International Institute for
Applied Systems Analysis
Schlossplatz 1
A-2361 Laxenburg, Austria

Tel: +43 2236 807 342
Fax: +43 2236 71313
E-mail: repository@iiasa.ac.at
Web: www.iiasa.ac.at

Working Paper **WP-17-013**

The Youthful Effect of Childcare Beyond Grandparenthood

Valeria Bordone (valeria.bordone@lmu.de)

Approved by

Wolfgang Lutz
Program Director, World Population

July 2017

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Abstract

Drawing on the active ageing framework that promotes social engagement throughout the life course and in later life, we study subjective age – how old a person feels – and its association with childcare This study compares 50-85 year olds (in chronological age) who look after grandchildren to those who do not and to people looking after other children (e.g., neighbours). Using data from the German Ageing Survey (DEAS), we carry out cross-sectional analyses on grandparenthood, grandparental childcare, and care to other children. We find that looking after other children has about the same beneficial effect on subjective age as looking after grandchildren in later life. Additionally, we exploit the longitudinal nature of DEAS to examine the association between grandparental childcare and subjective age at 3-year follow-up. The results show an age-specific association between grandparental childcare and subjective age with older grandparents experiencing a "rejuvenating effect" when engaged in grandparental childcare. These findings have wide social- and policy-implications, encouraging intergenerational relationships also outside the family to age well.

Acknowledgments

Work on this paper was conducted in the framework of the "Re-Ageing" project financed by the European Research Council (ERC), ERC2012-AdG 323947-Re-Ageing.

About the Authors

Valeria Bordone is Lecturer at the Department of Sociology, University of Munich (LMU). She is also Guest Research Scholar with the World Population Program at IIASA, Wittgenstein Centre for Demography and Global Human Capital (IIASA, VID/ÖAW, WU).

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Valeria Bordone

1 Introduction

Improvements in living conditions and better access to health care have resulted in an increasing proportion of the population who is living longer around the world. It is however important to identify what allows people to age well. In light of the need for a better understanding of the subjective components of ageing, this study investigates subjective age among the 50-85 year olds in Germany. First, we replicate previous analyses (that were carried out on USA data) on the association between grandparental childcare and subjective age. Second, we add to the literature on intergenerational relationships by considering an aspect so far often neglected, i.e. childcare provided to children other than the own grandchildren (e.g., neighbours). In both cases, we will analyse the association of childcare provision with subjective age among the 50-85 year olds.

The concept of subjective age - how old a person feels to be – is of particular interest and at the same time of simple interpretation and offers an opportunity to rethink the traditional understanding of ageing, measured by chronological age. Subjective age (see below for a more detailed description of this concept) is considered a central aspect of the ageing experience because the way in which people evaluate the own present status against the own representations of age forms one's personal ageing model (Demakakos et al. 2007). In later life, a youthful subjective age may reflect a denial of ageing by which people can dissociate themselves from the stigma attached to growing old (Montepare & Lachman 1989). In this view, a youthful subjective age is an indicator of successful ageing, which is consistent with studies showing that subjective age has significant effects on physical health, cognitive functioning, and longevity (see Westerhof & Wurm 2015 for a review). This is extremely important in a time when old age is a phase in life that is accessible to most people.

The literature on the antecedents of subjective age is however still limited. As Bodner and colleagues (2017) have recently pointed out, the bulk of the studies in this field have mainly focused on the long-term effects on health and mortality. It has been shown that age perceptions depend on both individual's experiences and age-related social categorisations (Diehl et al. 2015). For example, retirement and widowhood can function as "age reminders" (Kleinspehn-Ammerlahn et al. 2008; Settersten & Hagestad 2015). Also grandparenthood and provision of grandparental childcare have been found to be associated with subjective age. Closely related to our study, are for example the works by Kaufman and Elder (2003), who studied the effect of the age at grandparenthood on subjective age, and Bordone and Arpino (2016) who additionally considered the dimension of care provision to grandchildren. The latter work is of particular interest for the current study and it could be considered our starting point.

This paper aims to extend the previous literature, by considering whether and how childcare affects older people´s age identity, independently on whether it is directed to grandchildren or to other children. The contribution of this paper is therefore manifold: 1) We replicate the analyses by Bordone and Arpino (2016) on the association of grandparenthood and grandchild care with subjective age. While they based their analyses on the Health and Retirement Study (HRS) in the USA, we will use comparable data from Germany; 2) We extend the analysis on grandparental childcare with a longitudinal approach that can provide some hints of causality to the association between grandchild care and subjective age at 3-year follow-up; 3) We also consider childcare to children other than grandchildren (e.g., of neighbours). To our knowledge, this is the first study to compare grandparental childcare to other forms of childcare within or outside the family in terms of their association with subjective age among older people; 4) We account for heterogeneity in the associations studied by gender and chronological age.

Including an analysis of care provided to other children means extending the focus to the whole population of older people and not only considering those who have grandchildren. This perspective maintains central the role of older people for intergenerational exchange in nowadays societies where increasing proportions of the population age as grandchildless or with grandchildren not living in enough geographic proximity to provide them with grandparental childcare. In this respect, the German context offers the proper setting for the study, as we will discuss later.

2 Background and Hypotheses

2.1 Subjective Age and (Grand)Childcare

Ageing is recognised as a process that can be slowed down by maintaining physical, mental and social engagement throughout the life course as well as later in life. In the aim of promoting active ageing, it is necessary to optimise opportunities for health and participation as well as to enhance quality of life as people age (WHO 2002). In light of this, chronological age is a too static measure of age: it does not change across space and time (Christensen et al. 2009; Sanderson & Scherbov 2008; Sanderson & Scherbov 2013) and it does not vary between individuals. Therefore, alternative measures of age and ageing have to be considered (Sanderson & Scherbov 2008). It is particularly compelling the need to understand individual perceptions which reflect older people´s expectations, goals, and actions (Bordone & Arpino 2016; Diehl et al. 2015).

Among a series of notions grouped under the umbrella concept of age identity (see e.g., Ayalon et al. 2014; Bodner et al. 2016; Diehl et al. 2015; Stephan et al. 2015), several studies have investigated the concept of subjective age, how old a person feels to be (e.g., Kaufman & Elder 2003 on this and other aspects of age identity). Subjective age was initially conceived as an indicator of age that might be more strongly related to a person's level of functioning than chronological age (Havighurst & Albrecht 1953) and it has been anchored to the theories about self and identity (Westerhof et al. 2012). Asking individuals how old they feel may seem trivial. Yet, their responses yield powerful insights into both physical and psychological ageing, making subjective age a promising alternative marker of development (Kotter-Grühn et al. 2015).

