

Are changes in productive activities of older people associated with changes in their well-being? Results of a longitudinal European study

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Abstract Using the first two waves from the Survey of Health, Ageing and Retirement in Europe (SHARE) we explore dynamics of participation in two different types of productive activities (voluntary work and care for a person) and test their association with changes in well-being across 11 European countries ($N = 10,309$) among people aged 50 and older. In order to measure changes in well-being, we use a standardized instrument of quality of life in early old age (CASP-12) and assess relevant decreases and increases between both waves, applying the Edwards–Nunnally method. Main findings demonstrate that older people who maintain or start their productive activity in terms of volunteering between both waves have a lower probability of experiencing a relevant decrease in well-being, while no association with a relevant increase in well-being is observed. In case of caring for a person changes in participation remain unrelated to changes in well-being. These results are maintained after adjusting for important confounders, such as functional limitation, socioeconomic position and living with a partner. These latter conditions were also strongly related to changes in well-being. Our results support a core assumption of the activity theory of ageing claiming that the initiation and maintenance of a productive activity is beneficial for older people's well-being.

Keywords SHARE · Social productivity · Well-being · Dynamics

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Introduction

In early old age, major parts of populations in Western societies are still in good health and free from physical dependency (Banks et al. 2006; Börsch-Supan et al. 2005; National Institute on Aging 2007). While this stage in the life course, specifically after retirement, offers opportunities for individual freedom, hobbies and other options of self-realization (Laslett 1996), it nevertheless lacks a clear societal definition in terms of social roles or social status and their potentially beneficial effects on people's sense of belonging and contributing (Rowe and Kahn 1997). Several investigations into determinants of healthy ageing demonstrate that being engaged in a productive activity, such as volunteering is associated with improved well-being and quality of life (Bath and Deeg 2005; Hao 2008; Luoh and Herzog 2002; Li and Ferraro 2005; Mendes de Leon 2005; Musick et al. 1999; van Willigen 2000; Wahrendorf et al. 2006).

In theoretical terms, these beneficial effects occur most often if the type and quality of productive activity elicits recurrent experience of personal control or autonomy, and of social recognition or reward. Personal control and social reward were shown to exert strong effects on positive emotions and motivations (Ryff and Singer 1998; Siegrist et al. 2004). In this regard, volunteering clearly differs from caring as this engagement is usually based on free choice and as it offers opportunities of personal control and social recognition (Wahrendorf et al. 2006). This is less likely in case of caring for a sick or disabled person where choice is limited and where options of autonomy and reward are restricted (Schulz and Beach 1999). Differences of well-being of older people according to type of productive activity performed were reported in several studies, documenting consistently favourable effects in case of

volunteering (Hao 2008; Luoh and Herzog 2002; Li and Ferraro 2005; Mendes de Leon 2005; Musick et al. 1999; van Willigen 2000; Wahrendorf et al. 2006), but inconsistent or adverse effects in case of caring (Jones and Peters 1992; Li et al. 2004; Lee et al. 2003; Mc Munn et al. 2009; Schulz and Beach 1999; Wahrendorf et al. 2008).

However, most studies exploring associations of productive activities with well-being in older adults focus on the effect of participation in activities (measured at one time point) on prospective well-being. As such, these studies are based on a single assessment of these activities and prevent the analysis of effects that are due to continuity or change over time. For instance, demonstrating that the loss of a productive activity is associated with a decrease in well-being and quality of life would further strengthen the assumptions of the activity theory of ageing, suggesting that a relevant source of positive emotions (Antonucci et al. 2009; Ryff and Singer 1998) and positive expectancies (Carstensen and Mikels 2005) is no longer available. Similarly, starting a new productive activity may contribute to an increase, or at least maintenance of well-being and quality of life, reinforcing people's engagement in life and their sense of self esteem as reflected in favourable feedback from significant others (Ryan and Deci 2001; Siegrist et al. 2004).

Against this background, we set out to study whether changes in productive activities are related to changes in the quality of life of older people, using the first two waves of the Survey of Health, Ageing and Retirement in Europe (SHARE). More specifically, we hypothesize (1) that associations are more pronounced in case of volunteering than in case of caring, and (2) that a positive effect is observed in case of initiating or maintaining an activity and a negative effect in case of losing or giving up an activity. Two further aspects need to be considered here. First, so far the terms 'well-being' and 'quality of life' were used interchangeably. Yet, it should be stressed that the concept 'quality of life' addresses the fit of one's expectancies and motivations with the resources and opportunities provided by the social environment (Siegrist et al. 2004; Wiggins et al. 2008) whereas the concept 'well-being' describes people's general functioning and health in a less specified way (Ryan and Deci 2001). By using the concept 'quality of life' as a theoretically grounded indicator of well-being, a link to the assumptions of the activity theory of ageing mentioned above is more easily established than is the case with the concept of well-being. Quality of life in early old age, as assessed in this study, identifies four domains of favourable self experience (control, autonomy, self-realization and pleasure; Hyde et al. 2003; see Methods). Second, given the large data set collected from older people in 11 European countries, we are given the opportunity of exploring variations of

changes in well-being across countries and of studying the variations that exist at country and at individual level, using multilevel analysis. Furthermore, the large set of available information allows adjusting for important confounders and an exploration of socio-demographic and health-related determinants of changes in quality of life.

