Working Paper Series, N. 9, July 2020

Quality of life in older age: Does the context matter?

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UNIVERSITÀ DEGLI STUDI DI PADOVA
DIPARTIMENTO DI SCIENZE STATISTICHE

Contents

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Abstract: As societies age, the well-being of the elderly increasingly becomes a priority and a challenge. Measuring the quality of life of older people and identifying its determinants is a fundamental element, that could help in designing tailored policies for making aged people well-being increase all over Europe.
Most of research on active ageing stresses the importance of individual determinants of wellbeing, and some scholars suggest that macro factors have also a role, for instance the welfare provisions and models, as well as the level of socio-economic inequality, unemployment rate, gender equality policies, GDP. However, in the quoted studies only single macro dimensions are generally considered, while a research linking the multiple macro-dimensions of active aging to the individual level of wellbeing is lacking.
We want to fill this gap, aware that both active ageing (as a macro-level element) and individual well-being are complex concepts, influenced and determined by several aspects, and that research results could be influenced by the type of dimension chosen for the analysis.
Beyond understanding the micro-level elements influencing individual well-being, we want to "put individuals into contexts", and to investigate the role macro- level factors have in explaining individual wellbeing.
The novelty element of our research is that we use composite measures, both at the micro and macro-level.
We focus on a broad definition of quality of life in old age, capturing the multidimensional nature of such a concept by using the CASP-12 indicator drawn from the sixth wave of the Survey of Health, Ageing and Retirement in Europe (SHARE).
We chose as a macro-level composite indicator the Active Ageing Index (AAI), that depict an overall picture synthetizing several aspect considered to be important gauges of active ageing at the national level.
We use multilevel models, by taking into account the AAI measure as a level-2 variable, both in its elementary components and as a whole, to in depth investigate which macro-level factors foster/hinder elderlies' life quality.
Result seems to corroborate the hypothesis that the context matters and cannot be ignored in the analysis. This confirm other results found in the literature on the importance of the macro factors on individual's wellbeing and support the idea that using macro indicators in multilevel analysis increase the explaining potential of the study.

Keywords: Active Ageing Index, Active ageing, Multilevel models, Composite indicators, Quality of life at older ages

1. Introduction

As societies age, the well-being of the elderly increasingly becomes a priority and a challenge. Until a few decades ago, old age was considered as a period of rest in an individual's life course, in a sort of slow disengagement from society (Boudiny 2013). However, together with the increase in life expectancy, both the time spent in good health and in retirement have increased considerably, and the meaning attributed to the concept of 'ageing' has deeply changed.

In the late 1990s the World Health Organisation adopted the notion of "active ageing" (Walker 2002; Boudiny 2013), considered as the process of optimizing opportunities for health, participation and security, in order to enhance quality of life as people age. Thus, active ageing entails participation in socio-economic, cultural, and civic affairs, not just the ability to be physically active or to participate in the labour force. Allowing old people to realize their potential for physical, social, and mental well-being, while providing them with adequate protection and care, is a goal that policy makers should bear in mind, in order to extend healthy life expectancy and quality of life for ageing societies.

In such a context, measuring the quality of life of older people and identifying its determinants is a fundamental element, that could help in designing tailored policies for making aged people well-being increase all over Europe. Beyond understanding the micro-level elements influencing individual well-being, we want to "put individuals into contexts", and to investigate the role macro- level factors have in explaining individual wellbeing.

2. Background and hypotheses

Most of research on active ageing stresses the importance of individual determinants of wellbeing (as socioeconomic status, health status, participation in socially productive activities), and some scholars suggest that macro factors have also a role, for instance the welfare provisions and models (Niedzwiedz et al. 2014, Motel-Klingebiel et al. 2008, Conde-Sala et al. 2017, Esser and Palme 2010), as well as the level of socio-economic inequality (Mikucka et al. 2017; Roth et al. 2017; Niedzwieds et al. 2014), unemployment rate (Pittau et al. 2009; Di Tella et al. 2003), gender equality policies (Van Oyen et al. 2010, Högberg 2018, Palència et al., 2014), GDP (Degutis et al. 2010). However, in the quoted studies only single macro dimensions are generally considered, while a research linking the multiple macro-dimensions of active aging to the individual level of wellbeing is lacking.

We want to fill this gap, aware that both active ageing (as a macro-level element) and individual well-being are complex concepts, influenced and determined by several aspects, and that research

results could be influenced by the type of dimension chosen for the analysis. Such a complexity, in its whole, has to be taken into account for a comprehensive analysis of the role macro-level factors play in shaping individual quality of life perception. The use of composite measures, both at the micro and macro-level, represents the novelty element of our research, and will allow us to coherently put individuals in contexts, thus offering a coherent framework for the results interpretation.