Previous research has shown that older people, in general, feel younger than their chronological age (e.g., Montepare 2009; Rubin & Berntsen 2006; Westerhof & Barrett

2005). This positive self-perception of ageing (Kleinspehn-Ammerlahn et al. 2008) may indirectly lead to better health and quality of life (e.g., Penninx et al. 2000) and have important consequences on the individual´s involvement in family activities, but also in society and in the labour market in later life (see Westerhof & Wurm 2015 for a review of evidence of the longitudinal impact of subjective age on health and longevity). Thus, finding what contributes to feel younger among older adults is of key importance. As recently called by Kotter-Grühn and colleagues (2015), there is a need to address intra-individual variability in subjective age and to identify the conditions under which individuals feel younger (or older) to fully understand the potential of subjective age in the context of active and successful ageing and inform interventions aimed at preventing people from feeling older than they are.

Reflecting the increasing longevity and the longer overlapping lives of different generations (Timonen & Arber 2012), another strand of research has at the same time developed around the (positive) effects of grandparenting on grandparents´ well-being, indicating better health and health-related behaviours (Di Gessa et al. 2016; Hughes et al. 2007), cognitive functioning (Arpino & Bordone 2014), and sense of purpose in life (Coall & Hertwig 2011; Silverstein & Giarrusso 2013). In line with this, Bordone and Arpino (2016) found that active engagement in grandparental childcare is associated with about 2-year reduced subjective age among 74-85 years old grandfathers and 73-85 years old grandmothers. Yet, grandchildren could also be a powerful age reminder (Karp 1988; Ryff et al. 1994). Indeed, Kaufman and Elder (2003) showed that becoming grandparent at younger ages as compared to those who enter this role "on time" is associated with feeling old. Also Bordone and Arpino´s (2016) results indicated a youthful subjective age for people without grandchildren as compared to their counterparts who find themselves to be grandparents in younger old age (below 70 years old).

To our knowledge, no study has so far investigated whether there is an association between childcare provided to other children (i.e., not the grandchildren) and subjective age. Moreover, if such an association exists, it would be interesting to compare its direction and magnitude to the grandparental effect.

2.2. The German Context

Germany, because of its socio-demographic characteristics, is a very good case study for the topic under analysis. In Germany as well as in the USA, where grandparenthood has long been studied (e.g., Baker & Silverstein 2008; Grinstead et al. 2003; Silverstein & Marenco 2001) also in association with subjective age (Bordone & Arpino 2016), increased longevity has increased the shared lifetime between grandparents and their grandchildren (e.g., Lauterbach 1995). At the same time, low fertility and the postponement of first births have been working as delay factors in the transition to grandparenthood. Moreover, a comparably high proportion of people who remain childless in Germany has reduced the proportion of older people experiencing the grandparent role at all there (Harper et al. 2010; Pötzsch 2010; Uhlenberg & Cheuk 2010). Normatively, Germany shows a very high compliance to grandparental childcare, suggesting that it is a duty of the older generation (Hank & Buber 2009). In this respect, the grandparent role in Germany differs from the USA in that it is rated equally important across educational backgrounds and other social class indicators (Mahne & Motel-Klingebiel 2012). Previous research has shown that about 32% of German grandmothers

and 25% of German grandfathers regularly engage in grandparental childcare. These figures reflect an average position of Germany, together with Austria, the Netherlands, and Switzerland, within the European context (Hank & Buber 2009).

Among the rather consistent empirical evidence that younger age identity is related to better health and a longer life, Spuling and colleagues (2013) found 6-year prospective relations of youthful subjective age with better self-reported health and less physical illnesses in the German Ageing Survey. In another German study where Boehmer (2006) asked for subjective age one month and six months after surgery for malignant tumours, feeling younger was related to more positive self-reported health outcomes. Moreover, the Berlin Aging Study found support for the association between a youthful subjective age and survival in people aged 70 years and older (Kotter-Grühn et al. 2009). According to Mahne and Huxold (2015), investigations of older adults' well-being within the family in Germany should more explicitly account for the effects of being or not a grandparent as it is a central aspect of social integration in later life.

In line with this reasoning, we investigate the association of being a grandparent and the grandparental caregiving role with subjective age in Germany. However, in such a context where the grandparent role is perceived as very important, but in practice it has an increasingly restricted access due to the relatively higher proportion of (grand)childlessness, it is central to consider the effect of caring for members of the younger generation without limiting the focus to the grandparent-grandchild relationship. We will do so by investigating the association between the caregiving role to children other than grandchildren and subjective age.

2.3 Hypotheses

This study aims to answer the following research questions. First, we ask whether having grandchildren and taking care of them are associated with subjective age. Second, we ask whether caring for children other than the own grandchildren is equally associated with older people´s subjective age.

Drawing on the research reviewed above and in particular following the arguments, the methodological approach and the results provided by Bordone and Arpino (2016), we formulate our first, second and third hypotheses.

> H1. Having grandchildren may play the role of a premature marker of old age when the person is at an early stage of older adulthood and younger grandparents may therefore tend to feel older (i.e., positive association with subjective age). On the contrary, older grandparents may suffer because of grandchildlessness in contexts where it is normatively prescribed to hold a grandparent role in older age. A consequent youthful feeling is expected to be associated with grandparenthood in later life.
>
> H2. The association between grandchild care and subjective age is age-specific, with a youthful effect of grandparental childcare only later in life. Working as an age reminder, grandparental childcare in younger old age might counterbalance the youthful caregiving effect and, if significant, show a reversed effect.
>
> H3. These effects (of having grandchildren and of engaging in grandparental childcare) are expected to be more prevalent for women, due to the gendered

social prescriptiveness of grandmotherhood in the older cohorts (Reitzes & Mutran 2004).

Linked to grandparenthood are intergenerational relationships and informal roles of caregiving which may also affect age identity when they are not within the family. In line with the buffering hypothesis (Cohen & Wills 1985), we assume that in the same way as social integration predicts well-being, mortality, and health-related outcomes (see Berkman & Glass 2000), older people´s subjective age might be buffered by the engagement in childcare also outside the grandparent-grandchild relationship. In the German society, where naturally occurring opportunities for interaction between the generations within the family may be less prevalent than in other contexts or than perhaps once were, care relationships with children other than the own grandchildren may as well boost older people's youthful feeling. Both caregiving roles (as grandparent and not) may give a sense of responsibility to the older person engaging with a generation to which has lots to teach, but also to learn from (e.g., in terms of technology). Therefore, attachment generated by the caregiving role may play a substitution role where it does not have biological roots (e.g., Mayer 2009).

H4. We expect that looking after children in general is relevant and beneficial for older people's subjective age, independently on the biological link.

To our knowledge this is the first study that considers such dimension and compares the two types of childcare. It is therefore difficult to argue about the age-specific association of childcare outside the grandparent-grandchild relationship with subjective age. Yet, childcare other than to the own grandchildren may be more voluntary and less linked to age roles than grandparental childcare. This reasoning would suggest that if a rejuvenating effect exists for caregivers looking after other children, it may be similar across chronological age. We acknowledge that it could also be specific to the relationship between the older person and the child (or their parents), but the investigation of these aspects goes beyond the purpose of this study as the data used would not allow such detail of analysis.

3 Data and Methods

3.1 Sample Selection and Variables´ Description

This study uses data from the German Ageing Survey (DEAS), a nationwide representative cross-sectional and longitudinal survey of the German population aged 40 and older.