Methods

Data source

Data were obtained from the first two waves of the 'Survey of Health, Ageing and Retirement in Europe' (SHARE) (Börsch-Supan and Jürges 2005). SHARE is the first cross-national research project comparing data on working conditions, retirement, health and well-being and socio-economic position among people aged 50 and older in European countries (see www.share-project.com for details). First wave data were collected in 2004–2005, second wave data in 2006–2007. In sum, data from both waves are available for 11 countries (Sweden, Denmark, Netherlands, Germany, Belgium, France, Switzerland, Austria, Italy, Spain, Greece).¹ Data collection is based on probability household samples where all people above 50 years plus their (possibly younger) partners were interviewed using Computer Assisted Personal Interviews (CAPI). Due to different institutional setting in the participating countries, the sampling was either drawn as stratified simple random selection from the national population register (Denmark and Sweden) or as multistage sampling using regional and local registers (Germany, Italy, Spain, France, Netherlands) or telephone directories (Greece, Austria, Switzerland). The country-average of household response rate is 60.6% for the total sample ranging from 38.8% in Switzerland to 79.2% in France, with rates above 50% in eight countries. In our analyses we use data from SHARE release 2.3.0 from November 2009. The sample is restricted to 5,514 women (mean age: 63.4 years) and 4,858 men (mean age: 63.8 years) who participated at both waves with complete information available for all variables ($N = 10309$). In order to compensate for unit non-response and for attrition between the first and the second wave, calibrated longitudinal weights are applied. These weights are defined for longitudinal sample only and are calculated for each country separately (see Börsch-Supan and Jürges 2005 for details on methodological issues in SHARE).

¹ Data were collected only once in Poland, Czechia and Israel.

Measurement

Quality of life

We use a measure of quality of life specifically designed to capture well-being in early old age, which is widely used in international ageing surveys, the CASP-12 questionnaire. One of the innovations of SHARE is the inclusion of this newly developed measure at both waves—a psychometrically validated short version of the original 19 item version (CASP-19) (Wiggins et al. 2008; Hyde et al. 2003; Higgs et al. 2003). An important characteristic of this instrument is that it does not focus on respondents' self-evaluation of quality of life. Rather, quality of life is assessed as the degrees to which specific domains of psychological needs are satisfied (Doyal and Gough 1991), which are thought to be particularly relevant for favourable self experience in early old age. These domains refer to different strands of the literature, first, the literature of ageing and the existing new opportunities of the third age compared to former stages in life (Laslett 1996), and second, to the literature of Giddens (1991) who pointed out the importance of the sense of self for older people in a rapidly changing society. On this basis, four domains are used: control (C), autonomy (A), self-realization (S) and pleasure (P). The degree to which these aspects are perceived as being satisfied is measured with 12 questionnaire items (three for each domain) which are scored on a four-point Likert scale. A summary measure of the 12 items is used to assess quality of life in this study where the total sum score ranges from 12 to 48, with higher scores indicating better quality of life. For our sample in wave 1 Cronbach's alpha was 0.82 (wave 2 = 0.81), and the mean score was 37.60 (wave 2 = 37.54). Psychometric properties of CASP-19 are fully described elsewhere (Hyde et al. 2003). For our analyses, we are particularly interested in analysing relevant changes in quality of life between both waves. Hence, changes in the CASP-scores between both waves were measured using the Edwards–Nunnally method (Speer and Greenbaum 1995). In this procedure, the reliability of the scale is included when changes (relevant decline or improvement) are calculated. More specifically, an adjusted score in wave 1 is calculated for each respondent and a confidence interval is built around this adjusted score (using 2 as critical value). If the wave 2 score is outside of this interval, it is assumed to be significantly different. On this basis, respondent are regrouped into 'decrease', 'no change', and 'increase'.

Social productivity

At both waves respondents were asked about their participation in two different types of socially productive

activities. Those activities are (1) doing voluntary or charity work (voluntary work), and (2) caring for a sick or disabled adult (care for a person). For each activity respondents were asked whether or not they were involved during the last 4 weeks. In order to study dynamics of participation and its effect on quality of life, changes were assessed for each activity separately, where giving up or losing an activity was assumed if respondents were active at wave 1 but not at wave 2 in the respective activity. Accordingly, for the group of inactive people in wave 1 starting or gaining an activity was assumed if an investment was reported in wave 2.

