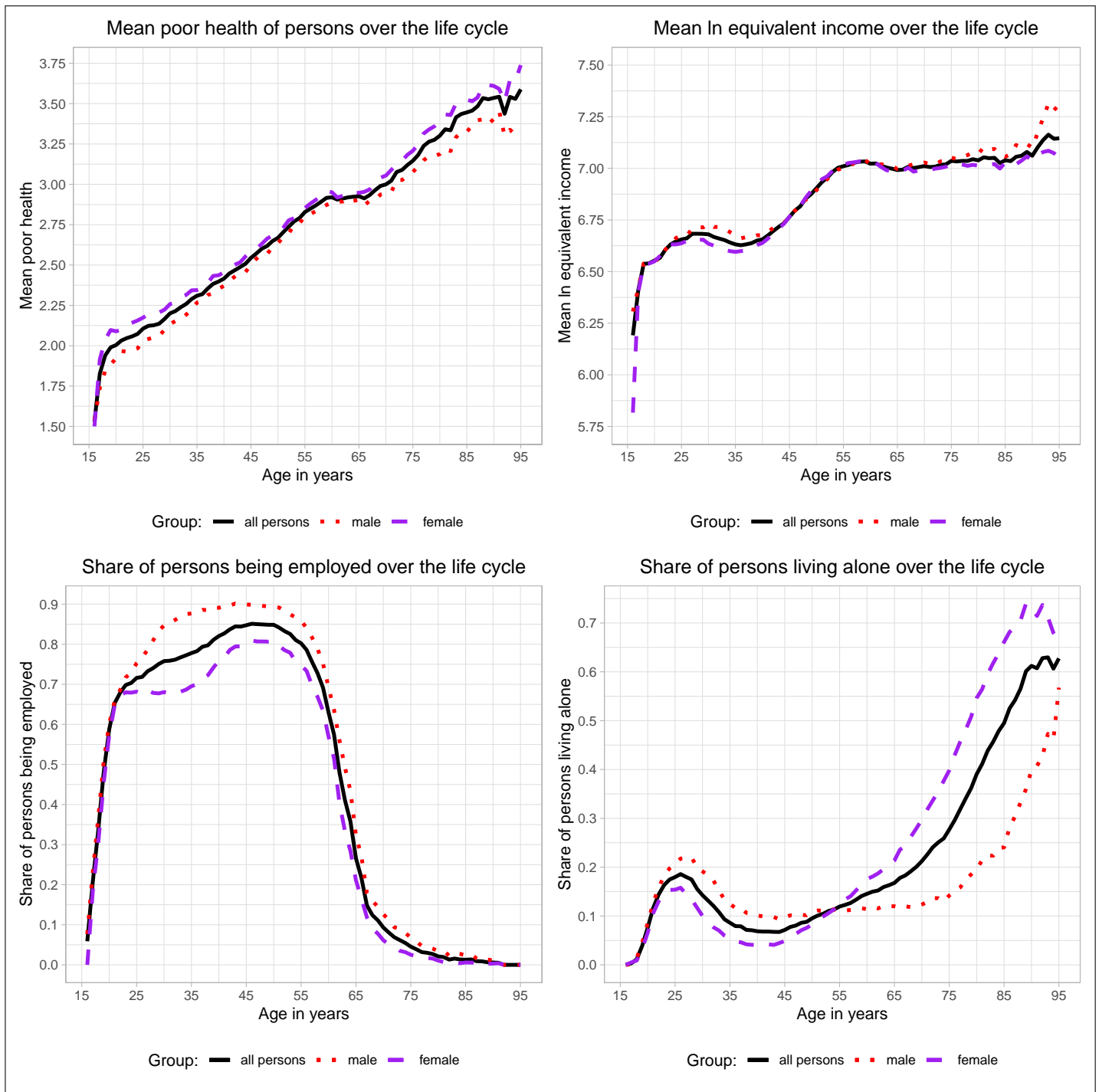


Figure 1: Evolution of the Various Variables of Interest Over the Life Cycle

Notes: This figure visualizes the evolution of the various variables of interest over the life cycle.

by dividing the household's total income from all sources by its equivalent size, which is calculated using the modified OECD equivalence scale. This scale assigns a weight to each member of the household: 1.0 to the first adult; 0.5 to the second and each subsequent person aged 14 and over; 0.3 to each child aged under 14. The equivalent size is the sum of the weights of all members of a given household.

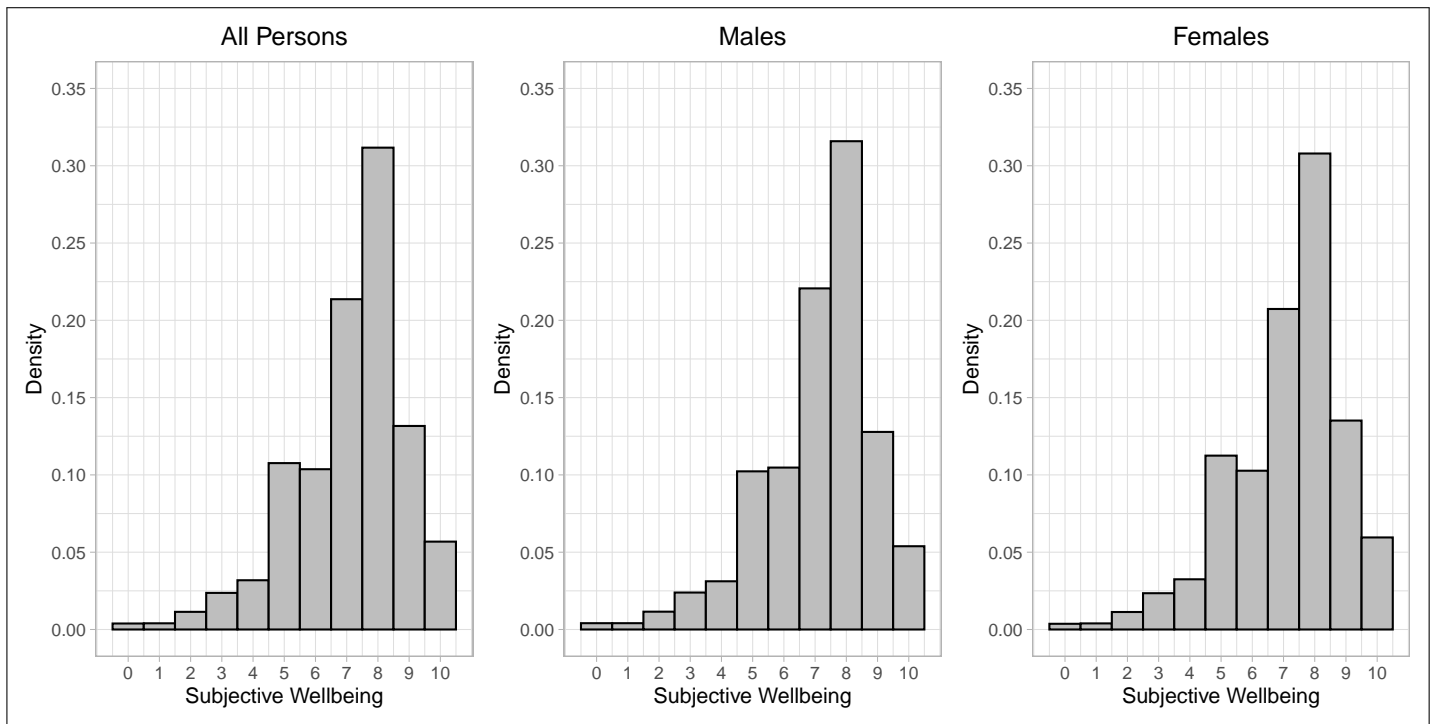


Figure 2: Histogram of Subjective Well-being Across Persons

Notes: This figure visualizes the distribution of subjective well-being values across persons and over time.

The variable *Employed* is derived from the question “Were you employed in the last year?” and is coded as: yes = 1; no = 0. The variable *Alone* is derived from household size. It is equal to 1 if the household size is 1 and 0 otherwise.

The dataset used in this paper covers the period 1992-2019 and includes up to 570,063 observations for 88,643 individuals. Summary statistics for all variables are presented in Table A1. The mean of the life satisfaction variable is 7.12 for all individuals in the sample. The subsamples for men and women show no significant differences in life satisfaction between the two groups. With regard to age (measured in decades), it should also be noted that the proportion of people aged 70 and over is substantial (around 7.5 per cent), so they should not be excluded on the grounds that they are too few in number.

Table A2 shows the correlation coefficients for the full sample and Table A3 for the reduced sample used in some of the robustness checks. The correlations between the explanatory variables are small to moderate. The highest correlations are between age and poor health (corr. = 0.38), income (corr. = 0.27) and employment (corr. = -0.35).