We chose as a macro-level composite indicator the Active Ageing Index (AAI), developed in 2012 by the European Centre for Social Welfare Policy and Research in Vienna (ECV) in close collaboration with the European Commission's DG for Employment Social Affairs and Inclusion and the United Nations Economic Commission for Europe.

Three are the main research questions of this paper. We derive our hypothesis from the idea that personal experience is shaped by broader social, economic and political factors: it means that wellbeing is about personal processes, but that these personal processes are deeply intertwined with societal mechanisms. The concept of an overall correspondence between the whole and its parts is an integral part of our thinking about social facts. Applying this idea to the association between macro-level active ageing and quality of life in older ages, we propose the following research question:

Do older people living in contexts characterized by high levels of active ageing (measured through the Active Ageing Index) show a higher level of individual quality of life, other things been equal?

Beyond focusing on the AAI 'levels', we want to use also a dynamic perspective, thus focusing on how changes in the AAI measure over time could influence the perceived quality of life. Such an approach could contribute in understanding if the dynamic processes driving to changes in macro-level factors included in the AAI measure can help explaining cross-countries differences in the way old people consider their life. So, our second research question is:

Do changes in macro-level degree of active ageing (measured as changes in the AAI levels) play a role in explaining the way European people perceive their wellbeing?

Our third research hypothesis is built on a gender perspective. Gender differences in the experience of aging are becoming an issue of concern to policy makers around the world. The Plan of Action emanating from the 2nd World Assembly on Aging (WAA) held in Madrid in April 2002 explicitly advocates recognizing the differential impact of aging on women and men and ensuring that a gender perspective is integrated into all policies, programs, and legislation dealing with aging. The effects of policies directed towards older people are not gender neutral: they are likely to affect men and women differently; moreover they can contribute to either strengthening

or weakening the link between gender and wellbeing.

To better understand gender differences in the quality of life of older persons, it necessary to examine the experiences of elderly men and women within the contexts in which they live. This is the reason why beyond understanding if gender differences emerge when analysing the micro-level factor influencing elderly's well-being, we want to know if macro-level active-ageing contextual characteristics influence female and male individual well-being differently.

Moreover, we evaluate whether sex-specific macro-level indicators play a role in determining the individual well-being of the opposite sex individuals. Our third research question is the following: *Do AAI levels have a different impact on individual well-being depending on their sex? Do female AAI levels have an impact on individual well-being of old men, and vice versa?*

3. The Active Ageing Index (AAI)

The rapid process of population ageing, mainly resulting both from declines in fertility and improvements in survival to older ages (increased life expectancy), and involving most developed countries, has risen several concerns on the policies governments should implement to address the needs and interests of an increasing number of older persons, including those related to housing, employment, health care, social protection, and other forms of intergenerational solidarity.

Old age is no more considered as a period of acceptance of physiological, social, economic, and psychological changes and declines (worsening health and cognitive or physical functioning, loss of social roles, loneliness, poverty) bringing elderlies to a slow disengagement from society. Old people live longer and in better health conditions, they spend more time in retirement and are more resourceful – both in economic and social term – than ever before. Such important demographic changes have raised concerns both from the socio-economic and political perspective, on how to give old people the chance to realize their potential, how to empower them, and promote their participation in society, thus guaranteeing and fostering their wellbeing.

The Active Ageing Index (AAI) is a multidimensional composite index, developed under the joint project of the European Commission's Directorate General for Employment, Social Affairs and Inclusion (DG EMPL) and the Population Unit of the United Nations Economic Commission for Europe (UNECE) within the framework of the 2012 European Year on Active Ageing and Solidarity between Generations (Zaidi et al. 2013).

It has been proposed as a tool for providing policy makers with synthetic, easily interpretable, fundamental information for the identification of strategies to be implemented when dealing with population ageing-related issues.

The AAI depict an overall picture synthetizing several aspect considered to be important gauges of

active ageing at the national level. Specifically, it is composed of four domains, each measured through a series of elementary indicators (See Appendix B for detalils):

- Employment, measured for understanding the level of participation of old people to the labour market and for identifying, if necessary, tailored policies for giving older workers better chances in the labour market;
- Participation in society. The rationale at the base of the inclusion of such domain is to measure the contribution of older people to society as carers for others, for ensuring greater recognition of what older people bring to society and create more supportive conditions for them;
- Independent, healthy and secure living: measuring the old people's level of empowerment and ability to remain in charge of their own lives for guaranteeing it to last as long as possible;
- Capacity and enabling environment for active ageing is devoted to measure the capacity and enabling environment for active ageing, and considers aspects such as (healthy) life expectancy, mental well-being, internet use, active relations with friends and family and education.