Additional measures

We integrated a number of additional measures, which mainly served as confounders in multivariate analyses including changes in functional health limitations. Variables were either coded as time-constant indicator (taken from wave 1) or as time-varying indicator (taken from both waves). Time constant measures were age (at wave 1) and gender, as well as income, education and country affiliation. Income information is based on the total annual household income composed of the sum of different income components assessed in the questionnaire, which we adjusted for household size and categorized into country specific tertiles (low, medium, high). Education is measured according to the International Standard Classification of Educational Degrees (ISCED-97) that we categorized into 'low education' (pre-primary, primary or lower secondary education), 'medium education' (secondary or post-secondary education) and 'high education' (first and second stage of tertiary education). As time varying measures were introduced changes in functional health limitations, changes in partnership and changes in retirement status were noted. Change in functional health limitations is based on information from the Global Activity Limitation Indicator (GALI) from both waves, which was used to create a four categorical variable. In order to measure change in retirement status we created a variable with three categories based on a self-evaluation of respondent's occupational status at both waves: (1) 'retired for more than 2 years' (at both waves), (2) 'retired within the last 2 years' (retired at wave 2 but not in wave 1) and (3) 'not retired at both waves'. Lastly, at both waves we measured whether the respondent lived in a partnership and created a four categorical variable. Table 1 summarizes all used variables.

Analyses

Following basic sample description, we present descriptive findings to explore associations between socio-

Table 1 Description of measures and sample (N = 10309)

Variable	Categories	Prevalence (unweighted)	N
Gender	Male	46.9	4,837
	Female	53.1	5,472
Age group (wave 1)	50–64 years	57.4	5,922
	65–74 years	28.3	2,918
	75 years or more	14.2	1,469
Voluntary work	Active at both waves	8.1	836
	Giving up	6.0	617
	Starting	6.9	716
	Inactive at both waves	79.0	8,140
Care for a person	Active at both waves	2.3	238
	Giving up	4.7	489
	Starting	5.6	577
	Inactive at both waves	87.4	9,005
Change in quality of life	Decrease	15.4	1,589
	No change	69.9	7,203
	Increase	14.7	1,517
Income	Low	36.3	3,738
	Medium	35.0	3,606
	High	28.8	2,965
Education	Low	48.0	4,948
	Medium	31.4	3,240
	High	20.6	2,121
Retired	2 years or longer	47.0	4,847
	Less than 2 years	9.2	949
	Not retired	43.8	4,513
Partnership	Partnership at both waves	74.3	7,656
	No partnership – Partnership	0.8	81
	Partnership – no partnership	2.2	226
	No partnership at both waves	22.8	2,346
Functional health	Limitations at both waves	25.8	2,657
	No Limitations–Limitations	14.2	1,469
	Limitations–no Limitations	12.4	1,281
	No Limitations at both waves	47.6	4,902
Country	Sweden	11.9	1,225
	Denmark	7.2	744
	Netherlands	9.6	991
	Germany	8.5	877
	Belgium	14.3	1,476
	France	5.8	594
	Switzerland	4.2	430
	Austria	9.4	974
	Italy	8.2	844
	Spain	7.7	798
Greece	13.2	1,356	

demographic factors together with dynamics of socially productive activities over time and changes in quality of life. Thereafter, we calculate regression models for binary outcomes to test effects of dynamics of participation on

changes in quality of life. Two models are calculated, one estimating the probabilities of experiencing a relevant decrease (versus no change or increase) and a second for the probabilities of experiencing an increase (versus no

change or decrease). Given the hierarchical structure of the data, we estimate logistic multilevel regression models for binary outcome variables, with individuals (level 1) nested within countries (level 2) (Rabe-Hesketh and Skrondal 2005). This allows accurate adjustment for country affiliation and to consider the dependence of the residuals within a country. Moreover, variations of changes in well-being can be studied on individual and country level separately. In Table 3, we present odds ratios and levels of significance, together with confidence intervals. Variability parameters between countries are shown for the random component (σ_u , ρ), and the log likelihood, the AIC (Akaike Information Criterion) and the BIC (Bayesian Information Criterion) statistics are given. All calculations were done using STATA 11.