Figure 1 shows the evolution of poor health, equivalised income, employment and living alone by age. Health deteriorates monotonically over the life cycle. Equivalised income shows a dip in the late thirties and a slight decline around retirement age, after which there is little change. Employment status is hump-shaped over the life cycle, with a sharp drop between the ages of 60 and 70 due to retirement. After that, between 10 and 5 per cent of people remain in employment. The proportion of people living alone increases until the late twenties. The proportion then falls again until the mid-forties, after which it rises steadily.

Figure 2 shows a histogram of subjective well-being (life satisfaction). The most common level of satisfaction is 8. From this observation, we define our “living in misery” variable that equals 1 if SWB is equal or smaller than 4 and 0 otherwise.

4 Econometric Approach

To examine how the effects of poor health, income and social relationships vary with age, we consider the following regression model:

$$LS_{it} = \sum_{j \in \mathbb{M}} \left(\left(\beta_0^{(j)} + \beta_1^{(j)} age_{it} + \beta_2^{(j)} age_{it}^2 + \beta_3^{(j)} age_{it}^3 \right) X_{it}^{(j)} \right) + \sum_{k=1}^3 \gamma_k age_{it}^k + \mathbf{W}_{it}' \boldsymbol{\delta} + \lambda_i + \varepsilon_{it}, \quad (1)$$

where LS_{it} is the well-being (or life satisfaction) of individual i at time t , $X_{it}^{(j)}$ refers to the variables of interest $j \in \mathbb{M} = \{poor\ health, \ln(income), employed, alone\}$. Our model equation allows for an age-independent effect on LS $\beta_0^{(j)}$ for each of the variables of interest, as well as an age-dependent effect modelled as a 3rd-order polynomial function of the individual’s age. The latter corresponds to the total marginal impact of a variable of interest on LS and is obviously given by:

$$\frac{\partial LS}{\partial X_{it}^{(j)}} = \beta_0^{(j)} + \beta_1^{(j)} age_{it} + \beta_2^{(j)} age_{it}^2 + \beta_3^{(j)} age_{it}^3. \quad (2)$$

\mathbf{W}_{it}' is a vector of standard individual- and household-level controls. Throughout the empirical analysis, we examine the sensitivity of our baseline findings to the individual’s marital status, educational level, and number of children. Moreover, λ_i refers to person-specific fixed effects (FE).¹¹ Finally, ε_{it} is an idiosyncratic error term. Standard errors are clustered at the person level i in all regressions.

5 Results and Discussion

5.1 Main Estimation Results and Marginal Effects

Table 1 presents the main results of our fixed effects estimations. The coefficient estimates are within-person effects. Column 1 shows the results of our baseline specification, which includes the variables poor health, $\ln(income)$, being employed, living alone, a third-degree age polynomial without interaction terms and person-specific fixed effects. As expected, income and being employed have positive coefficients, while poor health and living alone have negative coefficients. All regressions coefficients are statistically significant at the 1% significance level.

A deterioration in self-rated health of 1 point (on the 5-point scale) is associated with a decrease in life satisfaction of 0.5022 points (on the 11-point scale), while an increase in income of 1% is associated with an increase in life satisfaction of 0.0030 points. Getting a job is associated with an increase in satisfaction of

¹¹Note that the inclusion of person-specific FE implicitly accounts for cohort effects throughout the empirical analysis.

Table 1: The Impact of Wealth, Poor Health, and Sociability Measures – Baseline Results

	(1) Baseline Controls	(2) Only Poor Health	(3) Only Income	(4) Only Employed	(5) Only Living Alone	(6) All	(7) Full Model Male	(8) Female
<i>Self-Reported Subjective Well-Being (from Low = 0 to High = 10)</i>								
Poor Health	-0.5022*** (0.0039)	-0.1595*** (0.0587)	-0.5020*** (0.0039)	-0.5007*** (0.0039)	-0.5021*** (0.0039)	-0.2478*** (0.0592)	-0.4474*** (0.0890)	-0.0892 (0.0793)
ln(Income)	0.3008*** (0.0089)	0.3024*** (0.0088)	-0.1798 (0.1134)	0.3032*** (0.0089)	0.3103*** (0.0089)	-0.5995*** (0.1158)	-0.5995*** (0.1660)	-0.6680*** (0.1630)
Employed	0.0411*** (0.0081)	0.0437*** (0.0081)	0.0396*** (0.0081)	-1.5965*** (0.1214)	0.0389*** (0.0081)	-1.5381*** (0.1217)	-2.4753*** (0.1829)	-1.1074*** (0.1703)
Alone	-0.2733*** (0.0144)	-0.2761*** (0.0143)	-0.2759*** (0.0144)	-0.2754*** (0.0144)	1.4820*** (0.2055)	1.3783*** (0.2075)	1.6742*** (0.3109)	0.7945*** (0.2882)
[Age]	-0.9846*** (0.0602)	-0.3814*** (0.1083)	-2.6198*** (0.5386)	-1.4427*** (0.0725)	-0.8844*** (0.0638)	-4.3843*** (0.5509)	-5.5342*** (0.7955)	-4.0975*** (0.7766)
[Age] ²	0.1910*** (0.0125)	0.0432* (0.0234)	0.4438*** (0.1158)	0.2871*** (0.0151)	0.1717*** (0.0136)	0.7530*** (0.1183)	1.0166*** (0.1721)	0.6860*** (0.1664)
[Age] ²	-0.0122*** (0.0008)	0.0001 (0.0016)	-0.0242*** (0.0078)	-0.0182*** (0.0010)	-0.0111*** (0.0009)	-0.0385*** (0.0079)	-0.0579*** (0.0117)	-0.0327*** (0.0111)
Poor Health × [Age]		-0.1952*** (0.0399)				-0.1309*** (0.0403)	0.0248 (0.0605)	-0.2519*** (0.0540)
Poor Health × [Age] ²		0.0430*** (0.0084)				0.0293*** (0.0085)	-0.0065 (0.0127)	0.0566*** (0.0113)
Poor Health × [Age] ³		-0.0034*** (0.0005)				-0.0025*** (0.0006)	0.0000 (0.0008)	-0.0044*** (0.0007)
ln(Income) × [Age]			0.2590*** (0.0783)			0.5344*** (0.0800)	0.5385*** (0.1146)	0.5907*** (0.1131)
ln(Income) × [Age] ²			-0.0409** (0.0167)			-0.0921*** (0.0170)	-0.0956*** (0.0244)	-0.1031*** (0.0240)
ln(Income) × [Age] ³			0.0020* (0.0011)			0.0048*** (0.0011)	0.0054*** (0.0016)	0.0053*** (0.0016)
Employed × [Age]				1.2680*** (0.0917)		1.2202*** (0.0919)	1.9282*** (0.1383)	0.9186*** (0.1297)
Employed × [Age] ²				-0.2885*** (0.0212)		-0.2780*** (0.0213)	-0.4167*** (0.0312)	-0.2255*** (0.0308)
Employed × [Age] ³				0.0201*** (0.0015)		0.0194*** (0.0016)	0.0273*** (0.0022)	0.0171*** (0.0023)
Alone × [Age]					-1.1562*** (0.1382)	-1.0651*** (0.1400)	-1.2269*** (0.2105)	-0.6657*** (0.1954)
Alone × [Age] ²					0.2199*** (0.0280)	0.1950*** (0.0284)	0.2119*** (0.0433)	0.1246*** (0.0394)
Alone × [Age] ³					-0.0126*** (0.0018)	-0.0106*** (0.0018)	-0.0110*** (0.0028)	-0.0068*** (0.0025)
Observations	570063	570063	570063	570063	570063	570063	271041	299022
Number of Persons	88643	88643	88643	88643	88643	88643	43736	44907
Adjusted R ² Within	0.074	0.076	0.074	0.075	0.074	0.077	0.080	0.076
Person FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: The dependent variable is self-reported subjective well-being (0 = Low to 10 = High). *Poor Health* refers to self-rated health status (very good=1 to bad=5). *ln(Income)* is the ln of the monthly household net equivalent income (in EUR). *Employed* is equal to 1 for individuals who are currently employed, otherwise it is equal to zero. *Living alone* is equal to 1 for individuals with a household size of one, otherwise it is equal to zero. Standard errors, clustered at the individual level, are shown in parentheses. *: Significant at the 10% level. **: Significant at the 5% level. ***: Significant at the 1% level.

0.0411 points, while entering the status of living alone is associated with a decrease in satisfaction of 0.2733 points. The linear, quadratic and cubic age terms have significant negative, positive and negative coefficients, respectively, consistent with the usual mid-life dip in life satisfaction and a drop at very old age.