The AAI calculated for the 28 Member States of the European Union. All indicators are expressed in percentage (ranging from 0 to 100) and in a positive manner, meaning that "the higher the value, the better the active ageing outcome".

Furthermore, a specific index is calculated for each domain using the arithmetic weighted average of the indicators belonging to the respective domains. The overall aggregated index is calculated as the arithmetic weighted average of the domain-specific indices and the final explicit weights assigned to each domain are the following: employment – 35%; participation in society – 35%; independent, healthy and secure living – 10%; capacity and enabling environment for active and healthy ageing – 20%. The weights assigned to the indicators and domains resulted from the recommendations of an Expert Group, and the procedures used to select them are fully described in Zaidi et al. (2013).

Each domain can be analysed and interpreted separately, as can each indicator in a specific domain, thus allowing the identification of the domains most in need of public policy interventions. Moreover, it offers a breakdown of results by gender.

One of the strengths of the AAI has been recognized to be its contribute to sensitizing people, including policymakers, to the multidimensionality and complexity of the process of "ageing well", and to the role of gender in shaping this process. Another one is that, beyond the ranking of countries, the index further enables to see whether or not the position of a particular country

changes over time (when a reform is introduced, for example), thus representing an easy method of evaluating which policy should be changed or improved.

However, also some limits have been underlined (de São José et al. 2017). The assignment of weights to the domains and indicators has been criticized as it involves a significant level of arbitrariness. Moreover it has been stated that beyond reflecting the political relevance of both the indicators and the domains as perceived by the Experts, weights should also reflect old people preferences. In other words, it would be necessary to take into account how old people value the different aspects of actively ageing taken into account by the AAI measure, as it is plausible to hypothesize that the principle 'the higher, the better' could not be valid for them. For example, as far as employment is concerned, being not aware about the way old people value being employed (whether their participation in the labour market is based on a choice or on an economic necessity due, for example, to the lack of adequate pensions) could lead to policy interventions unable to foster individual life satisfaction.

In this paper we want to give an important contribution in this sense: linking individual measures of perceived quality of life to the AAI measure, in a micro-macro integrated framework, could help understanding which AAI domain are more able to explain variability in individual life satisfaction at older ages, thus giving some insights and suggestion for improving the AAI weighting system.

4. Data and Methods

4.1 The variable of interest

We focus on a broad definition of quality of life in old age, capturing the multidimensional nature of such a concept. Specifically, we adopt the CASP-12 indicator (Wiggins et al., 2008), a revised 12-item version of CASP-19 scale introduced by Hyde et al. (2003). CASP is a theoretically grounded measure of quality of life in older age, based on a sociological conceptualisation drawn upon the "Theory of Human Need" (Higgs et al., 2003). It is composed of four subscales (Control, Autonomy, Self-realization, Pleasure) and results as the sum of individual assessment of twelve questions or statements on a four-point Likert scale. In the 12 items version, the resulting score ranges from 12 to 48: the larger, the better quality of life, but no thresholds are so far introduced to discriminate between high and low quality of life (see an attempt provided by von dem Knesebeck et al., 2005).

4.2 Data sources

In this study we use data drawn from the sixth wave of the Survey of Health, Ageing and Retirement in Europe (SHARE), collected in 2015 (Börsch-Supan, 2019) (DOI: https://doi.org/10.6103/SHARE.w6.700). See Börsch-Supan et al. (2013) and Malter and Börsch-Supan (2017) for methodological details. This wave is temporally close to the timing of the collection of the indicators belonging to each AAI domain.

SHARE is a panel survey that collects detailed cross-national information on health, socio-economic status and social and family networks of citizens aged 50 and over from a large set of European countries, ranging from the Scandinavian and Baltic area to Mediterranean nations.

SHARE introduced the 12-item version of the CASP scale. The psychometric properties of this version of the CASP-12 and its cross-cultural robustness, based on the fourth wave of SHARE, were investigated by Borrat-Besson et al. (2015): they found similar results in cross-country comparisons, with some problems for Italy and Portugal.

The analysed sample is composed by 59.267 individuals, that is the total number of units for which the CASP-12 indicator may be constructed, living in 16 countries (Austria, Belgium, Croatia, Czech Republic, Denmark, Estonia, France, Germany, Greece, Italy, Luxembourg, Poland, Portugal, Slovenia, Spain and Sweden)[1].