Results

Descriptive findings

Table 1 gives an overview of the longitudinal sample of our analyses, consisting of 4,837 men and 5,472 women. The age distribution is as follows: 57.4% are between 50 and 64 years old, 28.3% between 65 and 74 years and 14.2% 75 years and older. Nearly half of the respondents were already retired in wave 1 (47.0%) and 9.2% entered retirement within the last 2 years. 74.3% reported to live in a partnership at both waves. More than half of the participants exhibited functional limitations to some extent (in wave 1 and/or in wave 2). With regard to changes in quality of life, 15.4% experienced a relevant decrease between both waves, while an increase is observed in 14.7% of the respondents. Looking at dynamics in socially productive activities, participation rates were generally higher in case of voluntary work, where 21.0% were either active in one of the waves or at both (12.6% in case of care for a person). More specifically, 6.0% gave up or lost their investment in voluntary work between both waves (care for a person = 4.7), while 6.9% started such an activity (care for a person = 5.6). Sample size was largest in Belgium and lowest in Switzerland, with N above 700 in nine out of 11 countries.

How are socio-demographic factors associated with changes in quality of life? In particular, how are dynamics of participation in socially productive activities related to its decrease or increase? Table 2 gives a first answer to these questions. It presents the proportion of people with either relevant decrease or relevant increase or no change in quality of life according to the covariates included in this study. A decrease in quality of life is more likely if participants are older, if their income or education is low, if they have no partner, if they suffer from limitations and if

they either remain inactive at both waves or if they give up volunteering. With regard to country affiliation, we observe variations between countries, with particularly high proportions of older people experiencing a decrease in quality of life in Southern European (Italy, Spain and Greece) compared to Western and Northern countries. Concerning type of productive activity, in case of caring for a person no associations between change in activity and change in quality of life are observed. Compared to variations in decrease of quality of life according to covariates, variations in increase are generally less pronounced. Yet, there are tendencies of improvement if participants were newly retired and if their functional limitations were reduced over time. All these associations were statistically significant.

Multivariate findings

In a next step, multivariate models are calculated to test the robustness of these findings by mutually adjusting for covariates. Two multilevel regression models are calculated with individual nested within countries, and respective results are presented in Table 3. In the first model, probabilities of experiencing a relevant decrease (versus no decrease) in quality of life over time are estimated, whereas in the second model, respective probabilities of an increase are indicated (versus no increase). In case of dynamics in socially productive activities, the category 'staying inactive' is defined as reference category. All estimates described in the 'Methods' section are presented in Table 3.

First, in both model we observe a significant, although small variation of the constant. Again, variations between countries are more pronounced in case of decrease compared to increase, with an intra-class correlation (' ρ ') indicating that about 5% of the total variance in decrease can be attributed to differences between the countries (in case of increase less than 1% only) after accounting for all covariates. In other words, within our sample variation of changes in quality of life is largely found at the level of individuals rather than at the level of countries, in particular in case of an increase.

Second, the probability of a decrease in quality of life over time is higher if participants are older and if functional limitations persist or emerge between the two waves. At the same time, the probability of a decrease is significantly lower if participants are involved in voluntary work at both waves or if they start with volunteering, if they have a partner, and if their income and education is high. The finding that volunteering is associated with a reduced probability of experiencing a decrease in quality of life is of particular interest in the context of this study.

Third, when estimating the probability of a relevant increase in quality of life over time, findings indicate that this is more likely among those who retired recently and

Table 2 Changes in quality of life (CASP-12) by covariates in per cent

Variable	Categories	Changes		
		Decrease	No change	Increase
Gender	Male	16.1	67.8	16.1
	Female	17.8	68.9	13.3
Age group (wave 1)	50–64 years	14.1	69.9	16.0
	65–74 years	18.4	68.6	13.0
	75 years or more	24.4	62.6	13.1
Voluntary work	Active at both waves	9.1	78.9	12.0
	Giving up	15.9	70.8	13.3
	Starting	8.6	74.6	16.7
	Inactive at both waves	18.4	66.8	14.8
Care for a person	Active at both waves	8.5	74.0	17.5
	Giving up	12.6	72.5	14.9
	Starting	12.4	76.5	11.1
	Inactive at both waves	17.6	67.6	14.8
Income	Low	21.0	64.2	14.9
	Medium	16.4	68.3	15.3
	High	11.3	75.3	13.4
Education	Low	21.4	63.5	15.1
	Medium	14.6	69.7	15.7
	High	9.7	78.7	11.6
Retired	2 years or longer	18.2	67.8	14.1
	Less than 2 years	14.6	65.5	19.9
	Not retired	16.2	69.6	14.2
Partnership	Partnership at both waves	15.0	69.9	15.1
	No partnership–Partnership	6.2	85.8	7.9
	Partnership–no partnership	25.1	59.3	15.6
	No partnership at both waves	21.9	64.3	13.8
Functional health	Limitations at both waves	22.3	65.7	12.0
	No Limitations–Limitations	19.8	67.4	12.8
	Limitations–no Limitations	14.4	65.9	19.7
	No Limitations at both waves	13.2	71.2	15.6
Country	Sweden	11.6	77.6	10.8
	Denmark	7.8	79.8	12.4
	Netherlands	10.6	73.6	15.7
	Germany	14.5	71.3	14.3
	Belgium	14.8	69.7	15.4
	France	11.8	72.4	15.7
	Switzerland	6.7	82.0	11.3
	Austria	19.5	66.5	14.1
	Italy	22.1	65.2	12.7
	Spain	23.4	59.0	17.6
	Greece	24.3	58.1	17.6
	Total	15.6	69.8	14.5