In columns 2 to 5, we introduce interaction terms between *poor health*, *ln(income)*, *employment* and *living alone* on the one hand and the age polynomial function on the other. Column 6 shows the fully specified model

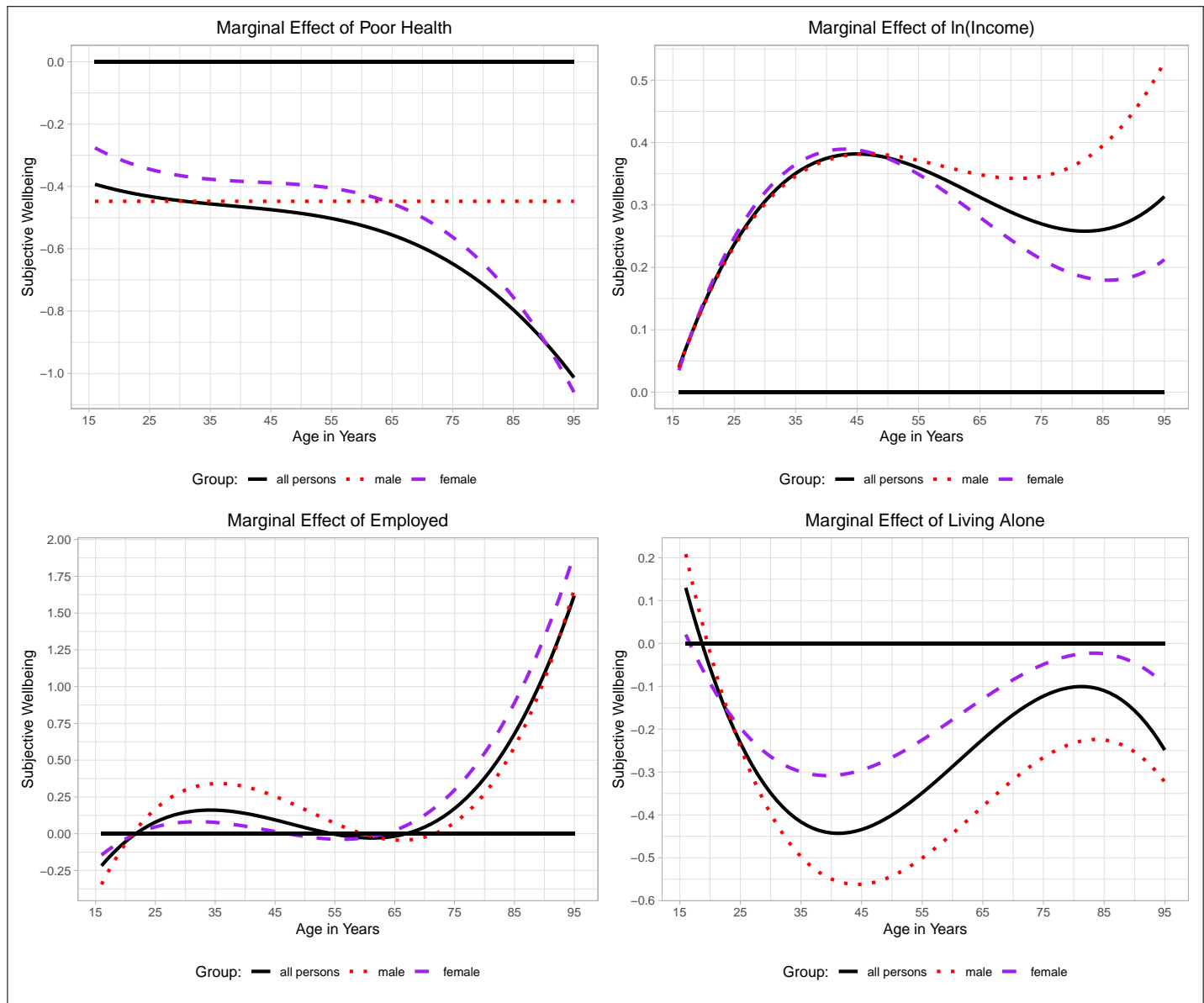


Figure 3: Marginal Effects of the Various Variables of Interest Over the Life Cycle

Notes: This figure shows the marginal effect of the different variables of interest over the life cycle. The regression specification is based on column (6) of Table 1 for all persons, and columns 7 and 8 for the male and female samples respectively. Note that we have calculated the marginal effects with the highest number of decimal places. However, the coefficients in Table 1 are rounded to four decimal places.

including all interaction terms simultaneously. It can be seen that all interaction terms are highly significant in throughout all specifications.

Regarding the poor health variable, we find that the interaction terms for poor health are negative with respect to age , positive with respect to age^2 and negative with respect to age^3 (columns 2 and 6). In addition, the effect of poor health not interacted is negative. Note that these coefficients cannot be interpreted separately as the ceteris paribus condition does not hold. However, we can examine the marginal effect and the absolute effect of the poor health variable. The marginal effect of poor health (see equation 2) is plotted in Figure 3,

which shows that it is negative throughout the age range and becomes stronger over the life cycle.

However, the change in effect size is rather moderate until people reach their sixties, after which the effect becomes progressively stronger. Thus, the impact of poor health on life satisfaction increases with age. The calculation of the absolute effect makes this clearer. Based on the specification in column 6, the absolute effect of poor health on life satisfaction for a twenty-year-old with an average health status of 3 is -1.2386 points. For an eighty year old with the same health status, the absolute impact is -2.1419 points, which is 1.7 times higher.¹²

For $\ln(\text{income})$, the interactions with age and age^3 are positive, while the interaction with age^2 is negative (see columns 3 and 6). Furthermore, the effect of $\ln(\text{income})$ not interacted is negative. The marginal effect of income is consistently positive and hump-shaped over much of the life cycle, i.e. it rises until the age of 45 and then falls. It starts to increase again at the age of 83. The absolute contribution of $\ln(\text{income})$ to life satisfaction for those aged twenty, forty-five and eighty with an $\ln(\text{income})$ of seven is 0.9786, 2.6725 and 1.8134 points of life satisfaction respectively.¹³ The absolute contribution of an $\ln(\text{income})$ of seven of a forty-five year old is 2.73 and that of an eighty year old is 1.85 times higher than that of a twenty year old.

Concerning the interactions of being employed with the age polynomial (columns 4 and 6), the coefficients of the interaction terms with age , age^2 and age^3 are positive, negative and positive, respectively. The coefficients of employed not interacted are negative. In the case of a dummy variable, the marginal and absolute effects coincide because the marginal effect is equal to the absolute effect for those who are employed, i.e., employed is equal to one. The marginal/absolute effect of being employed on life satisfaction is shown in the Figure 3. The marginal effect of being employed is negative before the early twenties and positive thereafter. The negative effect at a young age can be explained by the fact that for young adults the typical alternative to being employed is to be in education, which arguably offers no less opportunities for socialising than being employed, but may be preferred to being employed for other reasons (e.g., less workload and higher social status). From the early twenties onwards, the marginal effect of being employed is hump-shaped with age, i.e., it increases until the late thirties and then decreases until the mid-sixties. While the marginal effect is close to zero around the typical retirement age (early to mid-sixties), it rises sharply thereafter. This is consistent with the evidence cited above that working late in life has a positive effect on well-being, while involuntary retirement reduces well-being. Thus, in contrast to poor health and income, the effect of being employed on life satisfaction alternates between positive and negative as people age. Furthermore, between the ages of 16 and the late seventies, the absolute contribution of living alone to life satisfaction is between -0.25 and 0.25 points. Only from the late seventies onwards does it exceed 0.25 points of life satisfaction.

Finally, for living alone, the coefficients of the interaction terms are negative for age , positive for age^2

¹²The calculation is as follows: $(-0.2478409 + (-0.1309395 * \text{age}) + (0.02925034 * \text{age}^2) + (-0.002520791 * \text{age}^3)) * \text{poor health} = -1.2386$ for $\text{age} = 2.0$ and $\text{poor health} = 3$. Note that we have calculated the absolute efficiencies with the highest number of decimals so that the results are consistent with Figure 3. However, the coefficients in the tables are rounded to four decimal places.

¹³A value of $\ln(\text{income})$ equal to seven corresponds to an equivalent income of about EUR 1,096.

and negative for age^3 (columns 5 and 6). The coefficients of living alone are negative without interaction. As with the employment variable, living alone is a dummy variable and the marginal and absolute effects are therefore identical. The marginal/absolute effect of living alone on life satisfaction is shown in Figure 3. The marginal effects of living alone are negative except for those under the age of twenty. A positive effect in young adulthood is again explained by the typical alternative to living alone, living with one's parents. Compared with living with one's parents, living alone offers more personal freedom without necessarily implying a reduction in social relationships. After the early twenties, living alone becomes detrimental to well-being, and increasingly so until the early forties. After that, the negative impact on well-being decreases until the early eighties, when it increases again. The contribution of living alone to life satisfaction ranges from 0.15 to -0.45.