The sample is mainly composed by female respondents (about 57%), aged 67.2 years on average (standard deviation = 10.1), even if this mean varies from 64.7 in Croatia to 70.1 in Sweden. About one third of the respondents show a medium education (ISCED-97 level equal to 3), even if a large cross-country heterogeneity is present: about 11% and more than 35% of the German sample report low and high level of education, respectively, while in Spain nearly 80% of respondents are low educated (overall, Mediterranean countries show the largest proportions of low educated people). About 85% of men and 67% of women live with a partner.

The majority of respondents is retired (about 59%), but this value ranges from 45.6% in Greece to 77.8% in Czech Republic. Approximately, 90% of people (this percentage is slightly larger for men than women) do not report ADL limitations, but this proportion falls to 50% looking at mobility problems (the value is particularly low in Estonia Poland and Portugal).

4.3 The statistical analysis

Other than standard descriptive analysis, we investigate the relationship between quality of life and a large set of variables by means of some multilevel analyses (Snijders and Bosker, 2012), in

[1] In the sixth wave of SHARE, information was collected also in Israel and Switzerland, but it is not included in our analysis since AAI values are not available for these countries.

particular estimating random intercept models where the individual CASP-12 score is our dependent variable.

The explanatory variables used in this paper may be classified in 5 groups:

- *Demographic*: gender, age (in classes), household size, marital status, having children and/or grandchildren.
- *Socio-economic status*: education, occupational status, household income, real assets and financial assets (in quintiles), not seeing a doctor because of costs or waiting times.
- *Physical and mental status*: reporting at least one chronic disease, such as heart attacks, high blood pressure, diabetes and so on, reporting at least one ADL/IADL limitation, reporting mobility or arm function limitation, being depressed according to the EURO-D scale.
- *Cognitive abilities*: results of the ten words list test, both immediate and delayed, and numeracy (math) score.
- *Social networks*: received or gave personal/practical help from person(s) outside the household, looking after grandchildren.

However, the novelty element of our research is that we exploit AAIs (Active Ageing Indices, as described in Section 3) as level-2 variables, that is macro-level indicators measuring, in a composite way, several aspects that could drive the way old people perceive their quality of life. As underlined by Motel-Klingebiel et al. (2009), "levels of quality of life are principally affected by welfare state arrangements while distributions and the relevant social structure indicators are only shaped by welfare regimes to a certain extent. Consequently, it can be said from a social policy perspective that a liberalisation of welfare systems may only partly lead to increased variation in quality of life and hence, in diversity and social inequality among older people".

Therefore, we want to consider that countries differ in demographic characteristics (improvements in longevity), social norms (patterns of intergenerational transfers and contacts, gender norms), policy context (welfare state, pension systems, health care systems), and so on: these differences could help explaining cross-countries heterogeneity in perceived quality of life, once controlling for individual characteristics. To this end, the use of AAI as a level-2 variable, both in its elementary components and as a whole, will allow us going in depth in investigating which macro-level factors foster/hinder elderlies' life quality.

More specifically, we use 2018 AAIs, which values of their indicators derive from surveys and other sources carried out in 2016: these variables are included in the analysis according to both the

level reached by each indicator and the variation with respect to 2016 AAIs (whose information are mainly collected in 2014[2]).

For each model, the Intraclass Correlation Coefficient (ICC) is used to evaluate the role of the AAI indicators in explaining the cross-country heterogeneity in quality of life. All statistical analyses were performed using Stata software.

5. Results

The average value of the CASP score is equal to 36.97 (±6.35 s.d.), while its median is equal to 38, slightly higher for men (the mean is 37.45 and the median 38) than for women (the mean is 36.61 and the median 37). However, as depicted by Figure 1, our sample shows a large cross-country heterogeneity, since the average CASP score ranges from 31.38 in Greece to 41.32 in Denmark for females and from 32.44 to 41.42 for males, again in Greece and Denmark respectively.

We then estimate several multilevel models, separately for men and women.

In Table 1 we show the individual-level point estimates of Model 0 (the baseline model), where all level-1 covariates are introduced, while no level-2 variable is specified; as a consequence, all between-country variability is concentrated in the level-2 variance. This solution allows to estimate *value-added* residuals and compare countries according to a League Table, in the spirit of Goldstein and Healy (1995).

The ICC of the baseline model is equal to 15.12% for men and 15.18% for women: although a large set of individual characteristics, covering many domains of well-being, is introduced in the model[3], a non-trivial proportion of the total variability in the perception of the quality of life is ascribed to the cross countries variability. It is interesting to note that at the beginning of our analysis no gender differences emerge.

[2] Data of the "Participation in society" domain for 2016 and 2018 AAIs come from the same sources collected in 2016. Therefore, for this specific domain, no variation is included in any model.

[3] Estimation results of individual variables will not be commented because it is out of the scopes of the paper. However, main findings are in line with the literature.