Based on weighted data

those who were free from functional limitations, whereas persisting or deteriorating limitations reduced this probability. In addition, women were less likely than men to

experience an increase in quality of life. It is noticeable that volunteering, while preventing a decrease, does not directly affect an increase in quality of life. Moreover, caring for a

Table 3 Multilevel estimates for changes in quality of life (CASP-12): odds ratios, significant level and confidence intervals (95%)

Variable	Categories	Changes in quality of life			
		Decrease		Increase	
		OR	95% CI	OR	95% CI
Gender	Male	–	–	–	–
	Female	0.98	0.87–1.10	0.85**	0.75–0.95
Age group (wave 1)	50–64 years	–	–	–	–
	65–74 years	1.19*	1.03–1.39	0.90	0.77–1.05
	75 years or more	1.45***	1.22–1.74	0.82	0.67–1.00
Voluntary work	Active at both waves	0.67**	0.51–0.87	0.87	0.70–1.09
	Giving up	0.92	0.72–1.18	1.01	0.79–1.28
	Starting	0.57***	0.43–0.76	1.08	0.87–1.34
	Inactive at both waves	–	–	–	–
Care for a person	Active at both waves	0.74	0.48–1.14	0.88	0.60–1.30
	Giving up	0.85	0.64–1.13	1.19	0.92–1.53
	Starting	0.89	0.67–1.17	0.93	0.73–1.19
	Inactive at both waves	–	–	–	–
Income	Low	–	–	–	–
	Medium	0.91	0.80–1.04	1.02	0.89–1.16
	High	0.78**	0.66–0.92	0.86	0.73–1.00
Education	Low	–	–	–	–
	Medium	0.92	0.80–1.06	1.01	0.88–1.15
	High	0.83*	0.70–0.99	0.69***	0.58–0.82
Retired	2 years or longer	0.93	0.80–1.08	1.01	0.87–1.18
	Less than 2 years	0.90	0.72–1.11	1.40***	1.16–1.69
	Not retired	–	–	–	–
Partnership	Partnership at both waves	0.74***	0.64–0.84	1.10	0.95–1.27
	No partnership–Partnership	0.54	0.24–1.19	0.67	0.32–1.42
	Partnership–no partnership	1.13	0.80–1.60	1.19	0.81–1.74
	No partnership at both waves	–	–	–	–
Functional health	Limitations at both waves	1.61***	1.40–1.85	0.74***	0.64–0.86
	No Limitations–Limitations	1.67***	1.42–1.97	0.62***	0.51–0.75
	Limitations–no Limitations	0.99	0.81–1.21	1.30**	1.10–1.53
	No Limitations at both waves	–	–	–	–
Sigma u		0.40***	0.25–0.64	0.14***	0.07–0.26
Rho		0.047		0.006	
Log likelihood		–4193.07		–4232.22	
BIC		8598.68		8676.99	
AIC		8432.14		8510.45	

Note * $p < 0.05$; ** $p < 0.01$;
*** $p < 0.001$

person is neither associated with an increase nor a decrease in quality of life over time, after adjusting for relevant confounders.

Discussion

This paper uses the first two waves from the SHARE study with information from both waves on participation in two types of socially productive activities (voluntary work, care for a person) and quality of life among older people in 11

European countries. Our main findings demonstrate that a relevant decrease in well-being in terms of quality of life over time is less likely if people remain active at both waves or start volunteering between both waves, if they live with a partner, if their social position is high and, importantly, if they are free from functional limitations. Moreover, being free from functional limitations additionally increases the probability of experiencing a relevant increase in quality of life over time, an effect that is also obvious among recently retired participants. However, being engaged in volunteering, while preventing a

decrease, does not seem to be associated with a substantial increase in quality of life. Therefore, the findings of this study support our second hypothesis only in part. Yet, concerning the first hypothesis, changes in caring remain unrelated to changes in quality of life.