The interaction terms for all four main predictors of life satisfaction – poor health, income, being employed and living alone – with the age polynomial represent a common pattern of responsiveness of life satisfaction: early in the life course the responsiveness to changes in these variables increases, then weakens and later regains strength. However, the attenuation of an effect does not necessarily mean that it changes sign.

Columns 7 and 8 present the estimation results for the same model as in column 6, but this time differentiated by gender.¹⁴ According to the baseline regression (column 6), qualitative differences between men and women can only be found with regard to the variable poor health. While the coefficients of the interaction terms are statistically not significant for men, the coefficient of the non-interacted poor health variable is insignificant for women. Thus, while the marginal effect of poor health is constant for men, the marginal effect for women has a wave-like functional form with an almost constant part from 35 to 55 years and an increasingly negative effect thereafter (see Figure 3).

In terms of the absolute contribution of poor health to life satisfaction, this means that the contribution for a 20-year-old man with health status 3 is the same as for an 80-year-old man (-1.3422 points of life satisfaction). However, the absolute impact of poor health on life satisfaction for a twenty-year-old woman with an average health status of 3 is -0.9373 points, while for an eighty year old woman with the same health status the absolute impact is -1.9399 points, which is about two times higher. Another interesting finding is that the negative absolute contribution of poor health to women's life satisfaction does not exceed that of men until after the age of 65.

In terms of $\ln(\text{income})$, the marginal effects between men and women are not significantly different until around the age of 48. Thereafter, the marginal effects of $\ln(\text{income})$ of women and men diverge progressively with age. For women, the marginal effect decreases continuously until the age of 86 and then increases slightly. For men, however, it only decreases until the age of 71, after which it increases sharply.

In terms of the absolute contribution to life satisfaction: for a value of $\ln(\text{income}) = 7$, the difference between a twenty-year-old men and women is small, as the absolute contribution is 0.9689 and 1.0049 points, respectively. The difference in the contribution of $\ln(\text{income})$ to life satisfaction between men and women remains below 0.0007 points until the age of 48 and then increases continuously, reaching 2.2193 points at the

¹⁴Please note that this leads to a significant reduction in the sample size. However, the structure of the data does not change significantly (see Table A1).

age of 95. At this age, the contribution of $\ln(\text{income}) = 7$ to life satisfaction is 2.4928 times higher for men than for women.¹⁵

Regarding the effect of being employed on life satisfaction, the differences between men and women are small (see Figure 3).

Of the four variables of interest, living alone shows the largest differences between men and women (see Figure 3). Although women suffer slightly more than men from living alone until the age of 22, after that men always suffer more than women from living alone. This difference increases until the age of 52, when it reaches a maximum of -0.2776 points. At this age, the marginal/absolute effect of living alone on life satisfaction is -0.5283 for men and -0.2507 for women, which is a factor of 2.1 higher for men than for women. Above the age of 52, the difference in the marginal/absolute effect between men and women remains fairly stable, never falling below 0.2 points.

5.2 Robustness Checks

We have carried out a number of robustness checks. One robustness check involves replacing the dependent variable (11-point life satisfaction) with a dummy variable indicating whether an individual is “living in misery”, that is, their life satisfaction is less than or equal to four (Clark et al., 2018). This roughly represents the bottom decile of the distribution of subjective well-being (see Figure 2). As can be seen in Table 2, all the explanatory variables of the baseline model (column 1) are statistically significant, with their signs reversed compared to the baseline model in Table 1: The probability of living in misery increases with poor health and living alone, and decreases with income and being employed; it is affected by age in a cubic form, with the coefficients of age and age^3 being positive and that of age^2 being negative. In the models with interactions (columns 2 to 4), all coefficients also have the opposite sign as in the baseline regressions in Table 1. In the full model (column 2 in Table 2) all coefficients are significant.

Further robustness checks include reducing the age range to 16-70, dropping the poor health explanatory variable and including additional controls for education, marital status and number of children (see Table 3). Column 1 repeats the results of the full model in Table 1 column 6 for comparison purposes. In column 2 of Table 3, we address concerns about the endogeneity of life expectancy (Segerstrom et al., 2016) and re-estimate our (full) model on a subsample of individuals aged 16-70. The signs of the coefficients remain the same, and their magnitudes are similar to those in the baseline model (column 1). The results are therefore robust to this restriction in the age range.

Figure 4 plots the marginal effects for poor health, $\ln(\text{income})$, employed and living alone for the reduced age range of 16-70 years side by side with the results from the baseline model and the other robustness checks.

For poor health and employed, the marginal effects of the reduced age range 16-70 specification and the

¹⁵For comparison: The contribution of $\ln(\text{income}) = 7$ for an eighty year old man is 2.5334, while for a woman it is 1.3302. In other words, the contribution for an octogenarian man is 1.2031 points higher than for an octogenarian woman. In other words, the contribution of $\ln(\text{income}) = 7$ to life satisfaction is 1.9044 times higher for men than for women, both eighty years old.

Table 2: The Impact of Wealth, Poor Health, and Sociability Measures – Baseline Results, “Living in Misery” as the Outcome Variable

	(1) Baseline Controls	(2) All	(3) Full Model Male	(4) Female
<i>Living in Misery: 1 (Self – Reported Subjective Well – Being \leq 4)</i>				
Poor Health	0.0545*** (0.0008)	-0.0419*** (0.0112)	-0.0003 (0.0165)	-0.0712*** (0.0150)
ln(Income)	-0.0343*** (0.0016)	0.0756*** (0.0192)	0.0620** (0.0284)	0.0880*** (0.0260)
Employed	-0.0120*** (0.0015)	0.2086*** (0.0196)	0.3378*** (0.0304)	0.1472*** (0.0276)
Alone	0.0323*** (0.0026)	-0.2510*** (0.0369)	-0.2488*** (0.0542)	-0.1869*** (0.0508)
[Age]	0.0866*** (0.0097)	0.4295*** (0.0920)	0.5073*** (0.1352)	0.4184*** (0.1263)
[Age] ²	-0.0178*** (0.0021)	-0.0729*** (0.0199)	-0.0868*** (0.0291)	-0.0730*** (0.0275)
[Age] ²	0.0012*** (0.0001)	0.0035*** (0.0013)	0.0044** (0.0019)	0.0036* (0.0019)
Poor Health \times [Age]		0.0567*** (0.0077)	0.0253** (0.0114)	0.0789*** (0.0103)
Poor Health \times [Age] ²		-0.0118*** (0.0016)	-0.0045* (0.0024)	-0.0169*** (0.0022)
Poor Health \times [Age] ³		0.0008*** (0.0001)	0.0003** (0.0002)	0.0012*** (0.0001)
ln(Income) \times [Age]		-0.0680*** (0.0134)	-0.0569*** (0.0198)	-0.0787*** (0.0184)
ln(Income) \times [Age] ²		0.0122*** (0.0029)	0.0093** (0.0042)	0.0150*** (0.0040)
ln(Income) \times [Age] ³		-0.0007*** (0.0002)	-0.0005* (0.0003)	-0.0009*** (0.0003)
Employed \times [Age]		-0.1608*** (0.0148)	-0.2643*** (0.0231)	-0.1125*** (0.0210)
Employed \times [Age] ²		0.0345*** (0.0034)	0.0557*** (0.0051)	0.0250*** (0.0049)
Employed \times [Age] ³		-0.0023*** (0.0002)	-0.0035*** (0.0004)	-0.0017*** (0.0004)
Alone \times [Age]		0.1807*** (0.0249)	0.1703*** (0.0366)	0.1380*** (0.0344)
Alone \times [Age] ²		-0.0335*** (0.0050)	-0.0279*** (0.0075)	-0.0268*** (0.0069)
Alone \times [Age] ³		0.0019*** (0.0003)	0.0014*** (0.0005)	0.0016*** (0.0004)
Observations	570063	570063	271041	299022
Number of Persons	88643	88643	43736	44907
Adjusted R ² Within	0.028	0.031	0.034	0.030
Person FE	Yes	Yes	Yes	Yes

Notes: The dependent variable *Living in Misery* is a dummy variable equal to one if the self-reported subjective well-being is less than or equal to four and zero otherwise. *Poor Health* refers to self-rated health status (*very good*=1 to *bad*=5). *ln(Income)* is the ln of the monthly household net equivalent income (in EUR). *Employed* equals 1 for individuals who are currently employed, otherwise it is equal to zero. *Living alone* equals 1 for individuals with household size one, otherwise it is equal to zero. Standard errors, clustered at the individual level, are shown in parentheses. *: Significant at the 10% level. **: Significant at the 5% level. ***: Significant at the 1% level.