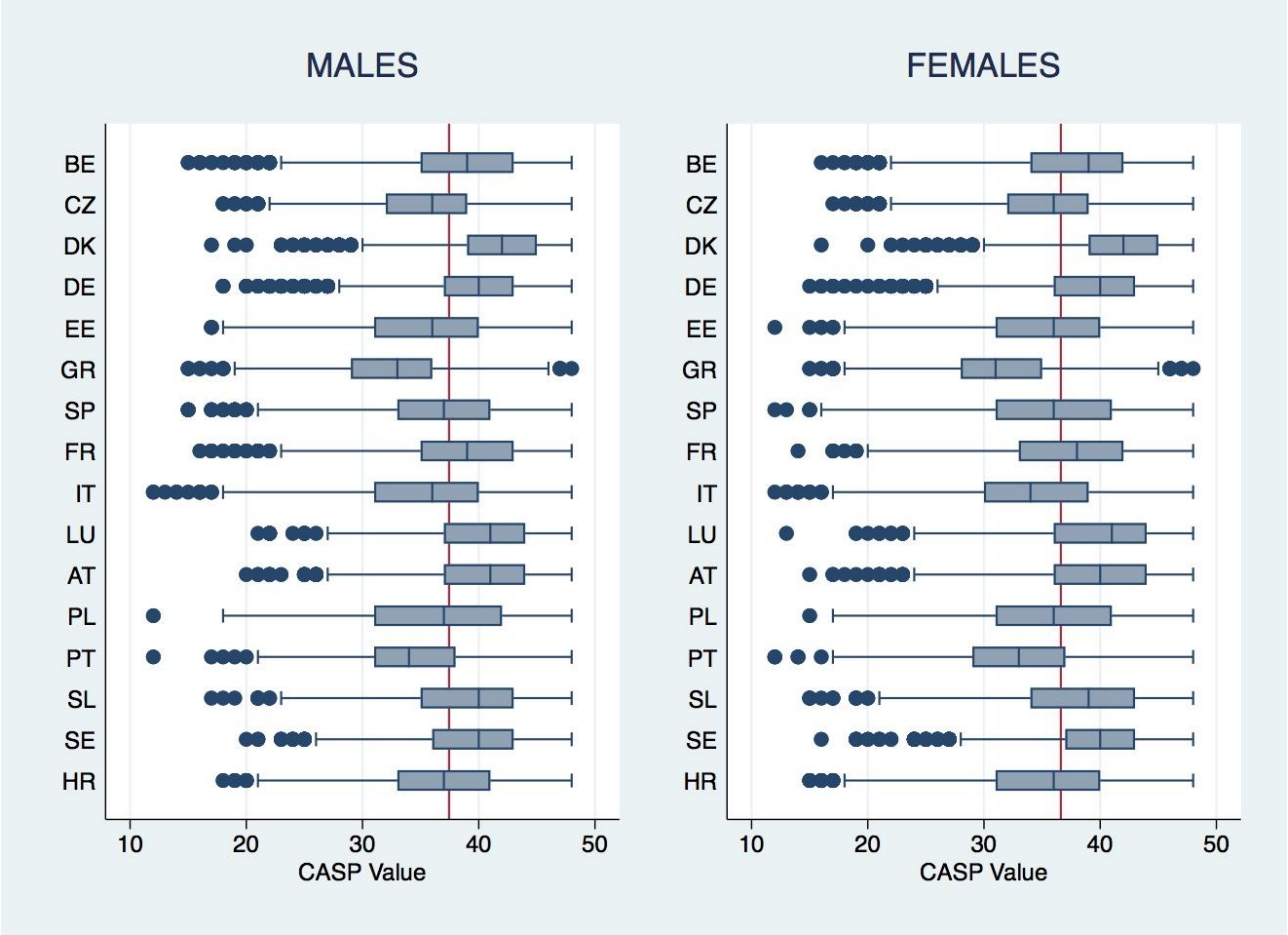

Figure 1: Distribution of the CASP indicator, by gender and country

Note: in red line the average value of CASP over all countries.

Figure 2 reports the analysis of the residuals after the baseline model estimation; based upon the procedure of Goldstein and Healy (1995), the estimates of two residuals are statistically different if their confidence intervals do not overlap. Then, according to the model specification, we may interpret negative values of the residuals as an average underreporting of wellbeing in that country, the opposite (overreporting) for positive values. After controlling for a large number of individual characteristics, people living in Denmark, Luxembourg and Austria show the highest wellbeing measures, whereas Greeks show the lowest values. Yet, even if the ICC estimate is essentially the same in the samples of respondents divided by gender, the ranking of the countries in the analysis of the residuals highlights some slight differences between males and females (for instance Italian women exhibit larger underreporting than Italian men, ceteris paribus).