To our knowledge, this is one of the first studies documenting an association of changes in socially productive activities of older people over time (volunteering) with changes in quality of life, in addition to changes that are attributable to relevant covariates. While several previous studies demonstrated associations of productive activities (assessed at one occasion only), with well-being (Menec et al. 2003; Morrow-Howell et al. 2003; Siegrist and Wahrendorf 2009a; Thoits and Hewitt 2001; van Willigen 2000) this investigation additionally finds that continuing or starting a socially productive activity in terms of volunteering over a 2-year observation period ‘prevents’ a relevant reduction in well-being, in terms of quality of life. Thus, exploring the dynamics of change in socially productive activities over time may add a relevant piece of information to research findings that are restricted to a single assessment of social engagement.

Several additional findings support the validity of reported results. First, we find a strong association between functional limitations (and their improvement or worsening between the two waves) and changes in quality of life. This fact is in line with a large body of evidence (Farquhar 1995; Netuveli et al. 2005). Similarly, living with a partner (Kim and McKenry 2002) and being in higher socio-economic position (Blane et al. 2007; Knesebeck et al. 2007) was found to be strongly associated with measures of well-being, and our study extends this evidence to the ‘prevention’ of a decrease in well-being in terms of quality of life. An interesting finding points to the fact that participants who were recently retired experience a relevant increase in quality of life. This observation is in line with the results of a recent large-scale prospective investigation demonstrating a substantial gain in self-rated health during the year preceding and following retirement (Westerlund et al. 2009). The authors of this latter study discuss their finding in the context of experiencing a relief from the obligations of employment, and the fact that this association is particularly strong among employees who suffered from poor quality of work adds to the credibility of this explanation (see also Siegrist and Wahrendorf 2009b).

When interpreting the results one must keep in mind that both phenomena under study, the change of a productive activity and a relevant change in quality of life during this relatively short observation period of 2 years, are infrequent events. For instance, starting or giving up voluntary work occurs in no more than 13% of the population, and a similar frequency is observed in case of a relevant decrease

in quality of life. Along these lines, it is of interest to observe that continuing or starting volunteering ‘prevents’ a decrease in quality of life in a relatively small group of older people, after adjustment for powerful confounders. A further aspect concerns our regression models. Since we decided to apply multilevel-models for binary outcomes, two separate models were calculated, one model for decrease (versus no change or increase), and a second model for decrease (versus no change or increase). Another possibility would have been to calculate one multinomial regression model contrasting increase and decrease (as distinct categories) against no change. Along these lines, we applied additional sensitivity analyses using multinomial regression. Results of these analyses were identical to the ones reported above, which additionally support the validity of our results.

In theoretical terms our findings have two implications. First, they strengthen the assumption of the activity theory of ageing by documenting that a given level of quality of life is preserved or maintained among those older people who continue or start to be active in terms of volunteering, whereas such an effect is absent among those who remained inactive during the observation period. A second implication concerns the type of socially productive activity in which older people are involved. According to our hypothesis, caring in general does not contribute to better quality of life, given the stressful facets of this activity. It is likely that the two aspects of a productive activity that are highly prevalent in voluntary work, a high degree of autonomy and control, and a high degree of esteem or recognition experienced as rewarding when conducting this activity, are absent in caring. For instance, ‘caring for a sick or disabled person’ (as used in our study to measure caring) often reduces options of autonomy and control of the caring person, and socially acknowledged rewards may be limited. Clearly, more refined analyses are desirable to explore these questions more precisely. For instance, more detailed information about the kind of care and the care receiver might be helpful, since both aspects might affect the extent to which caring is perceived as control-limiting. This may partly explain the lack of significant results in our analyses. Yet, in previous studies, where measures of reward and control were included, we demonstrated that the beneficial effect of productive activities on quality of life is contingent on the experience of reward in respective activities (Mc Munn et al. 2009; Siegrist and Wahrendorf 2009a) and on the experience of autonomy and personal control (Wahrendorf et al. 2008).

In this study, we did not focus on the determinants of starting or leaving productive activities (see, e.g. Hank and Erlinghagen 2009 for a pertinent analysis based on SHARE data). Yet, it is remarkable to note that previous results (Hank and Erlinghagen 2009) showed variations of

dynamics in volunteering between countries, with higher frequency of giving up such activities in Southern European countries where the prevalence is already low, compared to Western and Northern European countries where relatively highest frequencies of social engagement are observed (see also Hank and Stuck 2008). This pattern is similar to the between-country variation of decrease in quality of life we found in our results, with higher proportions of decrease in Southern compared to Western and Northern European countries. Probably these latter countries may encourage participation in productive activity, particularly after exit from labour market, by offering tailored policy programs (Salomon and Sokolowski 2003), and thus, indirectly prevent a decrease in quality of life of older people in these countries. Even if variations in changes in quality of life between the countries were relatively small compared to the within-country differences in our analyses, these policy programs might be one possible explanation of the observed country differences at the macro level.

