Informal elderly care and caregivers' subjective well-being

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Draft – Do not quote

Version: 2013-02-18

Abstract: Because of an ageing population and declining fertility rates, the topic of informal care for the elderly is gaining in importance. This paper uses panel data from the German Socio-Economic Panel (GSOEP) to analyze the effects of informal care provision on caregivers' subjective well-being. We also disentangle the effects of long-term care arrangements to provide insights into the ambiguous findings reported in the literature on long-term care effects on subjective well-being. Specifically, we show that the time spent caring has a non-linear effect, with subjective well-being declining in the first years of care provision but then increasing again, and that more care time is generally associated with lower levels of subjective well-being, albeit primarily in individuals born between 1920 and 1959. As regards the relation between well-being and caregiver co-residency, we find only a negative association, which supports either the "wear-and-tear" or "adaptation" models, depending on whether care time or residency is the subject of analysis. The amount of income needed to compensate a caregiver's loss in well-being amounts on average to approximately €7 per hour.

JEL-Classification: I11, I18, J10

Keywords: Informal elderly care, subjective well-being, Germany

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Introduction

Germany's ageing population has been the most important contributing factor to the steady rise in individuals needing care from the German Long-Term Care Insurance (LTCI), who now number about two and a half million. This demand for care, which has risen 4% in only 2 years (Federal Ministry of Health, 2009), will most probably continue to increase in the coming decades, with more than four million patients predicted to need long-term care by 2050 (Hackmann and Moog, 2008). At the same time, the supply of caregivers (CG) is declining for a number of reasons. First, with increasing female education and employment, female CGs (who have traditionally provided most of the care) are facing higher opportunity costs of informal care (Thome and Birkel, 2005). At the same time, the persistently low fertility rate in Germany is decreasing the number of potential CGs for older generations, meaning that the burden of intergenerational care is now distributed among fewer children, which increases the individual share. This latter effect is further reinforced by the children's mobility: today's families tend to be more geographically distributed than in the past (Röß, 2011), making daily care provision more difficult. In addition, women not only have fewer children than in the past, they also have them later in life, which, combined with children remaining longer in the parental home, often means that women are still burdened by their own children in their 50s, which makes caring for elderly parents more difficult. Finally, higher divorce rates have led to more single elderly households (Mager and Eisen, 2002), meaning no partner on whom individuals in need of care can rely.

This probable increase in demand accompanied by a decrease in supply has led policy makers to seriously reassess the role of formal versus informal care in Germany (Campbell *et al.*, 2009), not least because formal care is considerably more costly for the LTCI than informal care. In fact, to keep LTCI insurance premiums as low as possible, the German Social Law stipulates that informal care must take priority over any other stationary care arrangements[1]. Hence, to promote domestic care solutions, policy makers have recently introduced new legislation that – in addition to the financial benefits already in place –

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[1] See §3 of the German Social Law (Sozialgesetzbuch, SGB).

provides further incentives for prolonged home treatment aimed at reducing the negative impact on CGs' careers[2].

Such informal care solutions are also usually preferred to formal care by most care receivers (CRs) and CGs (Schneekloth and Leven, 2003). Yet even if relatives provide informal care voluntarily, this duty constitutes a burden whose physical and psychological toll is empirically well documented (Schulz *et al.*, 1990, 1995; Pinquart and Sörensen, 2003). For example, one strand of the (primarily medical) literature assesses how providing informal care affects the subjective well-being (SWB) of CGs (see, e.g., George and Gwyther, 1986; Yates *et al.*, 1999; Yee and Schulz, 2000; Chappell and Reid, 2002; Bookwala, 2009), showing that, despite major differences in magnitude, caregiving is generally associated with a decline in well-being. Other empirical studies, in contrast, document positive psychological effects of caregiving (i.e., Kramer, 1997). These differing results are variously attributed to "wear-and-tear," the erosion of CGs' resources and well-being over time by the accumulation of caregiving demands, or to the long-term effects being driven by CGs' "adaptation" to their new situation, making the negative effects only short-lived (Brickman and Campbell,1971). Overall, however, the results from longitudinal studies on caregiving's long-term impact on well-being are inconsistent (Bookwala, 2009).

Such inconsistency is perhaps not surprising given that this literature, albeit extensive, is hampered by a number of methodological and design problems, including the (nearly exclusive) use of cross-sectional data, unrepresentative data sets, and unreliable statistical methods that report simple correlation coefficients. These latter fail to take into account the impact of other potential SWB determinants, while the regression analyses using cross-sectional data allow no conclusion of causality because of omitted and unobservable personal characteristics. Moreover, most studies rely on self-reports (of SWB and informal care), meaning that the association identified between informal care and SWB could in fact be driven by "third factors" like personality traits of neuroticism, hardiness, extroversion, or negative affectivity; and most analyze specific populations, making generalizations problematic.

Our paper, besides being, to our knowledge, the first representative analysis of the effects of informal care on CGs' well-being in Germany, contributes to this research stream by examining the relation between informal care and SWB in a way that remedies some of the above shortcomings. Most particularly, our use of a rich set of covariates in the regression analysis partially eliminates the impact of other SWB determinants that may potentially

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[2]   LTCI benefits are regulated under SGB §36 -37; new legislation can be found in the German Care Time Law (Pflegezeitgesetz, PflegeZG)

correlate with eldercare provision. Likewise, our use of 10 years of data from the German Socio-Economic Panel (GSOEP) allows us to control for such unobservable individual characteristics as affectivity, thereby enabling more convincing conclusions about causality.

The paper is structured as follows: the next section reviews the pertinent literature on the effects of care on CGs' SWB. Section 3 then describes the data and methodology. Section 4 reports the results, and section 5 concludes the paper.

2. Prior Research

Medical and gerontological research, which began addressing the effects of domestic caregiving on CGs in the late 1970s (George and Gwyther, 1986; Kramer, 1997), has generated a rich body of literature focused on such diverse outcome variables as CGs' SWB (George and Gwyther, 1986; Yates *et al.*, 1999; Yee and Schulz, 2000; Chappell and Reid, 2002; Bookwala, 2009), employment (Heitmueller, 2010), and even marital relations (Bookwala, 2009). Given our research interest, we concentrate particularly on the literature that focuses on SWB.

Several meta-analyses give an overview of this literature with particular attention to its psychological implications. A study by Schulz *et al.* (1990), for example, reviews 33 articles from 1968 to 1990 in order to identify the psychiatric morbidity effects caused by caregiving. Most of the studies reviewed assess these psychological effects using multi-item scales that include questions about general well-being or happiness. Although the evidence overall suggests that CGs tend to show above-average psychiatric symptoms, the findings are far from conclusive because of major methodological shortcomings. In a subsequent review, Schulz and colleagues (1995) concentrate on 41 papers, published between 1990 and 1995, that focus on the well-being effects of caring for dementia patients – a form of care that places a high burden on CGs. Their general conclusion is that providing care for dementia patients leads to higher levels of depressive symptoms.