For the cross-sectional analyses, we consider respondents aged 50-85, with at least one child, from the 4 available waves between 1996 and 2011. Of the 16,352 observations with these characteristics, we excluded those with missing values in any of the variables described below (i.e., 13 on working status, 17 on grandparental childcare, 18 on number of children, 18 on self-reported health, and 670 with missing information on subjective age). Our working sample includes 8,034 men and 7,582 women.

In the longitudinal investigation of the association between grandparental childcare and subjective age, we consider respondents with at least one child and aged 50-85 at baseline. The sample size counts 2,900 respondents when considering wave 3 (baseline) and wave 4. In this case, we excluded 4 missing values on working status, 2 on

health, and 53 on subjective age, out of the 2,959 respondents with at least one child, interviewed at both waves and aged 50-85 at wave 3. The working sample is further reduced to 727 when considering respondents who participated in waves 2 (baseline), 3, and 4. For such analysis, we excluded 9 missing observations on subjective age out of 736 respondents interviewed in all three waves, with at least one child, and aged 50-85 at wave 2. More details on the methodological approach are provided after the description of the variables.

Similarly to Kaufman and Elder (2003) and Bordone and Arpino (2016), our measure of *subjective age* is the answer to the survey question: "What age do you feel?". By using a continuous variable we avoid attaching social labels to concepts such as age, young or old (Kaufman & Elder 2002). Moreover, the determinants of subjective age have been consistently identified across studies where subjective age was measured using single items or multi-item scales, reported in years or relatively to chronological age (see Bergland et al. 2014 for a review).

The two explanatory variables are categorical. First, we consider whether the respondent has no grandchildren; the respondent has grandchildren but does not look after them (reference category); or they provide grandchild care. In this way, we compare grandchildlessness to grandparenthood (Hypothesis 1) and isolate the association between looking after grandchildren and subjective age (Hypothesis 2). Second, we consider whether the respondent has no grandchildren or does not look after them, while they look after other children; the respondent does not look after any child (reference category); or the respondent provides grandchild care. This variable allows us to test our Hypothesis 4. It should be noted that the latter category (i.e., the respondent provides grandchild care) includes also respondents who provide care to both grandchildren and other children. As respondents who provide both grandparental childcare and care to other children account for only 0.6% of the total sample, we could not consider them as a separate category.

Both explanatory variables are constructed from the (possibly multiple) answers to DEAS´ question "Do you look after or supervise other people´s children privately?": a) Grandchildren; b) Children of siblings; c) Children of neighbours; d) Children of friends or acquaintances; e) Other; f) No. We consider all respondents who mention "a" as looking after grandchildren and those who mention only answers "b-e" as looking only after other children (i.e., other than grandchildren). Table 1 shows that the large majority of the working sample has grandchildren (33.5% of men and 29.3% of women are grandchildless). The percentage of grandchildless largely decreases with age, particularly rapidly between the first and the second age tertiles. About 16% of the male sample and 21% of the female sample look after their grandchildren, with a peak in the central age group considered (62-71 years old men and 61-70 years old women). These numbers correspond to about 24% of grandfathers and 30% of grandmothers and are very similar to those found by Hank and Buber (2009) investigating (at least weekly) grandparental childcare in Germany from the Survey of Health, Ageing and Retirement in Europe. Although DEAS also contains information on the frequency of childcare (daily, weekly, monthly, less often), we will not use it in this study for two reasons: 1) our results aim to be comparable to Bordone and Arpino (2016), where no distinction was made by frequency of childcare; 2) dividing childcare in frequency categories would further reduce the already small sample when considering sub-groups of the population. For the sake of completeness, we note that among both grandfathers and grandmothers looking after

grandchildren in our sample, about 20% engage daily and 48% on a weekly basis. This means that the following analyses mainly capture the association of a regular engagement in grandparental childcare and subjective age.

Table 1. Descriptive statistics on all the variables used in the multivariate analyses, by gender and chronological age groups (percent or mean and standard deviation (M and sd)).

	male				female			
	All ages	50-61	62-71	72-85	All ages	50-60	61-70	71-85
High education	41.4	43.9	42.9	37.2	23.1	31.4	22.4	14.2
Married	84.8	86.1	87.5	80.8	65.4	78.9	70.9	44.8
Working	28.5	74.0	8.1	0.2	26.1	64.5	7.4	0.1
Number of children: 1	24.5	25.1	25.0	23.4	25.8	26.6	24.5	26.2
2	45.5	48.5	46.4	41.5	43.1	46.0	43.5	39.5
3+	30.0	26.4	28.6	35.1	31.0	27.4	32.0	34.2
Poor self-reported health	12.3	11.0	9.7	16.4	11.9	9.0	9.3	17.6
West Germany	66.0	63.8	65.9	68.5	64.1	64.3	63.2	64.6
Subjective age (M and sd)	58.7	49.1	59.2	68.4	57.2	47.5	57.2	68.2
	(11.2)	7.7	7.7	8.5	(11.8)	7.6	7.7	9.2
No grandchildren	33.5	60.6	24.6	13.3	29.3	52.7	20.0	11.5
Has grandchildren but no care	50.8	28.0	52.9	73.1	49.8	25.7	52.1	75.1
Grandchild care	15.7	11.4	22.5	13.6	20.9	21.6	28.0	13.5
N	8,034	2,806	2,599	2,629	7,582	2,790	2,339	2,453
		50-67	68-85			50-65	66-85	
No gc/no gc care and no care to other children	82.8	83.0	82.7		76.2	72.4	80.3	
No gc/no gc care and care to other children	1.5	1.8	1.2		2.9	3.4	2.3	
Grandchild care	15.7	15.3	16.1		20.9	24.1	17.3	
N	8,034	4,279	3,755		7,582	3,980	3,602	

Note: gc=grandchildren; cross-sectional sample, all waves pooled.

The DEAS data show that about 1.5% of men and 3% of women look after other children only. This is more common among the youngest older people and, across age groups, for women (Table 1). Among respondents who look after other children, 9% declare a daily engagement, while 53% of men and 40% of women engage on a weekly basis, and 30% and 43%, respectively, monthly (data not shown in the Table).

It is interesting to note that among the youngest respondents, the majority of those not caring for any child (about 68%) and of those looking after other children (about 80%) do not have own grandchildren. However, in the other age groups between 60 and 87%

of the respondents not doing any childcare or looking after other children do have own grandchildren, maybe already grown up and not in need of care or living too far away to look after them. The analyses are carried out separately on men and women in order to test the Hypothesis 3.