Table 3: Robustness to Additional Controls and Sample Definitions

	(1) Baseline model	(2) Age range: 16-70	(3) excl. Poor Health	(4) Baseline + add. controls	(5) Sample males	(6) Sample females
<i>Self-Reported Subjective Well-Being (from Low = 0 to High = 10)</i>						
Poor Health	-0.2478*** (0.0592)	-0.6403*** (0.0886)		-0.1553** (0.0690)	-0.3661*** (0.1047)	-0.0015 (0.0916)
ln(Income)	-0.5995*** (0.1158)	-0.5638*** (0.1578)	-0.4931*** (0.1249)	-0.5715*** (0.1353)	-0.5452*** (0.1950)	-0.6639*** (0.1897)
Employed	-1.5381*** (0.1217)	-1.5295*** (0.1513)	-2.1244*** (0.1306)	-1.1838*** (0.1472)	-2.0551*** (0.2267)	-0.8602*** (0.2033)
Alone	1.3783*** (0.2075)	2.0495*** (0.3242)	1.4351*** (0.2264)	1.1890*** (0.2219)	1.5469*** (0.3324)	0.6248** (0.3088)
[Age]	-4.3843*** (0.5509)	-4.5134*** (0.8318)	-4.5897*** (0.5894)	-4.9080*** (0.6329)	-5.6517*** (0.9195)	-4.9150*** (0.8869)
[Age] ²	0.7530*** (0.1183)	0.7711*** (0.2013)	0.7689*** (0.1272)	0.8880*** (0.1327)	1.0605*** (0.1938)	0.8866*** (0.1858)
[Age] ²	-0.0385*** (0.0079)	-0.0397** (0.0154)	-0.0421*** (0.0086)	-0.0470*** (0.0087)	-0.0602*** (0.0129)	-0.0458*** (0.0122)
Poor Health × [Age]	-0.1309*** (0.0403)	0.1882*** (0.0689)		-0.1872*** (0.0454)	-0.0295 (0.0686)	-0.3004*** (0.0604)
Poor Health × [Age] ²	0.0293*** (0.0085)	-0.0491*** (0.0167)		0.0401*** (0.0093)	0.0047 (0.0140)	0.0655*** (0.0124)
Poor Health × [Age] ³	-0.0025*** (0.0006)	0.0034*** (0.0013)		-0.0032*** (0.0006)	-0.0007 (0.0009)	-0.0049*** (0.0008)
ln(Income) × [Age]	0.5344*** (0.0800)	0.5011*** (0.1208)	0.4437*** (0.0869)	0.5941*** (0.0909)	0.5812*** (0.1308)	0.6587*** (0.1280)
ln(Income) × [Age] ²	-0.0921*** (0.0170)	-0.0823*** (0.0289)	-0.0696*** (0.0186)	-0.1091*** (0.0189)	-0.1074*** (0.0272)	-0.1229*** (0.0266)
ln(Income) × [Age] ³	0.0048*** (0.0011)	0.0041* (0.0022)	0.0033*** (0.0012)	0.0060*** (0.0012)	0.0061*** (0.0018)	0.0067*** (0.0017)
Employed × [Age]	1.2202*** (0.0919)	1.2056*** (0.1220)	1.6955*** (0.0992)	0.9893*** (0.1059)	1.6718*** (0.1630)	0.7360*** (0.1481)
Employed × [Age] ²	-0.2780*** (0.0213)	-0.2756*** (0.0303)	-0.3914*** (0.0231)	-0.2310*** (0.0238)	-0.3713*** (0.0355)	-0.1822*** (0.0341)
Employed × [Age] ³	0.0194*** (0.0016)	0.0197*** (0.0024)	0.0277*** (0.0017)	0.0165*** (0.0017)	0.0249*** (0.0025)	0.0139*** (0.0025)
Alone × [Age]	-1.0651*** (0.1400)	-1.5688*** (0.2453)	-1.1007*** (0.1537)	-0.8903*** (0.1478)	-1.0999*** (0.2219)	-0.5062** (0.2069)
Alone × [Age] ²	0.1950*** (0.0284)	0.3067*** (0.0576)	0.2017*** (0.0314)	0.1620*** (0.0297)	0.1908*** (0.0453)	0.0920** (0.0415)
Alone × [Age] ³	-0.0106*** (0.0018)	-0.0180*** (0.0043)	-0.0110*** (0.0020)	-0.0086*** (0.0019)	-0.0099*** (0.0029)	-0.0046* (0.0026)
Observations	570063	508689	570063	538593	255997	282596
Number of Persons	88643	83688	88643	81412	40153	41259
Adjusted R ² Within	0.077	0.071	0.013	0.080	0.083	0.078
Person FE	Yes	Yes	Yes	Yes	Yes	Yes
Educational Controls	No	No	No	Yes	Yes	Yes
Married Status	No	No	No	Yes	Yes	Yes
Number of Children	No	No	No	Yes	Yes	Yes

Notes: The dependent variable is self-reported subjective well-being (0 = Low to 10 = High). *Poor Health* refers to self-rated health status (very good=1 to bad=5). *ln(Income)* is the ln of the monthly household net equivalent income (in EUR). *Employed* is equal to 1 for individuals who are currently employed, otherwise it is equal to zero. *Living alone* is equal to 1 for individuals with a household size of one, otherwise it is equal to zero. *Educational Controls* include years of education and a set of control variables for educational attainment of less than secondary education or completed secondary education. *Household Controls* include a set of control variables for individuals being married and the number of children in the household. Standard errors, clustered at the individual level, are shown in parentheses. *: Significant at the 10% level. **: Significant at the 5% level. ***: Significant at the 1% level.

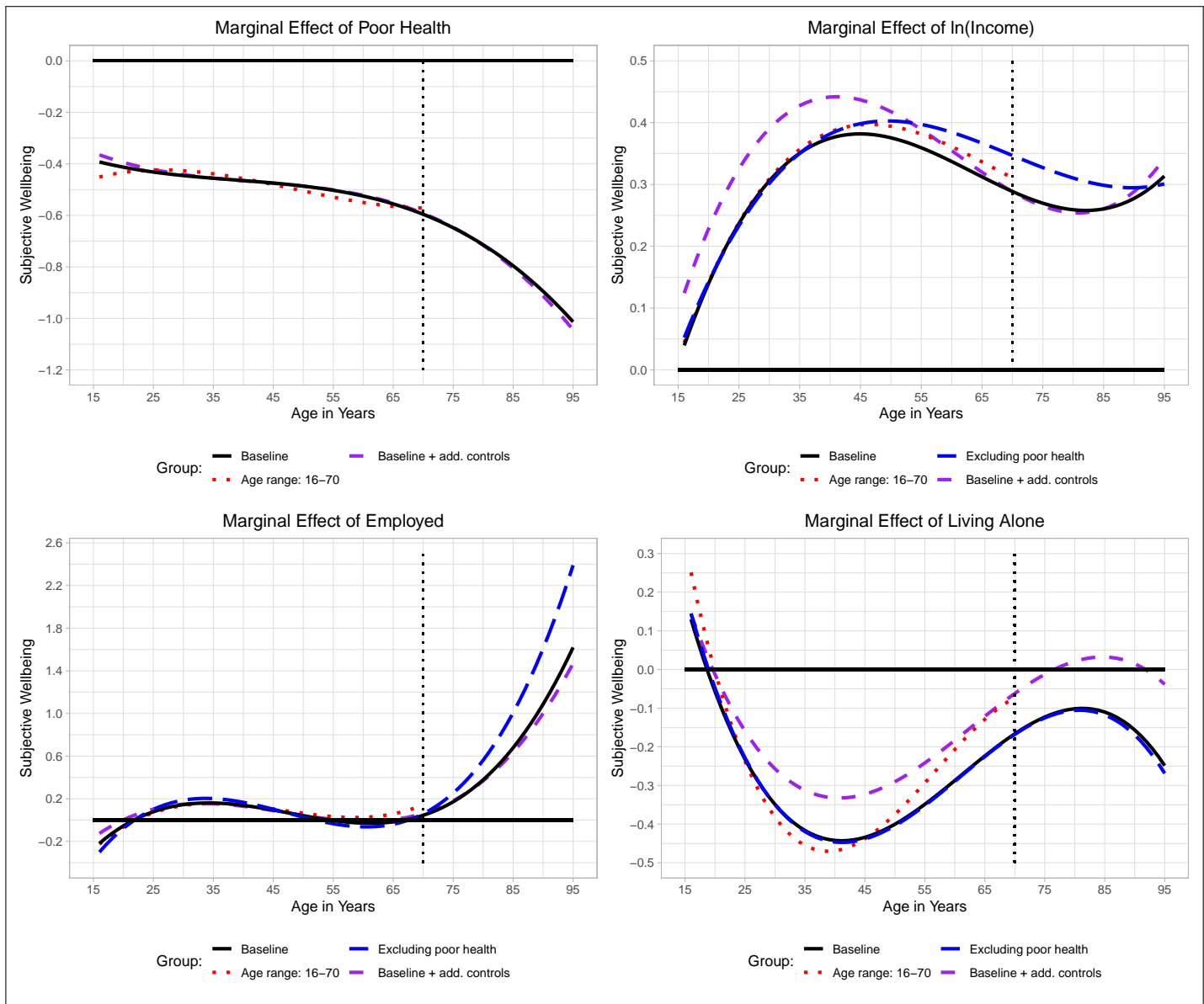


Figure 4: Marginal Effects of the Various Variables of Interest in the robustness checks