A more recent review by Pinquart and Sörensen (2003), which covers 228 studies between 1966 and 2002, focuses on the psychological effects of elderly caregiving on the CGs. These authors cluster the studies based on similar characteristics related to outcome (CG burden or depression), sampling (probability or convenience samples), impairment (dementia, non-dementia, or mixed patients), and relationship to the CG (spouse or adult children). They find overall evidence that behavioral problems (i.e., disruptive and aggressive behavior), physical and cognitive impairment, and the time spent on caregiving burdens the CG and increases symptoms of depression, with behavioral problems being particularly important

when caring for demented CRs.[3] They also report that spouses who provide care are often more burdened than adult children who act as caregivers. Savage and Bailey (2004) likewise examine the impact of caring on CGs' mental health, but cluster relevant papers from primarily medical databases according to different factors associated with CGs' burden. They find that the care relationship is an important factor for mental health outcomes, with closer relationships inducing more positive outcomes for the CG. They also find evidence that mental impairment among CRs negatively affects CGs' well-being, an effect enhanced by financial restrictions and lack of social support.

To assess the impact of caregiving on general well-being, George and Gwyther (1986) apply four generic categories – physical health, mental health (which also contains a single-item measure of life satisfaction), social participation, and financial resources – to a sample of family members caring for memory-impaired older adults. Specifically, these authors compare CGs' overall SWB to adjusted values from other population-based samples in order to calculate the difference in well-being between CGs and random community samples of non-CGs. Their final sample consists of 510 family CGs, who have a 20% lower level of self-reported life satisfaction than the control group. The authors conclude that the CGs' burden is driven primarily by their relatively lower levels of mental health and social participation.

More recent research focuses not only on the negative outcomes of caregiving but also increasingly on its positive effects, which tend to be perceived indirectly. That is, it is not the actual care task that (directly) triggers higher satisfaction but rather the feeling of having provided care and done something good (McDaid, 2001). For example, Ashworth and Baker (2000) ask 23 CGs aged between 14 and 85 in London about how they experience their care arrangement and what they think about respite care. They report that about 40% of the CGs interviewed expressed positive satisfaction with care provision. According to Chappell and Reid (2002), in their path analysis of 243 CGs identified by random-dialing in British Columbia, Canada, such experience may be influenced by social support and coping strategies, while the number of hours that informal care is provided increases the probability of being burdened and directly decreases CG well-being.

Amirkhanyan and Wolf (2006), using data from three waves of the Health Retirement Study (3,350 men and 3,659 women), further point to an age effect: older CGs seem to show lower symptoms of depression than younger CGs. Nevertheless, care provision affects the well-being of the entire family and having a parent in need of care increases the likelihood of

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[3] The relationship between adult children and their parents, however, is often shaped by conflicting norms and can thus be linked with a higher burden perception (Young and Kahana, 1989; Lye, 1996).

depression. This effect, they argue, is one that many studies fail to consider, an omission that leads to a risk of bias in simple comparisons between CGs and non-CGs, which cannot clearly differentiate whether well-being is derived from care provision care or influenced by having a family member with bad health.

Depression and impact on the family are also a major focus of Bookwala's (2009) study of the long-term impact of providing care to an ill or disabled parent (or parent-in-law), which draws on three waves of data collected over a 15-year period and a probability-based sample drawn from the National Survey of Families and Households (N = 716). Using well-being and marital quality as outcome indicators, this author finds some support for the wear-and-tear model, showing a decline in CGs' marital quality over time. In terms of depression symptoms, her research also shows different outcomes for men and women: women experience a higher probability of depression after a certain time of caring, whereas men's depression levels decrease over the same amount of time. Such gender differences are also illustrated by Raschick and Ingersoll-Dayton (2004), who use a cross-sectional subsample of 978 CGs from the 1999 National Long-Term Care Survey to compare the perceptions of men versus women. They report that women perceive more caregiving costs than men, tend be more burdened by caregiving experience, and show lower levels of life satisfaction. They also find that adult children receive higher emotional rewards than spouses, which may stem from the qualitative differences in the care situation; that is, spouses face more intensive responsibilities than do adult children.

This research overview (summarized in Table 1), although it refers mostly to findings for the U.S. with only limited evidence for other countries, suggests several conclusions. First, in line with theoretical reasons to expect both a positive and a negative effect of caregiving on CGs' well-being, as well as differences in sampling strategy, duration of study, and type of care experiences examined (Bookwala, 2009), the empirical evidence is mixed. Second, the majority of studies are subject to several methodological shortcomings, including non-representative samples, small sample sizes, limited use of control variables, and widespread use of cross-sectional analyses. According to Leigh (2010), for example, most of the caregiving research fails to account for omitted variable bias by ignoring important individual characteristic. His study, which uses 7 years of panel data from the Household, Income and Labour Dynamics in Australia (HILDA) survey (N = 10,000), controls for individual fixed effects and identifies no significant impact of caring on CG's well-being.

Table 1: Overview of the literature

Author	Data	Controls	Conclusion
George and Gwyther (1986)	Cross- section of 510 family CGs	Random community samples of non-CGs.	CGs suffer most from decreased mental health status and a lag in social participation. Their levels of self-reported life satisfaction are 20% lower than those of the control group
Schulz et al. (1990)	Review of 33 articles	-	CGs tend to have higher psychiatric symptoms than the average population.
Schulz et al. (1995)	Review of 41 articles	-	There is substantial evidence in the literature that dementia caregiving leads to higher levels of depression.
Lawton et al. (2000)	634 women over 3 years	CR age, race, living arrangement, CG age	The evidence for a negative link between caregiving and CGs' SWB is small.
Seltzer and Li (2000)	476 female CGs over 3 years	Age, level of education, income, and employment status.	Wives perceive downturns in their SWB on becoming CGs; daughters are barely affected.
Ashworth and Baker (2000)	Qualitative interviews with 23 CGs	-	About 40% of CGs report positive outcomes of caregiving
Chappell and Reid (2002)	Cross-section of 243 CGs	Age, sex, marital status, CR characteristics, perceived social support, frequent breaks, formal service hours, self-esteem, burden	Perceived social support (+), self-esteem (+), informal care hours (-), and burden (-) have a significant influence on the CGs' mental health.
Pinquart and Sörensen (2003)	Review of 228 studies from 1966 to 2002	-	According to the overall evidence, behavioral problems, physical and cognitive impairment, and care time increase depression symptoms, and spouses that provide care are often more burdened than adult children.
Raschick and Ingersoll-Dayton (2004)	Cross-sectional subsample of 978 CGs from the 1999 National Long-Term Care Survey	Financial hardship, employment status, care recipient functional dependency, behavior, hours of caregiving, gender, care relationship	Women perceive more caregiving costs than do men, and adult children receive higher emotional rewards than spouses.