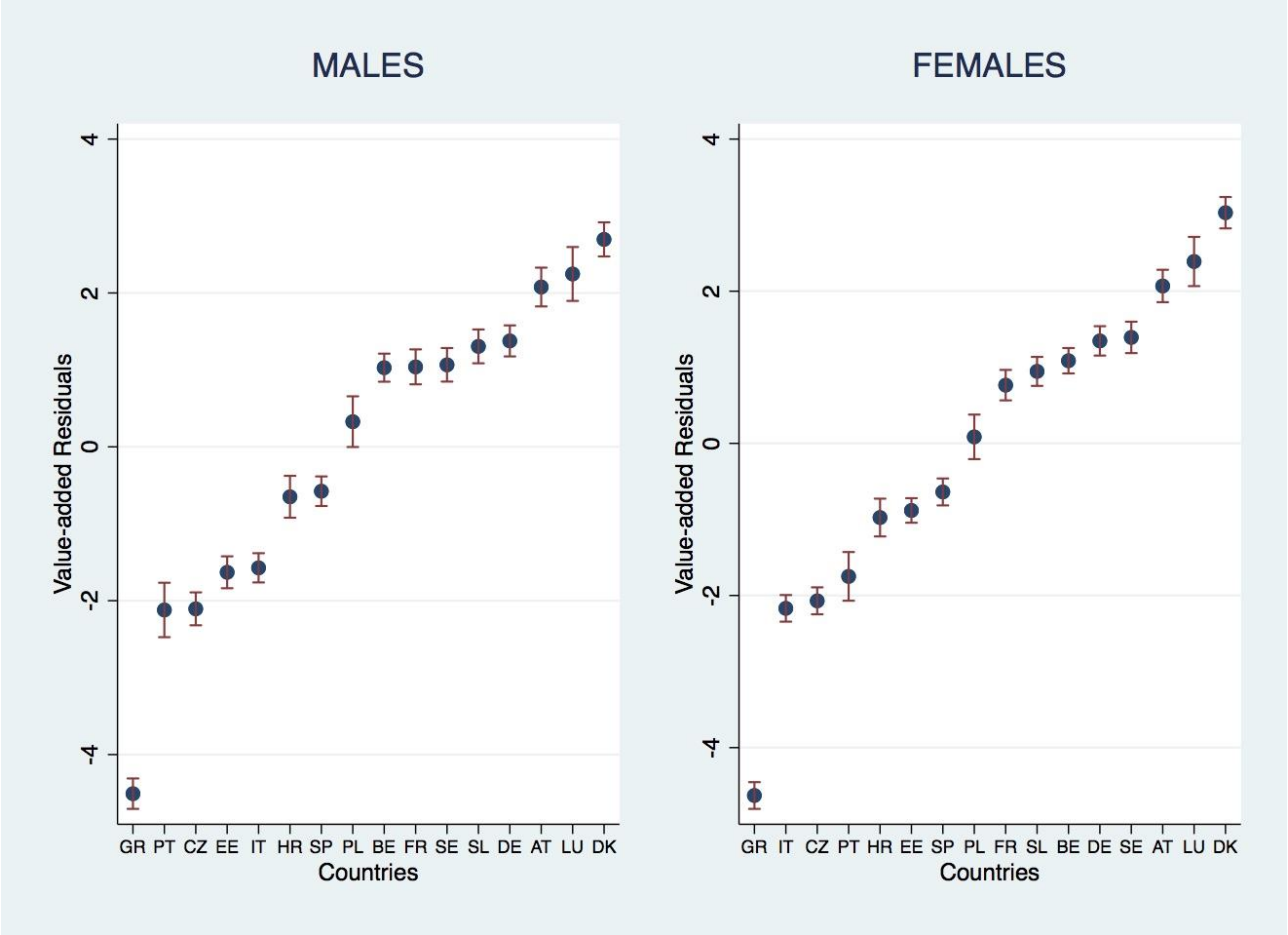

Figure 2: Value-added level-2 residuals after baseline model estimation, by gender

In all the next estimated multilevel models, AAI variables are in turn added (the set of individual covariates does not change). Results are shown in Tables 2, 3 and 4, even if we just report the point estimates of these level-2 variables (by gender sample), as well as the ICC value of the model, in order to analyse the amount of the unexplained cross-country variability[4].

When the global AAI is included as a second-level variable (Model I), the between country variability decreases to 11.5% for men and 10.3% for women. Despite most of individual level variable remains significantly correlated with the response variable, as expected they do not encompass cross-country variability, which is conversely reduced using the Active Ageing Index. Moreover, the larger the global country index, the better the individual quality of life, ceteris paribus.