Notes: This figure plots the marginal values of the variables of interest over the life cycle, based on the coefficients of the robustness checks carried out and reported in Table 3. The “Baseline” curve corresponds to column 1 of Table 3. The curves “age range 16-70”, “excluding poor health” and “Baseline + additional controls” correspond to columns 2, 3 and 4 respectively. Please note, that we have calculated the marginal effects with the highest number of decimal places. The coefficients in Table 3, however, are rounded to four decimal places.

baseline model are very similar. For $\ln(\text{income})$ and living alone, the marginal effect is also not very different from the baseline model. Only the right part of the respective curves shows a slightly higher marginal effect, which was to be expected as the second turning point in the baseline model is after the age of 70.

Column 3 responds to a common criticism of self-reported health, that it may reflect the same individual reporting style as reported life satisfaction (Clark et al., 2018). Accordingly, we omit the poor health variable and its interactions with the age polynomial in column 3. It turns out that all qualitative results (coefficient

signs and significance), as well as most quantitative results for the other variables (including the interaction terms), are unaffected. Thus, the results of our baseline model are not biased by potential measurement problems related to health. Looking at the marginal effects in Figure 4 of $\ln(\text{income})$, employed and living alone (excluding poor health), we see that for living alone there is no difference to the baseline model. In the case of employed, the marginal effects start to differ with increasing magnitude from the age of 70. The maximum is reached at the age of 95 with about 0.8 points of life satisfaction. For $\ln(\text{income})$, the differences in the marginal effects compared to the baseline model start at around 35 and increase until the age of eighty, before disappearing between 90 and 95.

In addition, in columns 4-6 we include as additional controls years of schooling, educational level, marital status and the number of children living in the household. This reduces the sample size for the all persons, male and female specifications to 538,593, 255,997 and 282,596 observations, respectively. The addition of these controls leave the qualitative results unchanged, i.e. the signs of the coefficients and the significant and insignificant variables remain the same. The latter are the interaction terms between poor health and the age polynomial for men and the non-interacted poor health variable for women. The quantitative results are also largely unaffected. This is the case for all three specifications, i.e. for the total sample (column 4), for men (column 5) and for women (column 6). Figure 4 shows the marginal effects of the full sample in column 4. We basically don't observe any difference in the marginal effects of poor health and being employed between the regressions with additional controls and the baseline model. For $\ln(\text{income})$ and living alone the marginal effects are more pronounced than in the baseline model, but for $\ln(\text{income})$ this is only the case for those aged under 70.

5.3 Discussion

The empirical analysis has revealed that the importance of health, income and indicators of social relationships (employment and living alone) for subjective well-being varies with age in a non-linear way. While the negative impact (marginal effect) of poor health increases monotonically and progressively with age, the importance of income and social relationships varies with age in a wave-like manner. Specifically, the importance of income rises until people are in their mid-forties, then declines and starts to rise again in the early eighties. Similarly, the importance of social relationships (or the lack of them) rises until mid-age, then falls and rises again in old age. These findings apply not only to an 11-point life satisfaction indicator, but also to a binary indicator of whether an individual is in the bottom decile of life satisfaction (living in misery) or not.

Overall, our results suggest that, with the exception of poor health, the importance of the main predictors of well-being increases in the first phase of the life cycle and declines by the mid-forties. This fits well with the explanations that have been put forward to explain the mid-life dip in subjective well-being and the post-midlife rise in well-being: In the first phase of the life cycle, people are increasingly worried about missed opportunities and unfulfilled aspirations (Schwandt, 2016), whereas thereafter they learn to cope better with unfavourable circumstances (Carstensen, 1995; Lawton, 1996) and their emotional response to depressing factors decreases (Brassen et al., 2012). The changing importance of income and social relations, thus, helps to explain the

familiar U-shaped relationship between age and subjective well-being into old age. The increasing importance of the main predictors of life satisfaction – health, income and social relations – in old age, together with a deterioration in health and social relations, helps to explain the decline in well-being in (very) old age.

Regarding the last stage of the life cycle, our finding of an increase in the importance of being employed is consistent with previous findings that working late in life has a positive effect on well-being, while involuntary retirement reduces well-being (Bender, 2012; Bonsang and Klein, 2012; Atalay and Barrett, 2022; Nikolova and Graham, 2014). Our finding that the importance of income begins to rise again at around age 80 is consistent with the idea that rising costs of care and medical treatment may put people in financial distress.

Given its potential role in explaining the relationship between age and SWB over the life cycle, it is surprising that the question of whether and how the association between SWB and its main predictors changes over the life cycle has hardly been systematically addressed. One exception to the apparent lack of evidence is a cross-sectional study from Germany. The study found an inverse relationship between reported life satisfaction and poor health that is stronger for younger than for older individuals, and an inverse relationship with financial worries that is strongest for individuals aged 50-69 (Karwetzky et al., 2022). These results are diametrically opposed to the main findings of this paper: a monotonically and progressively increasing importance of poor health and a lower importance of income for people in their sixties and seventies compared to those in their thirties, forties and fifties.

These differences in results can be explained by methodological differences. First, the study by Karwetzky et al. (2022) is based on cross-sectional data and thus refers to between-person differences, whereas the present study – by using fixed effects estimation on longitudinal data (1992-2019) – focuses on within-person changes. In other words, the present study is able to address the question: How are changes in SWB related to changes in health, income and social relationships? Second, fixed effects are an effective tool for controlling for time-invariant differences between individuals. In particular, they allow us to control for people's birth cohort, which might otherwise confound the analysis of the life-cycle effects we are interested in. Third, our data (from the SOEP) are representative of the German population, whereas the data used by Karwetzky et al. (2022) may be subject to selection bias.

Confidence in our results is further strengthened by their compatibility with psychologists' findings that from midlife and onwards, people learn to cope better with adverse circumstances (Carstensen, 1995; Lawton, 1996) and that their emotional response to depressing factors decreases with age (Brassen et al., 2012). Our findings that the effects of income, employment and living alone are attenuated after midlife are highly consistent with these psychological processes. Finally, and relatedly, our findings are consistent with the shape of the age-SWB relationship found in hundreds of studies.

Our fixed-effects estimations address to some extent endogeneity concerns that may be the result of omitted variables. To the extent that they capture people's "inherent" SWB, fixed effects also mitigate endogeneity concerns related to reverse causation, i.e., inherently happier people may be healthier and have higher incomes and better social relationships (Frey and Stutzer, 2002). Any endogeneity problems not captured by fixed effects is a limitation of this paper. The internal validity of our results is supported by a series of robustness

checks. Testing the external validity – whether our results generalise to other countries – is an obvious area for future research.

In addition to income, health and social relationships, another key determinant of SWB, personal characteristics inherited or acquired in childhood, might be expected to also change in importance over the life cycle. Investigating this issue is another direction for future research.

6 Conclusions

Previous literature has identified a characteristic relationship between age and SWB, with a decline in SWB until midlife, a recovery thereafter, and a further decline in very old age. Motivated by proposed explanations of the midlife dip in SWB that involve the realization of unmet aspirations in midlife, followed by people learning to cope better with adverse circumstances and a reduced emotional response to depressing factors, this paper examined whether and how the association between SWB and its main predictors – income, health and social relationships – changes over the life cycle. We found that while the negative impact of poor health on SWB increases with age, income and social relations become more important in an initial stage of the adult life cycle, decline in importance after midlife, and regain importance in old age. The initial increase in the importance of income and social relationships and their subsequent decline are consistent with both the observed shape of the age-SWB relationship and the psychological mechanisms that have been proposed to explain it.