Savage and Bailey (2004)	Review of 26 studies	-	CR disabilities and residency influence the impact of caring on the CG.
Amirkhanyan and Wolf (2006)	3 waves of the Health Retirement Study (3.350 men and 3.659 women)	Health, relationship to the CR, marital status, education, age, number of children, income, ethnic background, equity	Generally, non-CGs whose parents need care are more likely to show higher depression symptoms than non-CGs without disabled relatives.
Bookwala (2009)	3 waves of the U.S. National Survey of Families and Households (N = 716)	Age, race, education, number of children, employment status	In contrast to female CGs, males show a decline in depression symptoms over time. Experienced CGs are significantly less happy in their marriages than recent CGs.

3. Methodological Issues and Data

3.1 Data

This analysis is based on the German Socio-Economic Panel (GSOEP)[4], a survey administered by the German Institute for Economic Research (DIW), which provides a rich longitudinal data set. Begun in 1984, by 2010, the GSOEP incorporated 27 annual waves, had more than doubled its sample size over time, and covered 22,870 individuals (based on individual questionnaires, IQ). The GSOEP survey asks questions of all household members older than 16 years and also administers a household questionnaire (HQ) to heads of household on behalf of all household members (there were 16,099 households in 2010). Households are picked by regionally pooled multi-stage sampling, combined with a random walk selection. For detailed information about the survey, see Huber *et al.* (2011).

3.2 Variables

Although the survey began as far back as 2001 to include a question on the hours spent on "care and support of persons in need of care", semantically, the question in German differs slightly from the English translation[5]. That is, the word "pflege" is more of a medical term than "care" and focuses primarily on nursing tasks. This same section also asks about the time spent on housework (washing, cleaning, and cooking), particularly child care, implying that these tasks are most probably not covered by the care variable. In addition, the questionnaire only includes this question for a typical weekday in each wave and only asks about time spent caring on a typical Saturday or Sunday every second year. Hence, creating the main independent variable of "care time" poses two main challenges.

First, an approximation is needed to estimate the time spent on caregiving on weekends in those waves that do not include this question. Although theoretically, we could simply use the workday values for weekends, this method proves unsatisfactory because time spent on care on the weekends differs significantly from that spent during workdays.[6] We therefore impute the values from past waves for which all three variables are available; for example, we use 2001 values for the weekends in 2002. Second, the values for our care time variable, which represents the time spent weekly on caring for a dependent person, range from 0 to 168 hours, meaning that some respondents reported spending every hour of the week caring for a dependent person. These numbers suggest that people interpret care not only as

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[4]   The data used in this paper was extracted using the Add-On package PanelWhiz for Stata.PanelWhiz (http://www.PaneIWhiz.eu) was written by Dr. John P.Haisken-DeNew (john@PaneIWhiz.eu). See Haisken-DeNew and Hahn (2006) for details.

[5]   The German formulation being: "Versorgung und Betreuung von pflegebedürftigen Personen".

[6]   Two-way t-tests show significantly higher means in every wave for weekend care time.

physical care tasks but also as supervision of their protégé. Given that earlier studies report higher hours of care time for people with mental health problems who cannot be left unattended at any time (Ory *et al.*, 1999), we do not exclude these observations from our estimation.

For our main measure of well-being,[7] we use responses to the question on overall life satisfaction, available in every wave, which participants rank on a 10-point scale from 0 (completely dissatisfied) to 10 (completely satisfied*)*. If the pure effect of the informal care burden on CG's well-being is to be estimated, however, it is crucial that we control for all other variables that affect it; specifically, the main socioeconomic determinants of SWB (Diener *et al.*, 1999; Blanchflower and Oswald, 2008), including age, health, income, education, marital status, employment, and children in the household. In addition, because our panel analysis must necessarily be based on waves 18 (2001) to 27 (2010), for which we have care time data, we also include wave dummies.

As regards CR characteristics, the information in the GSOEP is limited; that is, the data set includes information about a care recipient only if that recipient is living in the household covered by the GSOEP. All 27 waves[8] do, however, include data from a section of the HQ that explicitly poses questions on informal care situations, such as the type of care received and the relationship to the CG. Hence, to investigate the impact of residency, we add a dummy indicating whether or not a CR lives in the household, which allows us to measure the effect of "care time" separately from a CR's place of residence. Finally, to shed light on the "wear-and-tear" versus "adaptation" models, we investigate the long-term effects of providing care by including a variable that measures the accumulated number of years that CGs have provided care, including also a squared term to capture possible non-linear effects.[9] The resulting descriptive statistics are outlined in the appendix.

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[7] For a discussion of the problems in measuring well-being, see Peichl and Pestel (2012); Juster and Stafford (1991); Warr (1990).

[8] Because the design of the GSOEP does not provide a direct link between CG and CR information in the HQ, we assume that a CG who spends some time on care and has a CR in the household (who receives family care) devotes all care time reported to this relative. Such an approximation will only create a bias if an additional CR is not covered by the GSOEP sample. We are confident, however, that this approximation creates only minor noise in the data.

[9] The counting of years begins with the 2001 wave when this question is asked for the first time. We cannot know, however, how long beforehand respondents were caregivers. We therefore test for this bias using an additional sample beginning with the 2002 wave and simply looking at those who were not CGs in 2001.

3.2 Methods

<u>Model I</u>

In model I, we use a sample of 33,994 individuals to measure the overall impact of providing care on SWB. In a first step, we use a standard fixed-effects (FE) model in the expectation that unobservables will depend on individuals' emotional resilience and skills for coping with stress.[10] We thus treat our dependent SWB variable as a cardinal and estimate an FE model of the following form:

$$w_{it} = \beta c_{it} + \gamma X_{it} + \mu_i + \varepsilon_{it} \text{ for t=1,..,T \& i=1,..,N}$$

where w_{it} is the SWB of the CG, c_i the time spent on care, and X_i a vector of other control variables. ε_i is the error term, and μ_i is a fixed constant variable capturing the unobserved heterogeneity in the error term.

For a consistent and efficient application of the FE model, we need a metric dependent variable, but most well-being indicators are measured on an ordinal scale. Using a standard FE regression with an ordered dependent variable, however, might bias our results (Baetschmann *et al.*, 2011), a non-metric variable issue that several panel models have been developed to address (Das and Van Soest, 1999; Ferrer-i-Carbonell and Frijters, 2004). We therefore test for a possible bias from the ordinal nature of our dependent variable using the fixed effect ordered logit model proposed by Baetschmann *et al.* (2011), a so-called "blow-up and cluster" estimator (BUC) whose consistency fares well in comparison to the FE model and other estimators for ordered dependent variables. Riedl and Geishecker (2011), for example, find that in Monte Carlo simulations, the BUC estimator outperforms all other models, especially for the GSOEP well-being variable, which contains 11 categories.

Specifically, the BUC estimator blows up the sample with K–1 copies of every observation and then dichotomizes them at different thresholds so that a conditional maximum likelihood logit can be estimated on the entire "blown-up" sample. Because some individual observations contribute to several terms in the log-likelihood, standard errors are clustered at the individual level:

$$w_{it}^* = \beta t_{it} + \gamma X_{it} + \mu_i + \varepsilon_{it}$$

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[10] A Hausman test supports the link between individuals and the unobserved effect and rejects the consistency of a random-effects model.