All the analyses control for chronological age (in age groups, as described below); high education (= 1 if ISCED>2 – higher secondary or tertiary education; = 0 otherwise – none, primary, or lower secondary education); poor self-reported health (= 0 if the respondent reports health as very good, good, or average; = 1 if bad or very bad); marital status (= 1 if married; = 0 otherwise); occupational status (= 1 if working; = 0 otherwise); and number of children (1 [ref.]; 2; 3+). Summary statistics of the control variables are shown in Table 1. This set of variables follows previous studies (in particular, see Bordone & Arpino 2016 for a more complete explanation of the choice of variables). We should add that in this study we divided the male and female sub-samples in three age groups of approximately the same sample size (tertiles cannot have exactly the same size for a discrete variable). Specifically, in the cross-sectional analysis on grandchild care, we considered for men the age tertiles 50-61 – reference, 62-71, 72-85; for women: 50-60 – reference, 61-70, 71-85. The age groups are slightly different in the longitudinal analyses on two waves, based on the tertiles at baseline. Two instead of three age groups, with the median used as threshold, are considered when analysing respondents who participated to three waves due to the reduced sample size as well as in the analysis of care to other children due to the limited number of respondents involved.

Other health controls included by Bordone and Arpino (2016), i.e., IADL, diagnoses of stroke and cancer, are either not available for all waves in DEAS or they are included in the drop-off questionnaire, filled in by a sub-sample of respondents. Yet, Macia et al. (2012) found that self-rated health is a good predictor of subjective age and the feeling of being old.

Moreover, the DEAS sample is stratified by region (Mahne & Huxhold 2015). Therefore, a dummy variable is added to control for it (coded 1 for West Germany; 0 for East).

3.2 Methods

Due to the nature of the dependent variable and in order to produce comparable results to Bordone and Arpino (2016), linear regression models are used.

In investigating grandparental childcare, we first carry out cross-sectional analyses. Since we pool the four waves, we may have more than one observation for many individuals in the sample. In the empirical analyses we thus present the results of models where the standard error was clustered at the individual level.

Exploiting the panel dimension of DEAS, we additionally carry out longitudinal analyses: 1) considering subjective age at wave 4 and the explanatory and control variables at previous interview; 2) considering grandparental childcare at wave 3 and subsequent subjective age at 3-year follow-up (wave 4), while controlling for covariates at baseline (wave 2). As explained by Di Gessa et al. (2016), controlling for baseline characteristics, while focusing on childcare provision at wave 3, allows us to some extent to account for the association between respondents' socio-demographic and health characteristics and their provision of grandchild care.

The limited number of panel respondents engaging in care to other children only allows us to carry out cross-sectional models for this type of childcare.

As the hypotheses relate to a moderating effect of chronological age, interactions between the explanatory variables and the age groups dummy variables are included in all the analyses. To ease the interpretation of results and the comparison with previous studies, the marginal effects on subjective age are shown graphically. Markers in the graphs indicate the average difference in terms of subjective age between two compared groups (e.g., grandchildless and grandparents not looking after grandchildren in Figure 1a) within a specific age bracket, for men on the left and for women on the right side. A positive (negative) value indicates an older (younger) subjective age for the considered group in comparison to the reference group. Given the small sample sizes when testing the effects of the explanatory variables by gender and age groups, the confidence intervals may be large. We believe that it is important to pay attention to the patterns and sizes of marginal effects rather than just considering statistical significance to assess the practical meaning of the estimates (see also Nuzzo 2014). We therefore show significance at 10%, but also indicate more traditional levels of significance with different markers. The complete estimates are reported in the Supplementary material.

4 Results

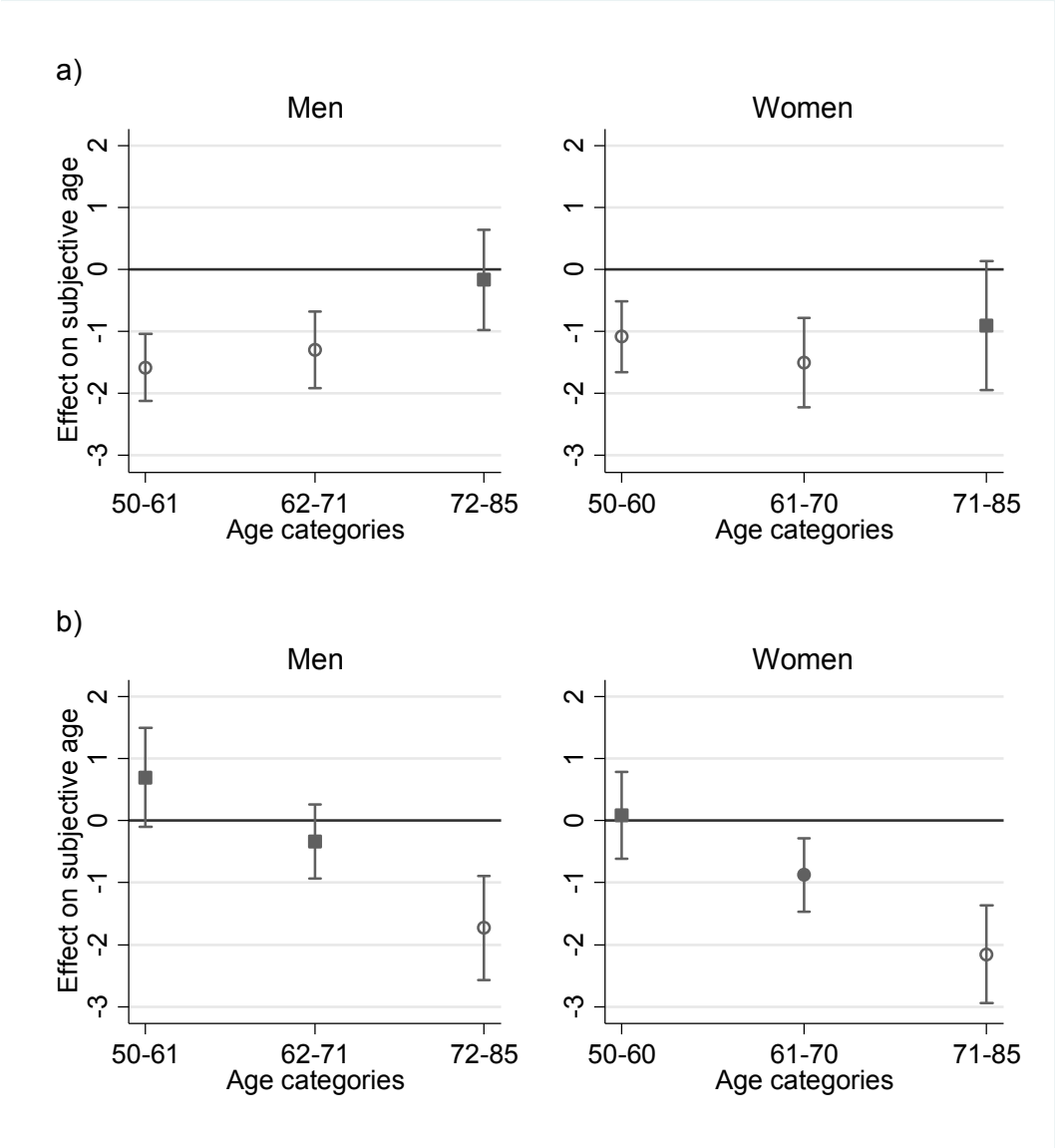
4.1 The Grandparental Effect

Figure 1 replicates the analyses of Bordone and Arpino (2016). Figure 1a shows a negative association between being grandchildless and subjective age until about age 70: both men and women in the younger age groups considered feel significantly younger (up to 1.6 years for men and 1.5 for women) if they do not have grandchildren as compared to their grandparent counterparts not engaging in grandparental childcare. Among the older respondents (i.e., 72-85 years old men and 71-85 years old women), there is no significant association between grandchildlessness and subjective age. Once we distinguish, among grandparents, those who look after their grandchildren and those who do not (Figure 1b), the age-specific association between grandparental childcare and subjective age found in previous research is confirmed. Looking after grandchildren is significantly associated with lower subjective age in later life: when engaged in grandparental childcare, grandfathers aged 71-85 years old and grandmothers from the age of 62 report a youthful subjective age of about 1.7 years and up to 2.2 years, respectively, as compared to their non-engaged counterparts.