The variation between 2014 and 2016 of the global index is significantly correlated with the individual well-being, even if this relationship is much weaker than considering just the global level (Model II); however, this level-2 variable is able to explain another 1.6% of the cross-country variability for both sexes. The negative sign of its estimate could appear odd, but we cannot forget

[4] Individual-level point estimates are available on request.

that the global AAI is a composite indicator and summarises the contribution of different factors, as it will be clearer when single domains will be introduced in the model to estimate (this also explain why this variable is statistically significant only at 10% of level); this issue will be furthered in the Discussion section.

Models from III to VI in Table 3 replicate the previous analyses, but including gender-specific overall AAIs (considering the effect of both the same sex AAI levels and the opposite sex ones), instead of the global index. Results do not change substantially, in terms of ICC values and estimates of the level of the index; the only difference is that variation estimates are no longer statistically significant, both for men and for women. An interesting finding is that in all cases, women exhibit a lower unexplained cross-country variability in quality of life than men, particularly relevant when the indices of the opposite gender is considered.

Models VII and VIII in Table 4 investigate the role of domain-specific overall AAIs: for the sake of brevity, models including only the statistically significant variables are reported. Findings are really interesting. First, the behaviour of men and women is very similar. Then, results of the global AAI level are substantially due to the "Independent, healthy and secure living" domain. Third, similarly to Model II, variations in the indices show some weak effects. In the end, using the same total number of level-2 covariates, the domain-specific variables are able to explain between country variability in quality of life much better than the global indices.

Table 5 reports the results of the models that introduce gender- & domain-specific AAIs (from Model IX to XII). When only the levels of the four domains are included, findings are very similar to the ones in Table 4: the "Independent, healthy and secure living" domain is the only statistically significant, using either the same sex AAI leves of the analysed sample or the opposite sex ones. On the other hand, the inclusion of variations of these AAIs really improves the model fit, even if this comes out only when the female indices are considered: no variation of the male AAIs are significant, both for male sample and the female one. The female "Independent, healthy and secure living" domain plays a key role in this analysis, because it is statistically significant according to both its level and its variation in the last two years. In models with the female AAI variations, the ICC falls to values much lower than 3%: the specification in the model of a limited number of level-2 covariates (only four) implies a reduction of about 13% in the cross-country heterogeneity in quality of life.

Summing up, we may highlight some very interesting findings:

- the use of global (overall or gender-specific) AAI is able to make smaller cross-country heterogeneity in quality of life of about 4% – 5% with respect to the baseline model, a reduction a bit stronger for women than men;

- the use of domain-specific AAIs is able to make smaller between-country variability in quality of life of about 9% with respect to the baseline model; however, differences between women and men are smaller than the ones observed using the global index.
- the model specifications able to explain almost all the cross-country heterogeneity in quality of life (model X and XII) are those including women domain-specific AAIs, both analysing the women sample and even the men sample;
- among the domains, the most important is the "Independent, healthy and secure living": it is the only statistically significant both in the levels and in the variations, for men and women;
- the domains of "Employment" and "Capacity of enabling environment for active ageing" play a role only including the variations with respect to the 2016 AAIs.

6. Discussion

This paper investigates the role of contextual correlates of individual's quality of life, testing the AAI calculated by the UN. Result seems to corroborate the hypothesis that the context matters and cannot be ignored in the analysis. This confirm other results found in the literature on the importance of the macro factors on individual's wellbeing and support the idea that using macro indicators in multilevel analysis increase the explaining potential of the study.

The novelty of this paper to measure contextual variables by the AAI index seems fruitful: the index and it variations prove to be good indicators to capture unexplained cross-country variability whose level is almost halved when we consider Global AAI and its variation for both men and women. Results support the hypothesis that AAI indexes are good measures of the contextual level of quality of life for both old men and women: living in a context fostering active aging is positively correlated with high level of individual wellbeing other things being equal. Policy makers should be therefore encouraged to invest in active aging, not only to face population aging at societal level, but also because it is positively correlated with individual level of wellbeing.

It should be remarked however that when we try to isolate the correlation between each single dimension of active aging and individual quality of life, the only domain that matters is "Independent, health and secure living", for both men and women. This is a clear indication that the single dimension of this domain should be specifically supported with targeted policies. At the same time, we suggest to the UN to evaluate the possibility to increase the explicit weight for the above domain (just 10%) given its robust correlation with old people's quality of life.

Finally, our results evidence that any positive variation of the AAI on the whole is linked to a

higher level of individual's wellbeing. In this sense, any further improvement in active aging could be beneficial on the whole for old men and women. Men's quality of life seems affected more by variation in men's employment level, and a public investment in this direction would be beneficial also for women. While women's wellbeing is sensitive to variations of more domains and therefore policy makers should support many aspects of active aging to improve women's quality of life.