The estimation of the latent variable w^*_{it} is based on the independent variables and the two error terms (u_i, e_{it}). w^*_{it} is approximated by an ordered variable w_{it}, which follows the rule:

$$w_{it} = k \quad if \ \tau_k < w^*_{it} < \tau_{k+1}$$

Here, the thresholds must strictly increase, running from $-\infty$ for t_1 to $+\infty$ at t_{K+1}. In addition, because the literature reports gender differences associated with the effect of caregiving on SWB, we run separate regressions for men and women.

<u>Model II</u>

An important control variable in this context is CG age because, besides the possibility of different perceptions among different age groups in providing informal care, caring can be physically demanding. Assisting recipients with mobility and personal hygiene, particularly, requires physical strength, which is very likely to differ among age groups. Model I, however, provides no differentiated perspective of ageing effects because time-demeaning age with an FE model in a 10-year panel data set subtracts most of the age effect. With longitudinal data, on the other hand, three separate time effects can be differentiated that could influence perceptions of caring: cohort, age, and period effects.

The first type, the cohort effect, refers to the influence of the conditions surrounding individuals born at the same time. For example, it is likely that, besides their actual age, those born before World War II experienced their environment differently at age 70 than will the baby-boomer generation at the same age. The age effect, in contrast, distinguishes the changing perceptions of people at different ages. For instance, 20-year-olds, being in the early stage of their lives, do not have the same values and experiences as 60-year-olds, a difference that we control for by using age and age-squared in the fixed-effects model. This effect of age on well-being is demonstrated in several studies, which also show that it tends to be U-shaped over the life course (Blanchflower and Oswald, 2008; Schilling, 2005). In Germany, this U-shaped relation between aging and well-being seems to apply particularly to those under 65, with a health-related decline in life satisfaction occurring at age 75+ that can be largely attributed to cohort effects (Gwozdz and Sousa-Poza, 2009; see also López Ulloa and Sousa-Poza, 2012). Although certain dimensions of well-being decline, however, others may remain constant (Kunzmann *et al.*, 2000).

The third type of effect, the period effect, occurs only in panel data and is hard to separate from the cohort effect. Nevertheless, there is no doubt that being 60 in 2001 differs from being 60 in 2010, not only because of the cohort or age effect but because general well-being can differ on account of macro events (e.g. recessions). We therefore control for period

effects by using dummies for every wave. To account for all three effects, we run separate regressions for seven decades in which we also control for waves and age.

Model III

Our third model pays specific attention to Amirkhanyan and Wolf's (2006) contention that the impact on CG's well-being is influenced more strongly by the presence of a CR in the household than by the fact of providing them with care. To test this assumption, we create three dummy variables: (i) CGs who provide care to CRs living in the same household, (ii) individuals living in the same household as the CR who do not provide any care, and (iii) CGs who provide care to CRs that do not live in the same household. The reference category is composed of individuals who neither provide care nor have a CR in their household, a differentiation that should provide further insights into the care effects not captured by our care variable.

For this model, we run three estimations that build upon one another. The first, model IIIa, designed to identify the effect of the care arrangements and how the CGs' SWB differs from that of those unaffected by caregiving, contains only the three dummy variables that separate the sample into four groups. Model IIIb then controls for the actual amount of care time provided in order to assess the pure impact of the domestic situation. Model IIIc simply adds in a quadratic function of "care" using the control variables mentioned above.

To gain additional insight into how the presence of a CR within a household effects the SWB of a household member, we observe caregiving households over a certain amount of time and compare the SWB of the members before and after a CR enters the household or a household member becomes a care recipient (see Clark *et al.*, 2008a). More specifically, we identify the first year in which one of the household members is in need of care and then compare the impact on the SWB of a CR in the household to a baseline set 5 to 9 years before the event. We then add dummy variables for 3-4 years, 2 years, and 1 year before the event; the year of event; and 1–2 years, 3–4 years, 5–7 years, and 8 or more years of shared residency with the person in need of care. We run the FE regressions using 1,715 household members (8,111 observations) in an unbalanced panel in which the average person is observed for 4.7 years.

Model IV

Because perceptions of the care situation can be influenced by different relationships between CGs and CRs, we specifically analyze this relational aspect using the information

reported by the head of household on the HQ about who provides care to whom. Although focusing specifically on CGs who provide care to a person living in the same household reduces the sample size to 1,452 individuals (with 4,947 observations), it does allow us to identify the family structure. We then create layers of generations within the household and two different categories of care arrangements: "intragenerational care", when people provide care within their own generation (e.g. spouses and siblings), and "intergenerational care", when individuals provide care to a member of an older generation (e.g., parents or grandparents)[11].

Model V

The impact of caregiving on the provider's well-being allows us to assign a monetary value to informal care time using the method developed by van den Berg and Ferrer-i-Carbonell (2007), which calculates the amount of income needed to compensate an individual's loss of well-being from an increase in informal care time. This method can only be applied if income has a positive effect and care time a negative effect, which generally appears to be the case (Boyce *et al.*, 2010; Easterlin *et al.*, 2010; Clark *et al.*, 2008b). To impute the diminishing marginal returns on well-being, we use the logarithmic values of net household income. The logarithmic function of weekly care hours serves a similar function for care: one additional hour of care has different effects on SWB whether it doubles the absolute care time or increases it by only 1% (e.g., changing it from 100 to 101 hours a week). It can also reduce the effect of high values (over-reporting), which could occur in the data.

For the valuation, we create a subsample of all those who provide at least one hour of informal care a week (N = 5,094), which we then regress on SWB while controlling for all important demographics. We thereby obtain coefficients with which to calculate the impact ratio of income and care time on SWB:

$$\frac{\partial t}{\partial y} = -\frac{\partial w / \partial t}{\partial w / \partial y}$$

This equation, in which *w* represents the overall SWB and *t* the time spent on informal care, shows how a change in care time can be compensated by a change in income y.

As already mentioned, using a logarithmic function of care provides the change estimation in percent; however, because the percentage increase in one hour of care depends

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[11] Because our focus is primarily on elderly CRs, we do not analyze the care provided by older CGs to younger CRs; most particularly, because providing care to a younger generation (as opposed to an older generation) can be expected to produce different perceptions, which would then have a different impact on CGs' well-being (see Sen and Yurtsever, 2007).

on the amount already provided, we need to look at different cut-off points. Specifically, we are interested in how a one-hour increase in care affects well-being and how much additional income can compensate the perceived loss. Here, as in van den Berg and Ferrer-i-Carbonell (2007), we focus on the means of both the income and care time variables to derive an average monetary value.

4. Results

Model I

Table 2 reports the results of the FE and BUC estimations for model I. The negative effect of informal care time on CGs' SWB is significant for both estimators and all modifications of the model. In the FE model (Ia), the coefficient is equal to -.0039; that is, an increase of 80 hours per week has approximately the same effect on SWB as becoming unemployed. The coefficient of the BUC (Ic) is slightly larger but much in tune with the FE results in all estimations, and neither the significance nor the sign of any coefficient differs between the FE and BUC. Given this similarity, the remaining discussion reports the results of the FE model only, which are more straightforward to interpret.