In a second step, we carried out longitudinal analyses on the same dependent variable. Figure 2 investigates the association between grandparental childcare at wave 3 (2008) and subjective age at 3-year follow-up (wave 4, 2011); Figure 3 also considers the outcome at wave 4 and the explanatory variable at wave 3, but the controls included are measured at wave 2 (2002). In this way, we aim to provide hints to a causal interpretation of the positive association between grandchild care and youthful subjective age. These sets of longitudinal analyses mainly confirm two key results: grandchildless people in early old age feel younger (about 2 years), while in later life there is a “rejuvenating effect” for grandparents looking after their grandchildren who tend to feel at least 2 years younger than their counterparts not engaging in grandparental childcare. This holds

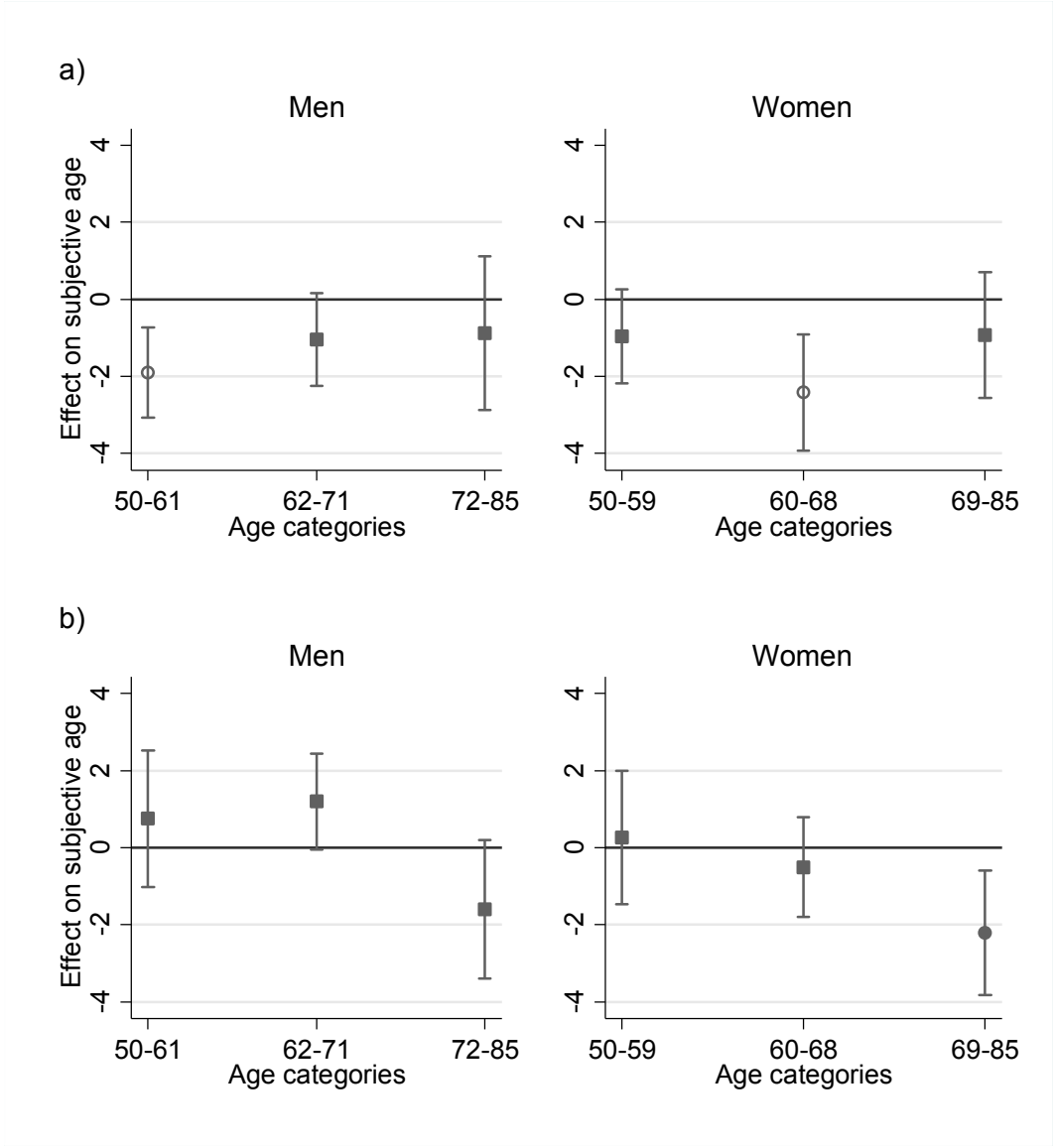
especially for women, where the effect of grandparental childcare on subjective age 3 years later is statistically significant in both longitudinal analyses.

Figure 1. Estimated effects with 90% confidence intervals on subjective age of (a) not having grandchildren and (b) providing grandchild care versus having grandchildren, but not providing grandchild care, by gender and age group.