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A Descriptive Statistics

Table A1: Descriptive Statistics for the Main Regression Variables by Gender and Sample Size

	All Persons				Males				Females			
Variables	Mean	SD	Min.	Max.	Mean	SD	Min.	Max.	Mean	SD	Min.	Max.
	Panel A: Full Sample											
Life Satisfaction	7.1281	1.7755	0	10	7.1239	1.7631	0	10	7.1319	1.7868	0	10
Age	4.6724	1.7316	1.6000	10.5000	4.6594	1.7230	1.6000	10.5000	4.6841	1.7393	1.6000	10.3000
Poor Health	2.5748	0.9725	1	5	2.5186	0.9647	1	5	2.6257	0.9768	1	5
ln(Income)	6.8124	0.5928	0.0000	14.3461	6.8262	0.6049	0.0000	14.3461	6.7999	0.5813	1.2040	13.1224
Employed	0.6226	0.4847	0	1	0.6777	0.4674	0	1	0.5726	0.4947	0	1
Alone	0.1372	0.3441	0	1	0.1282	0.3343	0	1	0.1454	0.3525	0	1
Male	0.4755	0.4994	0	1	1.0000	0.0000	1	1	0.0000	0.0000	0	0
Female	0.5245	0.4994	0	1	0.0000	0.0000	0	0	1.0000	0.0000	1	1
	Obs.: 570,063				Obs.: 271,041				Obs.: 299,022			
	Panel B: Reduced Sample											
Life Satisfaction	7.1149	1.7737	0	10	7.1075	1.7608	0	10	7.1217	1.7852	0	10
Age	4.7757	1.6839	1.6000	10.5000	4.7711	1.6740	1.6000	10.5000	4.7797	1.6928	1.7000	10.3000
Poor Health	2.5970	0.9671	1	5	2.5459	0.9594	1	5	2.6432	0.9716	1	5
ln(Income)	6.8262	0.5884	0.0000	14.3461	6.8404	0.6011	0.0000	14.3461	6.8133	0.5763	1.2040	13.1224
Employed	0.6350	0.4814	0	1	0.6910	0.4621	0	1	0.5843	0.4928	0	1
Alone	0.1389	0.3459	0	1	0.1297	0.3360	0	1	0.1473	0.3544	0	1
Male	0.4753	0.4994	0	1	1.0000	0.0000	1	1	0.0000	0.0000	0	0
Female	0.5247	0.4994	0	1	0.0000	0.0000	0	0	1.0000	0.0000	1	1
Lower than secondary schooling	0.1733	0.3785	0	1	0.1423	0.3493	0	1	0.2013	0.4010	0	1
Completed secondary schooling	0.5857	0.4926	0	1	0.5923	0.4914	0	1	0.5798	0.4936	0	1
Years of education	12.0053	2.6900	7.0000	18.0000	12.1474	2.7625	7.0000	18.0000	11.8767	2.6159	7.0000	18.0000
Marital status: married	0.6226	0.4847	0	1	0.6516	0.4765	0	1	0.5964	0.4906	0	1
Number of children	0.6943	1.0575	0	11	0.6749	1.0610	0	11	0.7120	1.0540	0	11
	Obs.: 538,593				Obs.: 255,997				Obs.: 282,596			

Table A2: Correlation Matrix for the main regression variables – Full Sample (Obs.: 570,063)

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1) Life Satisfaction	1	-0.0637	-0.4209	0.1631	0.0681	-0.0836	-0.0022	0.0022
(2) Age	-0.0637	1	0.3863	0.2760	-0.3554	0.1667	-0.0071	0.0071
(3) Poor Health	-0.4209	0.3863	1	-0.0033	-0.1997	0.0727	-0.0550	0.0550
(4) ln(Income)	0.1631	0.2760	-0.0033	1	0.1556	0.2011	0.0222	-0.0222
(5) Employed	0.0681	-0.3554	-0.1997	0.1556	1	-0.0996	0.1083	-0.1083
(6) Alone	-0.0836	0.1667	0.0727	0.2011	-0.0996	1	-0.0249	0.0249
(7) Male	-0.0022	-0.0071	-0.0550	0.0222	0.1083	-0.0249	1	-1
(8) Female	0.0022	0.0071	0.0550	-0.0222	-0.1083	0.0249	-1	1

Table A3: Correlation Matrix for the main regression variables – Reduced Sample (Obs.: 538,593)

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
(1) Life Satisfaction	1	-0.0538	-0.4219	0.1716	0.0766	-0.0814	-0.0040	0.0040	-0.0427	-0.0404	0.1111	0.0816	0.0705
(2) Age	-0.0538	1	0.3746	0.2739	-0.4186	0.1594	-0.0026	0.0026	-0.0748	0.0034	-0.0228	0.2239	-0.3560
(3) Poor Health	-0.4219	0.3746	1	-0.0114	-0.2247	0.0680	-0.0502	0.0502	0.0383	0.0433	-0.1326	0.0571	-0.1517
(4) ln(Income)	0.1716	0.2739	-0.0114	1	0.1395	0.2024	0.0230	-0.0230	-0.2853	-0.0440	0.4104	-0.0498	-0.4320
(5) Employed	0.0766	-0.4186	-0.2247	0.1395	1	-0.1100	0.1106	-0.1106	-0.1909	0.0506	0.2255	-0.0119	0.1199
(6) Alone	-0.0814	0.1594	0.0680	0.2024	-0.1100	1	-0.0254	0.0254	0.0137	-0.0045	-0.0089	-0.5148	-0.2637
(7) Male	-0.0040	-0.0026	-0.0502	0.0230	0.1106	-0.0254	1	-1	-0.0779	0.0126	0.0503	0.0568	-0.0175
(8) Female	0.0040	0.0026	0.0502	-0.0230	-0.1106	0.0254	-1	1	0.0779	-0.0126	-0.0503	-0.0568	0.0175
(9) Lower than secondary schooling	-0.0427	-0.0748	0.0383	-0.2853	-0.1909	0.0137	-0.0779	0.0779	1	-0.5443	-0.5276	-0.0867	0.0761
(10) Completed secondary schooling	-0.0404	0.0034	0.0433	-0.0440	0.0506	-0.0045	0.0126	-0.0126	-0.5443	1	-0.2333	-0.0050	-0.0609
(11) Years of education	0.1111	-0.0228	-0.1326	0.4104	0.2255	-0.0089	0.0503	-0.0503	-0.5276	-0.2333	1	0.0283	-0.0103
(12) Marital status: married	0.0816	0.2239	0.0571	-0.0498	-0.0119	-0.5148	0.0568	-0.0568	-0.0867	-0.0050	0.0283	1	0.2086
(13) Number of children	0.0705	-0.3560	-0.1517	-0.4320	0.1199	-0.2637	-0.0175	0.0175	0.0761	-0.0609	-0.0103	0.2086	1

B Additional Results

Table B1: The Impact of Wealth, Poor Health, and Sociability Measures – Heterogeneous Results by Male and Female Status