As figure 1 shows, the accumulated years of providing care display a U-shaped pattern, the average length of care provision within the 10 years of observation is 2.78, with the first years of being a CG seeming to impose the largest burden. Because of the squared term's positive relation, the negative impact of caring is reduced to a minimum at about 3.5 years and has a nullified impact after nearly 7 years[12].

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[12]   A comparison with a subsample from 2002–2010 using only CGs that began care provision in 2002 or later (not reported) shows a similar pattern.
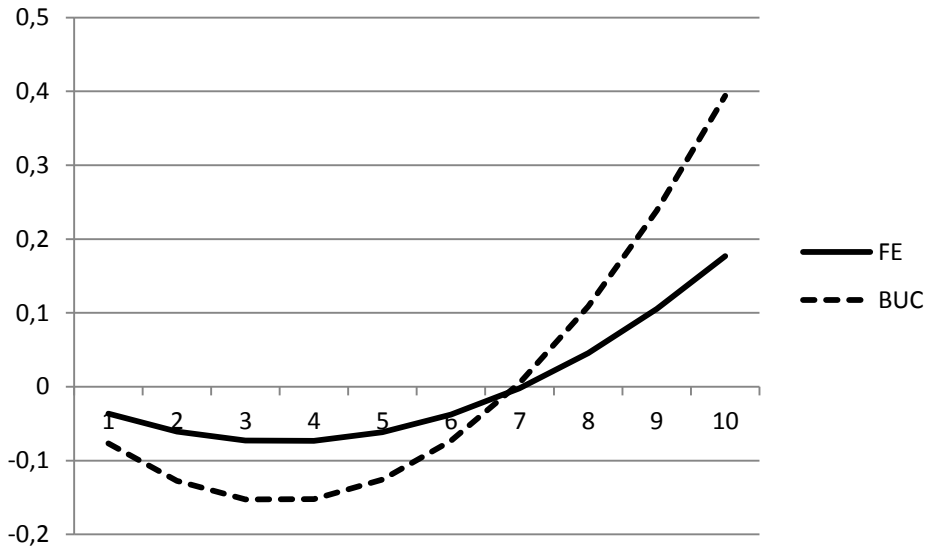
Figure 1: Impact of years of caregiving on subjective well-being

Figure 2 shows the results of a more flexible specification in which 10 dummy variables indicate how many years the CG has provided care within the observation time. Although the coefficients are negative in the first 3 years but positive in the last three, only two dummies are significant at the 5% level (years 3 and 9). The general picture is that wear-and-tear may dominate in the early years, but these negative effects are less pronounced in the long term. This finding lends support to the adaptation model, although larger samples would be needed to obtain conclusive evidence.

Figure 2: Dummies for years of being a caregiver

Residency does indeed appear to have an important impact on CGs well-being, which declines by 0.1758 (FE) if a CR lives in the CG's home, a relatively strong effect, comparable to half the coeffic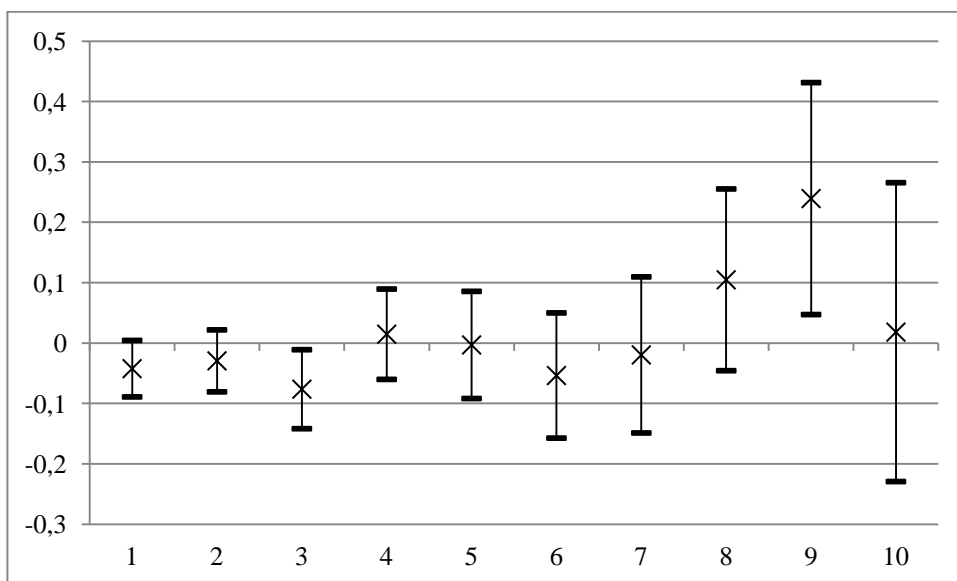ient of the full employment variable. We observe few differences, however, for gender except that the long-term care coefficients are not significant in the male sample and men are less strongly affected by having a CR in the household. Care time itself shows only minor differences, with women suffering just .0002 more in their SWB if they provide one hour of care a week. However, when model Ib introduces the diminishing marginal impact of care time on CGs' SWB, the data confirm our hypothesis: the care coefficients become more negative ($ß_{\text{Model Ia}}$ =-0.0039; $ß_{\text{Model Ib}}$=-0.0085) but are diminished by the positive squared term ($ß$=.0004) of increasing care hours. Nevertheless, the U-shaped pattern of the impact for long-term care remains, with negligible changes in the coefficients. Hence, overall, the results for model I suggest a negative impact of care and domestic care arrangements, whose relation to CG age is analyzed using model II.

Model II

Table 3 reports the results for seven estimations of the 10 birth decades. The N_{TOTAL} column shows the number of people born in that specific decade, while N_{CR} gives the number of CGs in these cohorts. For 1900 to 1919 (not shown), we obtain no significant results, driven primarily by the low number of observations: fewer than 400 people in the sample were born before 1919 and few provide care (n = 36). For the 1920s cohort, although the number of CGs is still low (n = 282), the impact of hours of care has the highest negative size among all decades ($ß$ = -0.0106). The coefficient of age is 0.5853 and only marginally diminished by the negative squared term (-0.004), possibly as a result of the oft-cited U-shaped pattern of SWB over the life course. The 1930s and 1940s cohorts show similar patterns. The residency dummy is highly significant and negative, with a magnitude of about -0.25, but the care coefficients decrease in younger cohorts, with the -0.0083 impact of one additional hour for a 1930 CG declining to -0.0051 for those from the following decade. The 1950s cohort shows an even lower impact of care time (-0.0034) and no significance for shared residency. The corresponding coefficients for CGs born after 1960 are not significant, possibly because the share of CGs is much smaller, meaning that younger people provide care less frequently, and shared residency is less common among younger cohorts, so obtaining empirical evidence among younger CGs may require a larger sample. Overall, however, the table does show a pattern for the link between age and caregiving, which, as already pointed out, is a physically demanding task that requires physical strength. Specifically, our analysis

shows larger declines in SWB for older cohorts resulting from care provision to and shared residency with the CR.