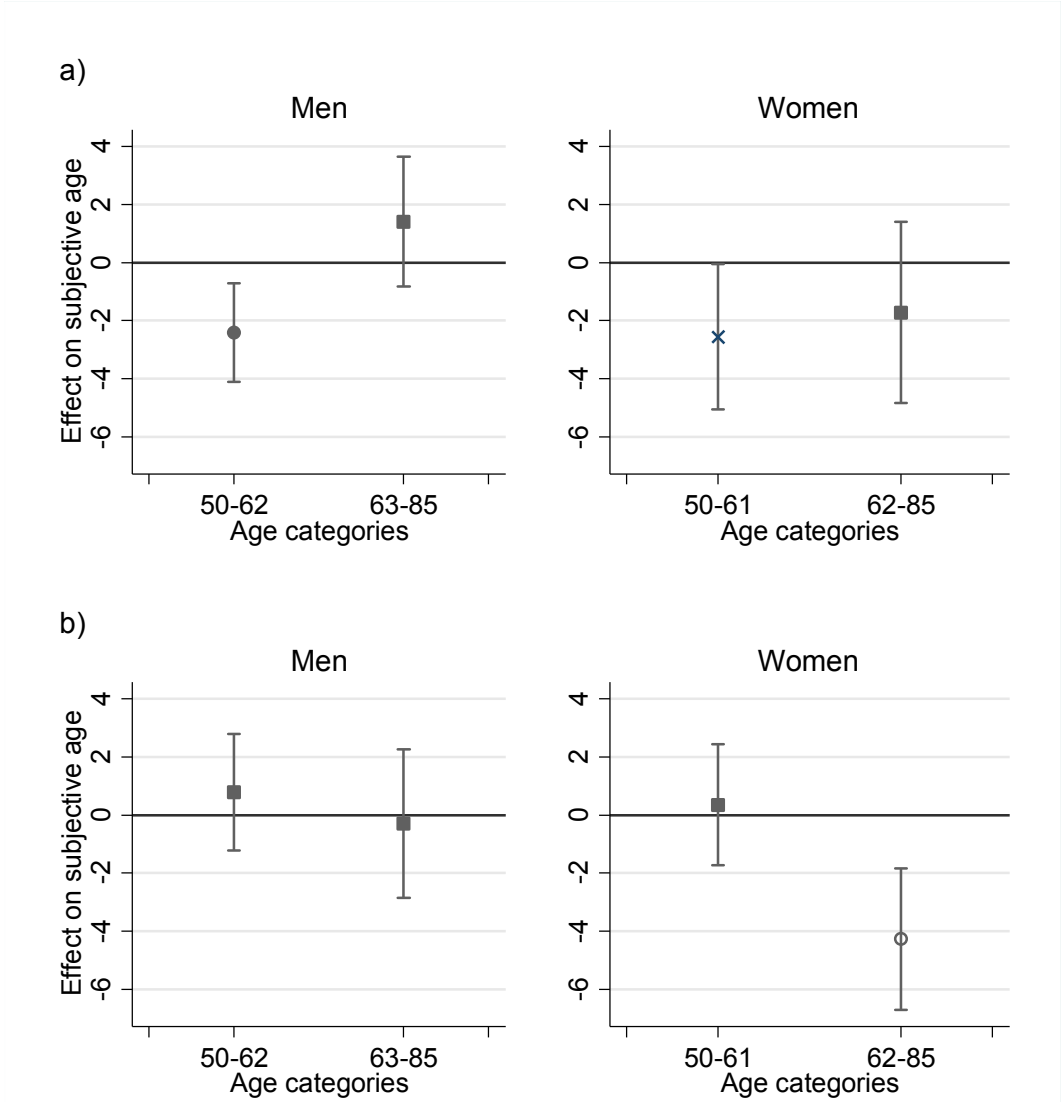
Note: Hollow dot indicates 1% significance level; grey dot indicates 5% significance level; grey square indicates not significant at 10%. Source: Author's elaboration on DEAS data.

Figure 2. Estimated effects with 90% confidence intervals on subjective age at wave 4 of (a) not having grandchildren and (b) providing grandchild care versus having grandchildren, but not providing grandchild care, by gender and age group, all measured at wave 3.



Note: Hollow dot indicates 1% significance level; grey dot indicates 5% significance level; grey square indicates not significant at 10%. Source: Author's elaboration on DEAS data, based on respondents with complete data across waves 3 and 4.

Figure 3. Estimated effects with 90% confidence intervals on subjective age at wave 4 of (a) not having grandchildren and (b) providing grandchild care versus having grandchildren, but not providing grandchild care (measured at wave 3), by gender and age group (all controls at baseline).

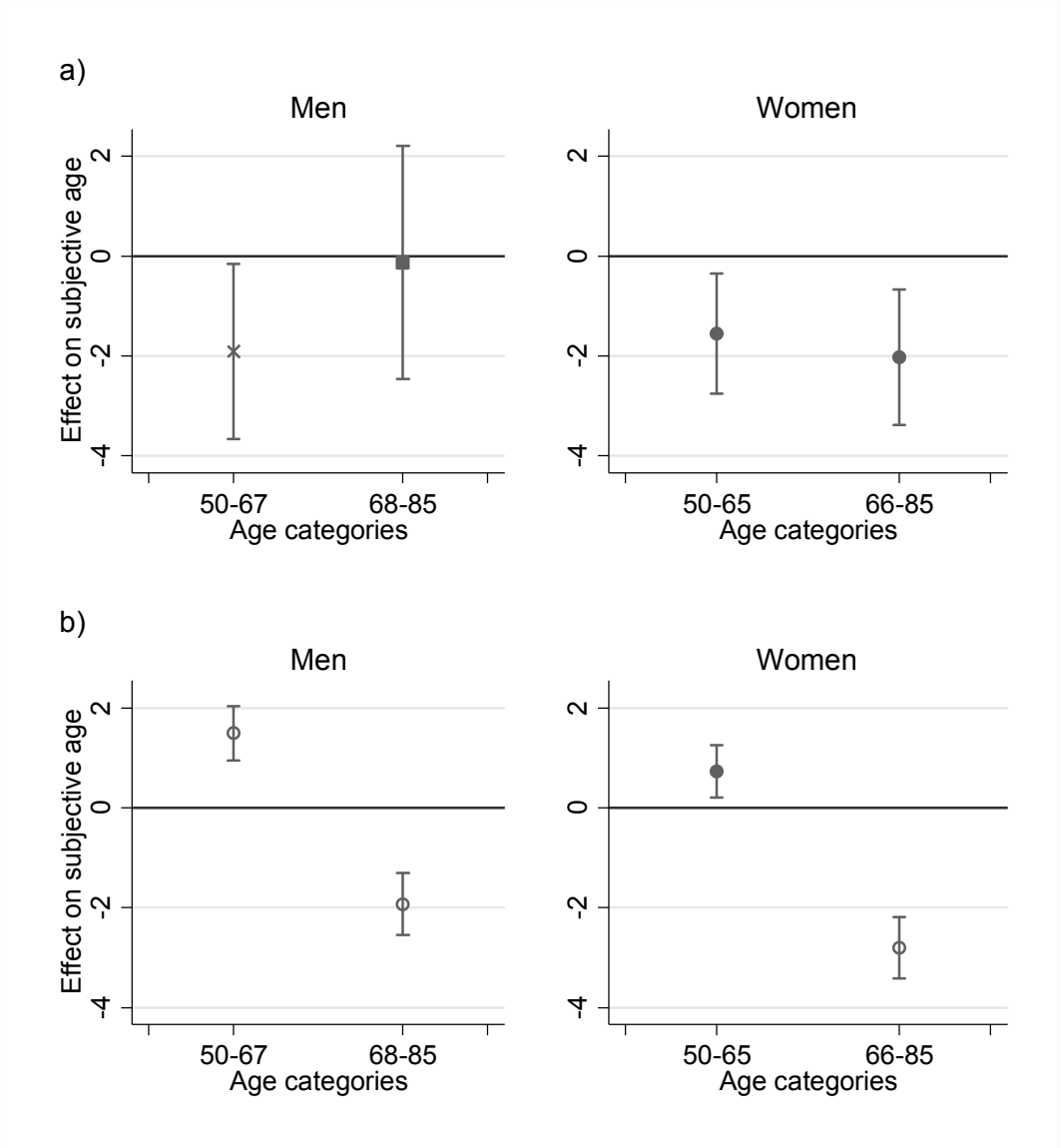


Note: Hollow dot indicates 1% significance level; grey dot indicates 5% significance level; cross indicates 10% significance level; grey square indicates not significant at 10%. Source: Author's elaboration on DEAS data, based on respondents with complete data across waves 2, 3 and 4.