Although the design of our study is considered a particular strength, several limitations are obvious. First, we cannot exclude a systematic measurement error in reporting continued or lost activity over time. For instance, people exhibiting reduced quality of life at wave 2 may have a higher probability of underreporting their current engagement in a productive activity. Moreover, as we have no data on the precise timing of reported changes in productive activities within the time window of 2 years, the temporal sequence between losing or gaining an activity and change in quality of life cannot be delineated. It is possible that reduced quality of life triggers decisions to give up an activity. A further limitation concerns the fact that all data rely on self-reports and, thus, may be subject to the problem of common method variance. However, we analysed systematic changes over time, taking into account issues of reliability and validity of measurements. In particular, by applying the Edwards–Nunnally method to construct our dependent variable, a relevant measure of meaningful changes in quality of life over time is obtained.

Finally, we cannot rule out some selection bias during follow up. Respondents who participated in socially productive activities at wave 1 may be more likely to continue participation in survey research at wave 2, and they may be more likely to report continued or gained productive activity. As a consequence, since we restricted our analyses to the longitudinal sample, findings might overestimate the level of active people at both waves and underestimate the level of people who stopped or lost their engagement. However, it is unlikely that this selection bias accounts for the observed difference in well-being according to the pattern of change in activity. Moreover, longitudinal

weights were applied in the analyses accounting for panel attrition.

In conclusion, despite these restrictions, the current report supports the general assumption that engaging in a voluntary productive activity contributes to the maintenance of well-being in terms of quality of life in early old age. This finding, resulting from the study of dynamics of productive activities over time, strengthens policy recommendations of enlarging the range of opportunities of volunteering across Europe.

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References

- Antonucci TC, Birditt KS, Akiyama H (2009) Convoys of social relations: an interdisciplinary approach. In: Bengtson VL, Gans D, Putney NM, Silverstein M (eds) *Handbook of theories of aging*. Springer, New York, pp 247–260
- Banks J, Breeze E, Lessof C, Nazroo J (2006) Retirement, health and relationships of older population in England—the 2004 English longitudinal study of ageing (Wave 2). Institute for Fiscal Studies, London
- Bath PA, Deeg D (2005) Social engagement and health outcomes among older people: introduction to a special section. *Eur J Ageing* 2:24–30
- Blane D, Netuveli G, Bartley M (2007) Does quality of life at older ages vary with socio-economic position? *Sociology* 41:717–726
- Börsch-Supan A, Jürges H (2005) The survey of health, aging and retirement in Europe—methodology. Mannheim Research Institute for the Economics of Ageing, Mannheim
- Börsch-Supan A, Brügiavini A, Jürges H, Mackenbach J, Siegrist J, Weber G (2005) Health, ageing and retirement in Europe. First results from the survey of health, ageing and retirement in Europe. Mannheim Research Institute for the Economics of Ageing, Mannheim
- Carstensen LL, Mikels JA (2005) At the intersection of emotion and cognition: aging and the positive effect. *Curr Dir Psychol Sci* 14:117–121
- Choi LH (2003) Factors affecting volunteerism among older adults. *J Appl Gerontol* 22:179–196
- Doyal L, Gough I (1991) *A theory of human need*. Macmillan, Hong Kong
- Farquhar M (1995) Elderly people's definitions of quality of life. *Soc Sci Med* 41:1439–1446
- Giddens A (1991) *Modernity and self-identity: self and society in the late modern age*. Polity Press, Cambridge
- Hank K, Erlinghagen M (2009) Dynamics of volunteering in older Europeans. *The Gerontologist*, published online