Table 2: CGs overall well-being

| | Fixed-effects | | | | | BUC | | |
| | Model Ia | | | | Model Ib | Model Ic | | |
	overall		female		male		overall		female		male		overall		female		male
Hours of care weekly	-.0039	***	-.0038	***	-.0035	***	-.0085	***	-.0045	***	-.0044	***	-.0040	*
Hours of care weekly²	-		-		-		.00004	***	-		-		-	
Time caring yearly	-.0418	***	-.0584	***	-.0180		-.0245	**	-.0896	***	-.1164	***	-.0475	
Time caring yearly²	.0060	***	.0077	***	.0034		.0042	***	.0129	***	.0160	***	.0078	
CR lives in the household	-.1763	***	-.2247	***	-.1324	***	-.1543	***	-.2406	***	-.2618	***	-.2324	**
R²(pseudo)	.1374		.1318		.1485		.1369		.0637				.0667	
Numbers of CG	5094		3055		2039		5094		5094		3055		2039	

Levels of significance: *, **, and *** = 10%, 5%, and 1%, respectively.
Regressions include controls for age, household income, education, marital status, employment, health, children, and waves.

Table 3: Cohort decades for CGs

Birth	Care		Age		Age²		CR in HH		N_TOTAL	N_CG
1920-1929	-.0106	***	.5853	***	-.0040	***	-.0980		1785	282
1930-1939	-.0083	***	.1201		-.0010	*	-.2544	***	3778	776
1940-1949	-.0051	***	.0265		,0002		-.2682	***	4845	1124
1950-1959	-.0034	**	-.0676		.0006		-.0889		5859	1288
1960-1969	.0006		-.0202		-.0001		-.1216		6551	830
1970-1979	-.0007		-.0466		.0006		-.1638		4728	382
1980-1989	-.0044		-.2614	***	.0047	***	.0312		4916	343

Levels of significance: *, **, and *** = 10%, 5%, and 1%, respectively.
Regressions include controls for household income, education, marital status, employment, health, children, and waves.

Model III

     This model is designed to reveal the dynamics outlined by Amirkhanyan and Wolf (2006), who stress the shortcomings in many studies in which a comparison of CG to non-CG does not measure the pure impact of caring. Rather, they find more negative effects generated by the existence of a CR within the family than by care time. To account for this effect, we split the residency dummy into three separate dummies and report the results in Table 4. Model IIIa, which does not control for care time, shows the negative coefficients for all three dummy variables. The coefficient for those who provide care to a resident has the highest value (ß=-0.3164), with a relatively large impact that corresponds to the effect of becoming unemployed. A comparison of the other two dummy variables confirms Amirkhanyan and Wolf's (2006) findings to some extent. Individuals with a CR living in the household suffer more in their well-being than those who provide care to a non-residential CR.

     Model IIIb integrates the care time variables into the estimation. Not only does the magnitude of the coefficient show minor differences with model Ib, but we observe changes in our three dummy variables compared to model IIIa. Both ßs for actual CG's (co-residential and non-residential) become smaller, while the dummy for non-CGs remains relatively constant. The coefficients for CGs with shared accommodation decrease by more than 40% from -0.3164 to -0.1893 and for non-shared CGs by as much as 60% ($ß_{IIIa}$ = -0.1015 to $ß_{IIIb}$ = -0.0373). These results suggest that approximately 16 hours of care by a CG assisting a CR outside the household has the same effect on SWB as having a CR in the household but not providing care time.

     Nevertheless, these differences between CGs and non-CGs in a household affected by informal care are hard to interpret once care time is controlled for. One possible explanation is that the time spent on caring strengthens the relationship between CR and CG, which makes the former feel more responsible and therefore more affected by the care situation of a close relative. Yet, even after care is controlled for in model IIIb, the non-resident CG still shows a negative ß, albeit with a low level of significance (10%), compared to non-CGs without a CR in their household. In fact, the coefficient is nearly the same size as the difference between CGs and non-CGs in a caring household, which could suggest that caring simply has a negative impact that is not captured by our care variable. At about .03, this effect is quite small and even becomes insignificant (for non-resident CGs) once we add in controls for the years of CG experience in model IIIc.

     The additional baseline method also shows an overall negative impact of residency even after care time is controlled for (see figure 3): compared to the baseline, even one year

before a CR is present in the household, there is a negative impact on the household member. This finding might be explained by some type of foreshadowing, by relatives already being in a bad state of health. This explanation is partly supported by our analysis of the time that household members spend on caring: whereas at the baseline, the subsample of 1,715 CGs provides an average of 0.4 hours of care weekly, one year before the event, this average care time rises to over 2 hours, and after the event, the mean is always above 13 hours a week.

In the first year with a CR in the household, the coefficient shows a high negative value ($ß$=-0.4660), and the size of the coefficients increases over the next 7 years. As we are using an unbalanced panel, the lack of significance in the 8+ year dummy is most probably related to the reduced sample size (N = 397). Nevertheless, this analysis indicates that the residency of a CR has a strong and persistent effect on the SWB of a household member, which suggests that, as no adaptation seems to be taking place, wear-and-tear tends to dominate.
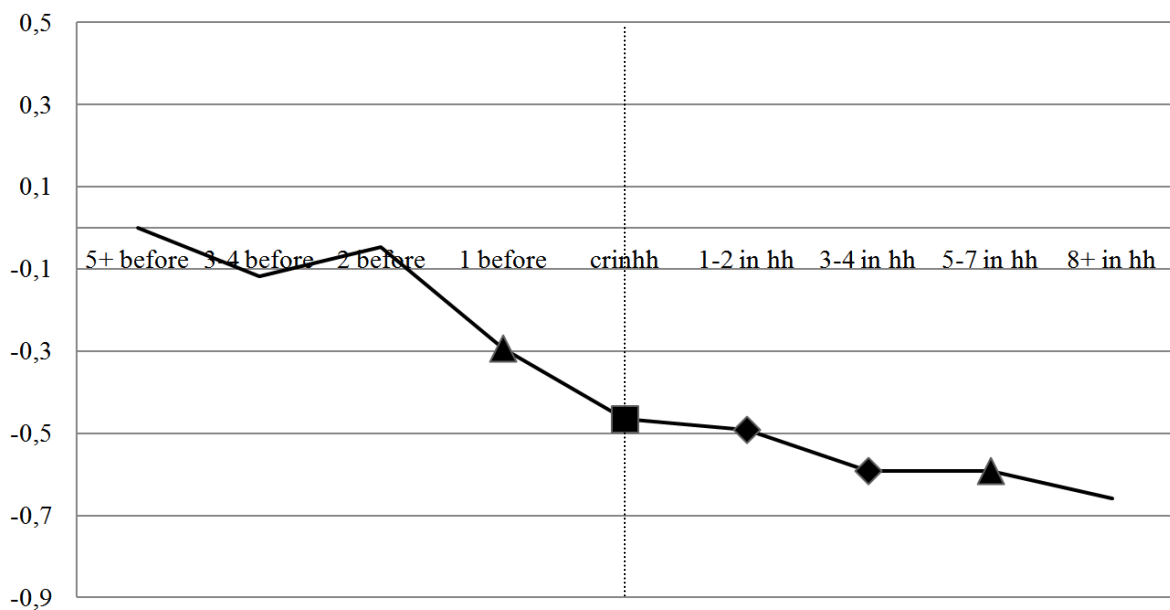
Level of significance: ▲ = 10%, ◆ = 5%, ■ = 1%