4.2 Does Childcare Other Than to Grandchildren Have the Same Benefit?

Figure 4 compares (a) respondents who only look after other children and (b) those engaged in grandparental childcare to their counterparts who do not look after any child. As explained above, we consider two age groups instead of three, in order to maintain the analyses by gender, due to the limited number of people in the sample who do engage in childcare outside grandparental childcare.

Figure 4. Estimated effects with 90% confidence intervals on subjective age of (a) not having grandchildren/not looking after them but looking after other children and (b) providing grandchild care versus not having grandchildren/not providing grandchild care and not looking after other children, by gender and age group.



Note: Hollow dot indicates 1% significance level; grey dot indicates 5% significance level; cross indicates 10% significance level; grey square indicates not significant at 10%. Source: Author's elaboration on DEAS data.

The results show a significant association between looking after other children and youthful subjective age, with an effect size between 1.5 and 2 when significant (Figure 4a). For men, this association seems to hold only at younger ages. When considering grandparental childcare (Figure 4b), we do find that the association among the younger and among the older respondents has opposite directions: younger grandparents looking after grandchildren tend to feel older than the respondents not looking after any child (1.5 years for men and almost 1 year for women); on the contrary, older grandparents looking after grandchildren tend to feel younger than their counterparts not engaged in any type of childcare (effect size of about 2 years for men and 2.8 for women).

It is interesting to note that by comparing the respondents looking after grandchildren to those who only look after other children, we find a positive association with subjective age among the youngest age group. Men aged 50-67 and women aged 50-65 who look after grandchildren feel on average, respectively, 3.6 and 2.5 years older as compared to their counterparts who look after other children (both statistically significant at 1%). At older age, however, the estimated effects are not significantly different from each other at 10%.

5 Discussion and Conclusions

Drawing on previous literature suggesting that the roles that individuals occupy affect how they perceive ageing and may in turn have consequences on their decisions and behaviours, we have investigated the association between caring for children and subjective age among the 50-85 year olds in Germany. This article focused, in particular, on provision of grandparental childcare and compared it to care provided to other children as well as to the status of non-engagement with childcare.

Grandparenthood is indeed one of the most important roles for older adults. However, in nowadays societies with increasing proportions of grandchildless older people, it is important to deepen our understanding of the effects of intergenerational relationships within and also outside the family. It is in light of this reasoning that this study extends prior knowledge.

The results confirm a heterogeneous association between grandparenthood and subjective age, moderated by chronological age. Our first hypothesis is partly confirmed: not having grandchildren is associated with youthful subjective age among younger old men and women. As suggested by Kaufman and Elder (2003), this may derive from a sort of unpreparedness of young grandparents to be grandparents. This is hinted also by the higher subjective age of young caregiving grandparents when compared to respondents not engaged in any childcare as well as to respondents who look after other children. Yet, differently from our hypothesis and from what has been found for the USA, older German women do not seem to feel younger for the fact of having grandchildren per se. This may be attributable to cultural and normative differences between the two contexts, for example in terms of how prescriptive grandmotherhood is. Such mechanisms would require further investigation in future studies. Another explanation may lie in the demographic characteristics of the two countries: the cohorts of women in the older age group considered have registered higher fertility rates and lower mean age at first birth in the USA than in Germany (Human Fertility Database). As a consequence, the German women studied are more likely than their counterparts in the USA to have been exposed

to grandchildlessness either as their own experience or with their peers. It should be noted that 5.8% of the 73-85 years old American women in the HRS sample used by Bordone and Arpino (2016) did not have grandchildren, while the corresponding proportion in our sample is about double (11.5% of the 71-85 year olds).

Our analyses also provide support for the hypothesised old age-specific association between grandchild care and subjective age (Hypothesis 2): both older grandfathers and older grandmothers who look after their grandchildren report a more youthful subjective age than their counterparts with the same chronological age who do not. The grandparent role as caregiver may keep older people younger by actively involve them with the younger generations, giving them "something to live for" (Kaufman & Elder 2003) and it may also indirectly affect subjective age through an increase in contact with the own children (as argued by Bordone & Arpino 2016). Interestingly, not only the direction of the association but also the effect size of an about 2 year "rejuvenating effect" is very similar to the one found by Bordone and Arpino (2016).

For both hypotheses 1 and 2, the longitudinal investigations mainly confirm the cross-sectional associations, although some confidence intervals become quite large due to the reduction in sample size once we consider only respondents with complete data across multiple waves, especially for caregiving men. This may indeed be one reason for the absence of a significant "rejuvenating effect" of grandfather childcare on subjective age three years later. However, it should also be acknowledged that the older age group considered in the three wave analysis includes much younger grandparents than in the previous analyses. Indeed, the cross-sectional results suggested that grandfathers would feel younger if looking after grandchildren only in their 70-80s, differently from women whose youthful subjective age associated with grandchild care was already visible at younger ages.

The third hypothesised association, i.e., between childcare other than to grandchildren and a youthful subjective age, also finds support in our analyses: women looking after children within or outside the family network tend to feel younger than their counterparts who do not at any chronological age; while such "rejuvenating effect" for men holds at age 50-67. Yet, only a small proportion of the older ones engaged in such a care and this may explain the very large confidence intervals. It seems that, differently from grandparental childcare, care to other children does not carry an "age reminder" for younger old people. What is very interesting of this analysis, though, is that the effect size of the association between caring for children other than the own grandchildren and feeling younger is comparable to the one generated by the engagement in grandparental childcare (i.e., about 2 years).

We acknowledge that this study has some limitations, in particular due to the small sample size once the longitudinal panel is used that does not allow us to consider always the same age groups throughout the various sets of analyses nor to extend longitudinally the analysis on childcare to other children. Yet, we believe that the take-home message of this study is clear and should be considered as a starting point to develop deeper investigations of the effects of intergenerational relationships outside the family, in contexts with limited naturally occurring opportunities for intergenerational interactions: there is a positive association between providing childcare and feeling younger among both women and men, and this has similar magnitude independently on whether the child is or not the own grandchild. We also acknowledge that our study focuses on one country

only. However, by replicating previous analyses from the USA it allows a cross-country comparison. Furthermore, the socio-demographic reality of Germany as well as its patterns of grandparental childcare are similar to other European countries and this allows us to speculate a possible extension of our results to most of Central and Western Europe.