	Males												Females											
	(1) Baseline Controls	(2) Only Poor Health	(3) Only Income	(4) Only Employed	(5) Only Living Alone	(6) Full Model	(7) Baseline Controls	(8) Only Poor Health	(9) Only Income	(10) Only Employed	(11) Only Living Alone	(12) Full Model												
	<i>Self-Reported Subjective Well-Being (from Low = 0 to High = 10)</i>																							
Poor Health	-0.5011*** (0.0059)	-0.3180*** (0.0879)	-0.5008*** (0.0059)	-0.4984*** (0.0058)	-0.5011*** (0.0059)	-0.4474*** (0.0890)	-0.5028*** (0.0053)	-0.0312 (0.0788)	-0.5027*** (0.0053)	-0.5017*** (0.0053)	-0.5026*** (0.0053)	-0.0892 (0.0793)												
ln(Income)	0.3079*** (0.0127)	0.3088*** (0.0127)	-0.2184 (0.1639)	0.3089*** (0.0127)	0.3192*** (0.0128)	-0.5995*** (0.1660)	0.3027*** (0.0124)	0.3058*** (0.0124)	-0.2075 (0.1593)	0.3054*** (0.0124)	0.3073*** (0.0124)	-0.6680*** (0.1630)												
Employed	0.0700*** (0.0128)	0.0716*** (0.0128)	0.0675*** (0.0128)	-2.4164*** (0.1834)	0.0664*** (0.0128)	-2.4753*** (0.1829)	0.0184* (0.0105)	0.0213** (0.0104)	0.0165 (0.0105)	-1.2380*** (0.1699)	0.0186* (0.0105)	-1.1073*** (0.1703)												
Alone	-0.3832*** (0.0203)	-0.3837*** (0.0202)	-0.3873*** (0.0203)	-0.3816*** (0.0202)	1.5399*** (0.3014)	1.6742*** (0.3109)	-0.1715*** (0.0203)	-0.1770*** (0.0201)	-0.1716*** (0.0203)	-0.1767*** (0.0203)	1.0379*** (0.2885)	0.7945*** (0.2885)												
[Age]	-1.0320*** (0.0869)	-0.8175*** (0.1556)	-2.9693*** (0.7816)	-2.0290*** (0.1175)	-0.9826*** (0.0897)	-5.5342*** (0.7955)	-0.9220*** (0.0829)	0.0006 (0.1509)	-2.6979*** (0.7575)	-1.1410*** (0.0950)	-0.8248*** (0.0921)	-4.0975*** (0.7766)												
[Age] ²	0.1950*** (0.0180)	0.1384*** (0.0338)	0.5395*** (0.1689)	0.4004*** (0.0243)	0.1878*** (0.0188)	1.0166*** (0.1721)	0.1833*** (0.0173)	-0.0387 (0.0326)	0.4483*** (0.1628)	0.2313*** (0.0198)	0.1636*** (0.0200)	0.6860*** (0.1664)												
[Age] ²	-0.0121*** (0.0012)	-0.0063*** (0.0023)	-0.0326*** (0.0114)	-0.0247*** (0.0016)	-0.0118*** (0.0012)	-0.0579*** (0.0117)	-0.0121*** (0.0011)	0.0055** (0.0022)	-0.0227** (0.0109)	-0.0152*** (0.0013)	-0.0109*** (0.0014)	-0.0327*** (0.0111)												
Poor Health×[Age]		-0.0696 (0.0598)				0.0248 (0.0605)		-0.2942*** (0.0536)				-0.2519*** (0.0540)												
Poor Health×[Age] ²		0.0138 (0.0125)				-0.0065 (0.0127)		0.0657*** (0.0112)				0.0566*** (0.0113)												
Poor Health×[Age] ³		-0.0014* (0.0008)				0.0000 (0.0008)		-0.0050*** (0.0007)				-0.0044*** (0.0007)												
ln(Income)×[Age]			0.2997*** (0.1132)			0.5385*** (0.1146)			0.2817** (0.1105)			0.5907*** (0.1131)												
ln(Income)×[Age] ²			-0.0533** (0.0242)			-0.0956*** (0.0244)			-0.0433* (0.0235)			-0.1031*** (0.0240)												
ln(Income)×[Age] ³			0.0031* (0.0016)			0.0054*** (0.0016)			0.0019 (0.0016)			0.0053*** (0.0016)												
Employed×[Age]				1.8797*** (0.1388)		0.0016 (0.1383)				1.0195*** (0.1293)		0.0016 (0.1297)												
Employed×[Age] ²				-0.4048*** (0.0312)		-0.4167*** (0.0312)				-0.2477*** (0.0307)		-0.2255*** (0.0308)												
Employed×[Age] ³				0.0265*** (0.0022)		0.0273*** (0.0022)				0.0185*** (0.0023)		0.0171*** (0.0023)												
Alone×[Age]					-1.1688*** (0.2028)	-1.2269*** (0.2105)						-0.8447*** (0.1952)												
Alone×[Age] ²					0.2075*** (0.0415)	0.2119*** (0.0433)						0.1663*** (0.0393)												
Alone×[Age] ³					-0.0112*** (0.0026)	-0.0110*** (0.0028)						-0.0068*** (0.0025)												
Observations	271041	271041	271041	271041	271041	271041	299022	299022	299022	299022	299022	299022												
Number of Persons	43736	43736	43736	43736	43736	43736	44907	44907	44907	44907	44907	44907												
Adjusted R ² Within	0.076	0.077	0.076	0.077	0.076	0.080	0.073	0.075	0.073	0.073	0.073	0.076												
Person FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes												

Notes: The dependent variable is self-reported subjective well-being (0 = Low to 10 = High). *Poor Health* refers to self-rated health status (very good=1 to bad=5). *Income* is the log of the monthly household net equivalent income (in EUR). *Employed* equals 1 for individuals who are currently employed. *Living alone* equals 1 for individuals with household size one, and zero otherwise. Standard errors, clustered at the individual level, are shown in parentheses. *: Significant at the 10% level. **: Significant at the 5% level. ***: Significant at the 1% level.

Table A2: The Impact of Wealth, Poor Health, and Sociability Measures – Baseline Results, “Living in Misery” as the Outcome Variable

	(1) Baseline Controls	(2) Only Poor Health	(3) Only Income	(4) Only Employed	(5) Only Living Alone	(6) All	(7) Full Model Male	(8) Female
<i>Living in Misery: 1 (Self – Reported Subjective Well – Being ≤ 4)</i>								
Poor Health	0.0545*** (0.0008)	-0.0520*** (0.0111)	0.0545*** (0.0008)	0.0543*** (0.0008)	0.0545*** (0.0008)	-0.0419*** (0.0112)	-0.0003 (0.0165)	-0.0712*** (0.0150)
ln(Income)	-0.0343*** (0.0016)	-0.0346*** (0.0016)	0.0079 (0.0183)	-0.0346*** (0.0016)	-0.0360*** (0.0016)	0.0756*** (0.0192)	0.0620** (0.0284)	0.0880*** (0.0260)
Employed	-0.0120*** (0.0015)	-0.0125*** (0.0015)	-0.0119*** (0.0015)	0.2364*** (0.0196)	-0.0117*** (0.0015)	0.2086*** (0.0196)	0.3378*** (0.0304)	0.1472*** (0.0276)
Alone	0.0323*** (0.0026)	0.0330*** (0.0026)	0.0324*** (0.0026)	0.0323*** (0.0026)	-0.2820*** (0.0363)	-0.2510*** (0.0369)	-0.2488*** (0.0542)	-0.1869*** (0.0508)
[Age]	0.0866*** (0.0097)	-0.0892*** (0.0178)	0.2282** (0.0888)	0.1629*** (0.0121)	0.0646*** (0.0101)	0.4295*** (0.0920)	0.5073*** (0.1352)	0.4184*** (0.1263)
[Age] ²	-0.0178*** (0.0021)	0.0221*** (0.0039)	-0.0389** (0.0193)	-0.0335*** (0.0025)	-0.0131*** (0.0022)	-0.0729*** (0.0199)	-0.0868*** (0.0291)	-0.0730*** (0.0275)
[Age] ²	0.0012*** (0.0001)	-0.0018*** (0.0003)	0.0022* (0.0013)	0.0022*** (0.0002)	0.0009*** (0.0001)	0.0035*** (0.0013)	0.0044** (0.0019)	0.0036* (0.0019)
Poor Health × [Age]		0.0641*** (0.0076)				0.0567*** (0.0077)	0.0253** (0.0114)	0.0789*** (0.0103)
Poor Health × [Age] ²		-0.0133*** (0.0016)				-0.0118*** (0.0016)	-0.0045* (0.0024)	-0.0169*** (0.0022)
Poor Health × [Age] ³		0.0009*** (0.0001)				0.0008*** (0.0001)	0.0003** (0.0002)	0.0012*** (0.0001)
ln(Income) × [Age]			-0.0226* (0.0128)			-0.0680*** (0.0134)	-0.0569*** (0.0198)	-0.0787*** (0.0184)
ln(Income) × [Age] ²			0.0035 (0.0027)			0.0122*** (0.0029)	0.0093** (0.0042)	0.0150*** (0.0040)
ln(Income) × [Age] ³			-0.0002 (0.0002)			-0.0007*** (0.0002)	-0.0005* (0.0003)	-0.0009*** (0.0003)
Employed × [Age]				-0.1874*** (0.0149)		-0.1608*** (0.0148)	-0.2643*** (0.0231)	-0.1125*** (0.0210)
Employed × [Age] ²				0.0414*** (0.0034)		0.0345*** (0.0034)	0.0557*** (0.0051)	0.0250*** (0.0049)
Employed × [Age] ³				-0.0028*** (0.0002)		-0.0023*** (0.0002)	-0.0035*** (0.0004)	-0.0017*** (0.0004)
Alone × [Age]					0.2048*** (0.0244)	0.1807*** (0.0249)	0.1703*** (0.0366)	0.1380*** (0.0344)
Alone × [Age] ²					-0.0393*** (0.0049)	-0.0335*** (0.0050)	-0.0279*** (0.0075)	-0.0268*** (0.0069)
Alone × [Age] ³					0.0023*** (0.0003)	0.0019*** (0.0003)	0.0014*** (0.0005)	0.0016*** (0.0004)
Observations	570063	570063	570063	570063	570063	570063	271041	299022
Number of Persons	88643	88643	88643	88643	88643	88643	43736	44907
Adjusted R ² Within	0.028	0.031	0.028	0.029	0.029	0.031	0.034	0.030
Person FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: The dependent variable *Living in Misery* is a dummy variable equal to one if the self-reported subjective well-being is less than or equal to four and zero otherwise. *Poor Health* refers to self-rated health status (*very good*=1 to *bad*=5). *ln(Income)* is the ln of the monthly household net equivalent income (in EUR). *Employed* equals 1 for individuals who are currently employed, otherwise it is equal to zero. *Living alone* equals 1 for individuals with household size one, otherwise it is equal to zero. Standard errors, clustered at the individual level, are shown in parentheses. *: Significant at the 10% level. **: Significant at the 5% level. ***: Significant at the 1% level.

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