Figure 3: Baseline analysis of a CR resident in the household

Model IV

Table 5 shows the different effects of care once the sample is split into inter- and intragenerational CGs. Not only is the coefficient for intergenerational care three times larger than that for intragenerational care, but the intergenerational CGs are significantly younger

(M^{age}_{inter} = 51) than their intragenerational counterparts (M^{age}_{intra}= 66). Although this difference may be explainable by the higher opportunity costs of caring among the young (and often working) CGs, it might equally be associated with the oft-cited family conflicts that arise from intergenerational care (Young and Kahana, 1989; Lye, 1996; Raschick and Ingersoll-Dayton, 2004). As regards explained variance, whereas using the same model explains approximately 15% of the variance for intergenerational care, for the intragenerational subsample, it explains less than 5%. This notable difference suggests that older CGs may be affected by something other than care and the control variables we select. In addition, the comparison between female and male CGs reveals certain differences in the family structure: in intergenerational care arrangements, both genders are more or less equally burdened by care, whereas for intragenerational CGs, we obtain significant results only for women. In neither estimation do we obtain any results related to the long-term effect, probably because of the small sample size.

Table 4: The importance of residency

	Model IIIa		Model IIIb		Model IIIc	
Hours of care weekly	-		-.0079	***	-.0080	***
Hours of care weekly²	-		.00004	***	.00004	***
Time caring yearly	-		-		-.0113	
Time caring yearly²	-		-		.0029	
CG provides care to a resident	-. 3164	***	-.1893	***	-.1818	***
CG provides care to a non-resident	-. 1007	***	-.0373	*	-.0308	
CG does not provide care to a needy resident	-. 1630	***	-.1597	***	-.1585	***
R²	. 1394		.1382		1366	

Levels of significance: *, **, and *** = 10%, 5%, and 1%, respectively.
Regressions include controls for age, household income, education, marital status, employment, health, children, and waves.

Table 5: CGs' overall well-being

	*Inter*generational care			*Intra*generational care		
	overall	female	male	overall	female	male
Hours of care weekly	-.0114 ***	-.0115 ***	-.0112 **	-.0035 **	-.0066 ***	.0024
Time caring yearly	.0230	.0261	.0307	.0317	.1624	-.2316
Time caring yearly²	.0012	.0046	.0023	.0003	.00002	.0039
R²	.1526	.1568	.1218	.0443	.0025	.0058
N	385	210	175	766	422	344

Levels of significance: *, **, and *** = 10%, 5%, and 1%, respectively.
Regression include controls for age, household income, education, marital status, employment, health, children, and waves.

Model V

The results of the monetary valuation using the van den Berg and Ferrer-i-Carbonell (2007) method are given in Table 6. Here, based on the coefficients, we estimate the increase in income needed to compensate CGs for one additional hour of care with particular attention to the values for the mean of weekly care time and household net income. Because the 5,094 CGs in the sample provide 14.5 hours of care on average, we define the cut-off point at 14 to 15 hours, which implies a 7% increase in the time spent caring. The mean income of CG households is €2,997 a month, a little lower than the average of the whole sample. The bold numbers show how much money would be needed to compensate an average CG with an average income for one more hour of care, which is valued within the range of €7.62 to €7.89.

Table 6: Monetary valuation

Additional hour of informal care	Change	FE	BUC
4-5	25%	27.60 €	26.66 €
9-10	11%	12.27 €	11.85 €
14-15	**7%**	**7.89 €**	**7.62 €**
19-20	5%	5.81 €	5.61 €
29-30	3%	3.81 €	3.68 €
39-40	2%	2.83 €	2.73 €
167-168	0.6%	0.66 €	0.64 €

N = 5,094, M_{care}= 14.5 , M_{income}= €2997; the controls are regular.

These results are in line with those of van den Berg and Ferrer-i-Carbonell (2007), who identify a monetary value of one additional hour (taken at the average) of between €7.21 and €9.06 for a sample of Dutch CGs in the 2000s. It is interesting to compare this value with the minimum hourly wages for care nurses, namely €7.50 for Eastern and €8.50 for Western Germany. A further comparison can be made with the benefits from the German LTCI, in which CRs are entitled to financial compensation if care is provided by a relative. As of 2012, a CR who needs 15 hours of care per week would be classified as care level 1 and be entitled to €235 a month[13]. If this compensation were paid to the informal CG, then, according to our calculations, the hourly compensation of approximately €3.62 would not be enough to hold the CG's well-being constant.

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[13] SGB XI § 37

5. Conclusions

Despite the growing importance of informal care in Germany, few studies address the effects of such care on the caregivers themselves, and research that does exist for other countries is hampered by methodological problems, including reliance on often small and unrepresentative cross-sectional analyses. This paper therefore aims to provide new evidence for Germany on the effect care provision has on CGs' SWB while striving to overcome some of these methodological problems by exploiting the representative and longitudinal nature of the German Socio-Economic Panel. Our results contribute useful new evidence to the extant literature and confirm previous findings.

First, and in line with much previous research, we observe a negative correlation between hours of care and CG's SWB (Schulz *et al.*, 1995; Chappell and Reid, 2002; Pinquart and Sörensen, 2003). This effect is relatively large and comparable to becoming unemployed. Second, regarding long-term care, we find a pattern that cannot simply be attributed to one of the two existing theories, adaptation and wear-and-tear. Most particularly, by allowing the possibility of a non-linear relation between long-term care and SWB, we find some evidence for a U-shaped pattern: in the first years, care seems to decrease SWB, reaching a minimum at about year 3. However, although this observation is in line with the wear-and-tear model, we also observe an attenuating effect that supports the adaptation model: that is, SWB increases with each additional year of care provision. Hence, our evidence suggests that these two models need not be mutually exclusive. Rather, becoming a CG can be a slowly evolving process in which adaptation to the new role of CG is likely to take time. Changes in working time or professional care support, especially, need time to be organized and finally implemented.

Third, we show that this negative effect depends on birth cohorts, with negative effects being nearly exclusively observed for cohorts born between 1920 and 1959. This negative impact of care hours, however, also increases with higher age, an effect that could be related to the lower physical capability of older CGs. At the same time, older CGs also seem to be the most burdened by the presence of a CR in the household, which could be related to the additional loss of an active and mutually valuable partnership. Yet we find no evidence that this higher impact of caring can be explained by the family structure of the care arrangement; for example, by the prevalence of intragenerational care among older CGs.