The present study emphasises the importance of considering the subjectivity of ageing which, as we show, relates to the roles that individuals hold in later life and is in particular associated with active intergenerational interaction. In doing so, we have also accounted for an age moderating effect in a gender comparative framework. The practical importance of our results is given by the fact that subjective age tends to outperform chronological age as a predictor of health and well-being (Demakakos et al. 2007; Kotter-Grühn et al. 2009; Stephan et al. 2011; Westerhof & Barrett 2005). The advantages of this study lie in the replication and extension of previous results in a comparable way that allows us to assess that the magnitude we find is substantially important. Furthermore, we have carried out longitudinal analyses that permit us to some extent to take into account the associations between older people´s socio-demographic and health characteristics and the provision of childcare. This sheds some further light on the associations found in cross-sectional studies and may help in clarifying the mechanisms behind them.

The natural development of this study will be to consider transitions, such as becoming grandparent, and changes in grandparental and other types of childcare (e.g., continuous no care, continuous care to grandchildren, starting or stopping to look after grandchildren or other children).

6 References

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Appendix

Table S1. Unstandardized coefficients and clustered standard errors (in parentheses) from cross-sectional linear regressions estimating the association between subjective age and (I) grandchild care, (II) other childcare, for men and women, including interactions with age groups.

	I. Model for Figure 1		II. Model for Figure 4	
	Men	Women	Men	Women
Provision of childcare:				
No grandchildren (Ref. no care)	-1.576***	-1.094***		
	(0.327)	(0.344)		
Grandchild care	0.729	0.117		
	(0.485)	(0.424)		
(Ref. no care * 1st age tertile)	0.000	0.000		
No grandchildren * 2nd age tertile	0.321	-0.425		
	(0.482)	(0.535)		
Grandchild care * 2nd age tertile	-1.067*	-1.019*		
	(0.599)	(0.547)		
No grandchildren * 3rd age tertile	1.473**	0.190		
	(0.579)	(0.713)		
Grandchild care * 3rd age tertile	-2.446***	-2.305***		
	(0.699)	(0.640)		
Only other childcare (Ref. no care)			-1.947*	-1.547**
			(1.075)	(0.726)
Grandchild care			1.480***	0.744**
			(0.328)	(0.317)
(Ref. no care * 1st age quantile)				
Other childcare * 2nd age quantile			1.843	-0.517
			(1.775)	(1.097)
Grandchild care * 2nd age quantile			-3.420***	-3.555***
			(0.490)	(0.489)
Age (Ref. 1st tertile)				
2nd tertile	7.905***	8.586***		
	(0.376)	(0.380)		
3rd tertile	16.441***	18.632***		
	(0.383)	(0.408)		
2nd quantile (Ref. 1st quantile)			11.654***	13.485***
			(0.254)	(0.296)
High education	-0.217	-0.697***	-0.134	-0.805***
	(0.194)	(0.270)	(0.201)	(0.282)
Married	0.827***	-0.399*	0.771**	-1.446***
	(0.290)	(0.230)	(0.305)	(0.242)
Working	-2.554***	-1.659***	-5.828***	-4.050***
	(0.273)	(0.290)	(0.243)	(0.265)
2 children (Ref. 1)	0.091	0.133	0.176	0.152
	(0.242)	(0.261)	(0.246)	(0.268)
3+	0.178	0.305	0.483*	0.549*
	(0.274)	(0.282)	(0.275)	(0.287)
Poor self-reported health	5.654***	5.737***	5.617***	5.972***
	(0.316)	(0.371)	(0.329)	(0.390)
West Germany (Ref. East)	-0.435**	-0.675***	-0.334*	-0.702***
	(0.201)	(0.217)	(0.203)	(0.227)
Wave 2 (Ref. wave 1)	-0.366	0.546*	0.034	0.859***
	(0.274)	(0.290)	(0.285)	(0.307)
Wave 3	0.172	0.226	0.029	-0.046
	(0.236)	(0.262)	(0.246)	(0.280)
Wave 4	0.584**	0.323	0.632**	0.684**
	(0.256)	(0.286)	(0.267)	(0.300)
Constant	50.766***	49.203***	53.503***	52.344***
	(0.458)	(0.460)	(0.417)	(0.400)
N	8,034	7,582	8,034	7,582

Note: * p<0.10; ** p<0.05; * p<0.01.

Table S2. Unstandardized coefficients and clustered standard errors (in parentheses) from linear regressions estimating the association between subjective age at wave 4 and grandchild care at wave 3, with controls (I) at wave3, (II) at wave 2, for men and women, including interactions with age groups.

	I. Model for Figure 2		II. Model for Figure 3	
	Men	Women	Men	Women
Provision of childcare:				
No grandchildren (Ref. no care)	-1.884***	-0.934	-2.503**	-2.412
	(0.711)	(0.735)	(1.034)	(1.485)
Grandchild care	0.731	0.244	0.673	0.398
	(1.079)	(1.045)	(1.201)	(1.254)
(Ref. no care * 1st age tertile)				
No grandchildren * 2nd age tertile	0.874	-1.445		
	(0.993)	(1.149)		
Grandchild care * 2nd age tertile	0.381	-0.715		
	(1.319)	(1.301)		
No grandchildren * 3rd age tertile	1.085	0.041		
	(1.363)	(1.206)		
Grandchild care * 3rd age tertile	-2.315	-2.418*		
	(1.522)	(1.428)		
(Ref. no care * 1st age quantile)				
No grandchildren * 2nd age quantile			3.820**	1.200
			(1.686)	(2.273)
Grandchild care * 2nd age quantile			-0.904	-4.656**
			(1.922)	(1.935)
Age (Ref. 1st tertile)				
2nd tertile	6.744***	8.600***		
	(0.869)	(0.831)		
3rd tertile	14.405***	19.259***		
	(0.942)	(0.886)		
2nd quantile (Ref. 1st quantile)			8.075***	11.361***
			(1.066)	(1.324)
High education	-0.593	0.079	0.432	-0.230
	(0.403)	(0.439)	(0.785)	(1.006)
Married	1.150*	-0.163	1.766	-0.210
	(0.649)	(0.469)	(1.252)	(1.071)
Working	-3.063***	-0.333	-2.655***	-2.590**
	(0.683)	(0.622)	(0.841)	(1.070)
2 children (Ref. 1)	0.634	-0.063	-1.212	-0.552
	(0.486)	(0.491)	(0.876)	(1.156)
3+	0.764	0.004	-0.417	0.244
	(0.581)	(0.570)	(1.087)	(1.272)
Poor self-reported health	4.221***	4.400***	3.663***	1.295
	(0.968)	(0.870)	(1.339)	(1.963)
West Germany (Ref. East)	-0.355	-0.680	-0.510	-0.434
	(0.429)	(0.425)	(0.811)	(0.903)
Constant	54.608***	50.552***	59.937***	58.441***
	(0.984)	(0.923)	(1.693)	(1.654)
N	1,472	1,428	383	344

Note: * p<0.10; ** p<0.05; * p<0.01.