- Hank K, Stuck S (2008) Volunteer work, informal help and care among 50+ in Europe: further evidence for 'linked' productive activities at older ages. *Soc Sci Res* 37:1280–1291
- Hao Y (2008) Productive activities and psychological well-being among older adults. *J Gerontol B* 63:64–72
- Higgs P, Hyde M, Wiggins D, Blane D (2003) Researching quality of life in early old age: the importance of the sociological dimension. *Soc Policy Admin* 37:239–252
- Hyde M, Wiggins RD, Higgs P, Blane D (2003) A measure of quality of life in early old age: the theory, development and properties of a needs satisfaction model (CASP-19). *Aging Ment Health* 7:186–194
- Jones D, Peters T (1992) Caring for elderly dependants: effects on the carers' quality of life. *Age Ageing* 21:421–428
- Kim HK, McKenry P (2002) The relationship between marriage and psychological well-being: a longitudinal analysis. *J Fam Issues* 23:885–911
- Knesebeck Ovd, Wahrendorf M, Hyde M, Siegrist J (2007) Socio-economic position and quality of life among older people in 10 European countries: results of the SHARE study. *Ageing Soc* 27:269–284
- Laslett P (1996) *A fresh map of life*. Macmillan, London
- Lee S, Colditz GA, Berkman LF, Kawachi I (2003) Caregiving and risk of coronary heart disease in U.S. women: a prospective study. *Am J Prev Med* 24:113–119
- Li Y, Ferraro KF (2005) Volunteering and depression in later life: social benefit or selection process? *J Health Soc Behav* 46:68–84
- Li TC, Lee XD, Lin CC, Amidon RL (2004) Quality of life of primary caregivers of elderly with cerebrovascular disease or diabetes hospitalised for acute care. *Qual Life Res* 13:1081–1088
- Luoh MC, Herzog AR (2002) Individual consequences of volunteer and paid work in old age: health and mortality. *J Health Soc Behav* 43:490–509
- Mc Munn A, Nazroo J, Wahrendorf M, Breeze E, Zaninoto P (2009) Participation in socially productive activities, reciprocity and well-being in later life: baseline results in England. *Ageing Soc* 29:765–782
- Mendes de Leon CF (2005) Social engagement and successful aging. *Eur J Ageing* 2:64–66
- Menec VH (2003) The relation between everyday activities and successful aging: a 6-year longitudinal study. *J Gerontol B Psychol Sci Soc Sci* 58:74–82
- Morrow-Howell N, Hinterlong J, Rozario PA, Tang F (2003) Effects of volunteering on the well-being of older adults. *J Gerontol B* 58:137–145
- Musick MA, Herzog AR, House JS (1999) Volunteering and mortality among older adults: findings from a national sample. *J Gerontol B* 54:173–180
- National Institute on Aging (2007) *Growing older in America: the health and retirement study*. National Institute on Aging, Bethesda
- Netuveli G, Wiggins RD, Hildon Z, Montgomery SM, Blane D (2005) Functional limitation in long standing illness and quality of life: evidence from a national survey. *BMJ* 331:1382–1383
- Rabe-Hesketh S, Skrondal A (2005) *Multilevel and longitudinal modeling using stata*. Stata Press, College Station, TX
- Rowe JW, Kahn RL (1997) Successful aging. *Gerontologist* 37:433–440
- Ryan RM, Deci RL (2001) On happiness and human potentials: a review of research on hedonic and eudaimonic well-being. *Annu Rev Psychol* 52:141–166
- Ryff CD, Singer BH (1998) The contours of positive human health. *Psychol Inq* 9:1–28
- Salomon LM, Sokolowski SW (2003) Institutional roots of volunteering. Towards a macro-structural theory of individual voluntary action. In: Dekker P, Halman L (eds) *The values of volunteering*. Kluwer Academic, New York, pp 71–90
- Schulz R, Beach SR (1999) Caregiving as a risk factor for mortality: the caregiver health effects study. *JAMA* 282:2215–2219
- Siegrist J, Wahrendorf M (2009a) Participation in socially productive activities and quality of life in early old age: findings from SHARE. *J Eur Soc Pol* 19:317–326
- Siegrist J, Wahrendorf M (2009b) Quality of work, health, and retirement. *Lancet* 374:1872–1873
- Siegrist J, Knesebeck Ovd, Pollack CE (2004) Social productivity and well-being of older people: a sociological exploration. *Soc Theor Health* 2(1):1–17
- Speer DC, Greenbaum PE (1995) Five methods for computing significant individual client change and improvement rates; support for an individual growth curve approach. *J Consult Clin Psychol* 63:1044–1048
- Thoits PA, Hewitt LN (2001) Volunteer work and well-being. *J Health Soc Behav* 42:115–131
- Van Willigen M (2000) Differential benefits of volunteering across the life course. *J Gerontol B* 55:308–318
- Wahrendorf M, Knesebeck Ovd, Siegrist J (2006) Social productivity and well-being of older people: baseline results from the SHARE study. *Eur J Ageing* 3:67–73
- Wahrendorf M, Ribet C, Zins M, Siegrist J (2008) Social productivity and depressive symptoms in early old age—results from the GAZEL study. *Aging Ment Health* 12:310–316
- Westerlund H, Kivimäki M, Singh-Manoux A, Melchior M, Ferrie J, Pentti J, Jokela M, Leineweber C, Goldberg M, Zins M, Vahtera J (2009) Self-rated health before and after retirement in France (GAZEL): a cohort study. *Lancet* 374:1889–1896
- Wiggins RD, Netuveli G, Hyde M, Higgs P, Blane D (2008) The evaluation of a self-enumerated scale of quality of life (CASP-19) in the context of research on ageing: a combination of exploratory and confirmatory approaches. *Soc Indic Res* 89:61–77