Fourth, our results support previous studies' emphasis on the importance of CR residency. In households that provide informal care over time, we observe no patterns of

coping but rather see households with a CR as worse off over the long term compared to non-CG families. Although this observation adds some support to the wear-and-tear theory in terms of the capacity to adapt to domestic care arrangements, further research is needed to distinguish the effects of close distance to a suffering family member from a possible increase in housework that might burden the caregiving family.

Finally, to make our findings more tangible and comparable to the existing formal care reference values, we use the negative effect of caring to determine the additional hourly income needed in order to compensate CGs for one additional hour of care. In our sample, we identify a value between €7.62 and €7.89 per hour on average, which appears consistent with the results obtained in other countries. Hence, although the politically enforced priority that LTCI benefits be used to maintain a domestic care arrangement might be a less expensive and even a socially more desirable form of care, such informal care is likely to take place at the expense of CG's SWB. In fact, our valuation suggests that higher monetary benefits are needed if the negative effects of caring are to be compensated, especially given that the market for private care insurance is still surprisingly small (Meier, 1999; Brown and Finkelstein, 2007). With such negative outcomes for partners and offspring in cases of care dependency, it may be advisable to make these increasing risks of burdening the closest family members more public.

Appendix

Table A1: Descriptive statistics - Model I

Variable	Mean	Std. Dev.	Min	Max
Subjective well-being	6.97119	1.768399	0	10
Care time weekly	1.11235	6.919154	0	168
Years of caring	.2107114	.9249506	0	10
CR in the HH	.0249679	.1560277	0	1
Age	48.07661	17.51999	16	100
Male	.4794583	.4995792	0	1
Health status	3.378018	.9573898	1	5
Net household income	2991.553	2126.816	0	99999
High education	.3824814	.4859945	0	1
Married & together	.6045294	.4889528	0	1
Married & separated	.0171154	.1297019	0	1
Divorced	.0716932	.25798	0	1
Widowed	.0657355	.2478198	0	1
Fully employed	.3899549	.4877411	0	1
Part-time employed	.1041031	.305395	0	1
Otherwise employed	.1230816	.3285317	0	1
Child below 16 in HH	.2906149	.4540473	0	1
Observations	19004			

Table A2: Descriptive statistics – Model II

Variable	Cohort	Mean	Standard Deviation	Min	Max
Subjective well-being	00s	5.625	236	0	10
	10s	6.321	224	0	10
	20's	6.857	1.934	0	10
	30s	6.946	1.803	0	10
	40s	6.978	1.788	0	10
	50s	6.777	1.832	0	10
	60s	6.932	1.731	0	10
	70s	7.097	1.649	0	10
	80s	7.271	1.628	0	10
	90s	7.521	1.581	1	10
Regular care time weekly by caregivers	00s	30	.	30	30
	10s	19.85	15.21	1	70
	20s	20.82	22.35	1	168
	30s	18.24	23.38	1	168
	40s	14.53	20.17	1	168
	50s	11.91	16.03	1	168
	60s	14.70	24.15	1	168
	70s	14.23	24.60	1	168
	80s	1.26	16.96	1	168
	90s	9.38	10.16	1	56
Share of caregivers in the sample	00s	.0113	.1066	0	1
	10s	.0579	.2337	0	1
	20s	.0804	.2720	0	1
	30s	.0993	.2991	0	1
	40s	.1163	.3205	0	1
	50s	.1086	.3112	0	1
	60s	.0562	.230a	0	1
	70s	.0336	.1802	0	1
	80s	.0298	.1701	0	1
	90s	.0310	.1736	0	1
Share of male caregivers	00s	.	0	0	
	10s	.5057	.5028	0	1

20s	.5452	.4982		0	1
30s	.4413	.4966		0	1
40s	.4070	.4913		0	1
50s	.3363	.4725		0	1
60s	.3116	.4632		0	1
70s	.3129	.4639		0	1
80s	.4767	.4998		0	1
90s	.6595	.4789		0	1

Table A3: Descriptive statistics – Model III

Variable	Mean	Standard Deviation	Min	Max
Caregiver with care receiver in the household	.0197	.1391	0	1
Noncaregiver with care receiver in the household	.0052	.0720	0	1
Caregiver with no care receiver in the household	.0557	.2295	0	1

Other variables similar to descriptive statistics of Model I

Table A4: Descriptive statistics – Model IV: Intergenerational care

Variable	Mean	Std. Dev.	Min	Max
Subjective well-being	6.7023	1.9520	0	10
Care time weekly	17.0984	20.5277	1	168
Years of caring	3.1612	2.2352	1	10
Age	50.9876	13.7514	17	85
Male	.4488	.4975	0	1
Health status	3.2527	.9727	1	5
Net household income	3261.509	1799.145	345	12000
High education	.4441	.4970	0	1
Married & together	.6279	.4835	0	1
Married & separated	.0155	.1235	0	1
Divorced	.0542	.2266	0	1
Widowed	.0348	.1835	0	1
Fully employed	.3155	.4648	0	1
Part-time employed	.1201	.3252	0	1
Otherwise employed	.1356	.3425	0	1
Child below 16 in HH	.1100	.3131	0	1
Observations	1290			

Table A5: Descriptive statistics – Model IV: Intragenerational care

Variable	Mean	Std. Dev.	Min	Max
Subjective well-being	6.0844	2.0159	0	10
Care time weekly	25.0482	28.3214	1	168
Years of caring	3.0694	2.1837	1	10
Age	66.1464	13.2283	17	99
Male	.4563	.4981	0	1
Health status	2.8103	.9645	1	5
Net household income	2321.903	1252.448	329	12000
High education	.5640	.4959	0	1
Married & together	.8369	.3694	0	1
Married & separated	.0108	.1034	0	1
Divorced	.0428	.2025	0	1
Widowed	.0669	.2500	0	1
Fully employed	.1085	.3111	0	1
Part-time employed	.0482	.2143	0	1
Otherwise employed	.1064	.3085	0	1
Child below 16 in HH	.0470	.2116	0	1
Observations	2404			

Table A6: Descriptive statistics – Model V

Variable	Mean	Std. Dev.	Min	Max
Subjective well-being	6.6831	1.8595	0	10
Care time weekly	14.7262	20.8170	1	168
Years of caring	2.7895	2.0328	1	10
CR in the HH	.2614	.4394	0	1
Age	54.3340	14.7092	17	99
Male	.3854	.4867	0	1
Health status	3.177	.9290	1	5
Net household income	2996.876	2015.153	0	55000
High education	.4027	.4904	0	1
Married & together	.7374	.4400	0	1
Married & separated	.0142	.1183	0	1
Divorced	.0683	.2523	0	1
Widowed	.0569	.2317	0	1
Fully employed	.2950	.4560	0	1
Part-time employed	.1319	.3384	0	1
Otherwise employed	.1208	.3260	0	1
Child below 16 in HH	.1891	.3916	0	1
Observations	14352			

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