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Appendix A

Tables

Table 1: Point estimates of the model without the total value of AAI 2016 (Model 0)

Group	Variable	Point estimates	
		Men	Women
DEMO	Age class (ref. Up to 55):		
	56-60	0.033	- 0.161
	61-65	0.145	- 0.079
	66-70	0.247	- 0.048
	71-75	0.037	- 0.034
	76-80	- 0.092	- 0.250 *
	81-85	- 0.190	- 0.129
	86 or older	- 0.153	- 0.340 *
	Household size	- 0.144 ***	- 0.139 ***
	Marital status (ref. Being single):		
	Having a partner living in the hh	0.173 *	0.232 ***
	Having a partner living outside the hh	0.177	0.119
	Having at least 1 child	- 0.073	0.113
	Having at least one grandchild	0.289 ***	0.151 **
ECONOMIC STATUS	Education (ref. Low):		
	Medium	0.331 ***	0.252 ***
	High	0.312 ***	0.183 **
	Occupational status (ref. Retired):		
	Being worker	0.175 *	- 0.111
	Being homemaker	- 1.533 **	- 0.232 ***
	Other job status	- 0.807 ***	- 0.814 ***
	Household income (ref. 1st quintile):		
	2nd quintile	0.327 ***	0.302 ***
	3rd quintile	0.475 ***	0.334 ***
	4th quintile	0.625 ***	0.564 ***
	5th quintile	1.094 ***	0.922 ***
	Household real assets (ref. 1st quintile):		
	2nd quintile	0.100	0.239 ***
	3rd quintile	0.413 ***	0.496 ***
	4th quintile	0.710 ***	0.656 ***
	5th quintile	1.047 ***	1.095 ***
	Household financial assets (ref. 1st quintile):		
	2nd quintile	0.812 ***	0.503 ***
	3rd quintile	1.180 ***	0.800 ***
	4th quintile	1.441 ***	1.152 ***
	5th quintile	1.478 ***	1.387 ***
	Not seeing doctor due to costs	- 1.413 ***	- 1.383 ***
	Not seeing doctor due to waiting times	- 0.781 ***	- 0.448 ***

Note: *** = 1%; ** = 5%; * = 1%

Table 1 (continued): Point estimates of the model without the total value of AAI 2016 (Model 0)

Group	Variable	Point estimates	
		Men	Women
PHYSICAL & MENTAL STATUS	Reported chronic disease:		
	A hearth attack	- 0.401 ***	- 0.419 ***
	High blood pressure	- 0.214 ***	- 0.185 ***
	High blood cholesterol	- 0.241 ***	- 0.106 *
	A stroke	- 0.567 ***	- 0.433 ***
	Diabetes	- 0.210 **	- 0.191 **
	Chronic lung disease	- 0.514 ***	- 0.227 **
	Cancer	- 0.534 ***	- 0.144
	Stomach ulcer	- 0.526 ***	- 0.305 **
	Cataracts	0.035	- 0.185 *
	Hip, femoral or other fractures	- 0.062	0.159
	Alzheimer or other affective disease	- 1.397 ***	- 1.648 ***
	Rheumatoid arthritis	- 0.508 ***	- 0.365 ***
	Osteoarthritis or other rheumatism	- 0.351 ***	- 0.308 ***
	Other diseases	- 0.472 ***	- 0.300 ***
	Having at least one ADL limitation	- 0.353 ***	- 0.160
	Having at least one IADL limitation	- 0.724 ***	- 0.940 ***
	Mobility or arm function limitation	- 0.490 ***	- 0.465 ***
	Being depressed (EURO-D scale)	- 3.888 ***	- 3.652 ***
COGNITIVE ABILITIES	Ten words list test – immediate	0.096 ***	0.108 ***
	Ten words list test – delayed	0.102 ***	0.082 ***
	Numeracy – math performance	0.205 ***	0.206 ***
SOCIAL NETWORKS	Looking after grandchildren	- 0.041	0.154 **
	Received practical help from outside hh	- 0.371 ***	- 0.156 **
	Gave practical help to outside hh	0.114	0.151 **
	Intercept	35.816 ***	36.443 ***
	Level-1 variance	20.700	21.447
	Level-2 variance	3.688	3.840
	ICC	15.12%	15.18%

Note: *** = 1%; ** = 5%; * = 1%

Table 2: Point estimates of the model with the total value of AAI 2016 (Model I)

Group	Variable	Point estimates	
		Men	Women
DEMO	Age class (ref. Up to 55):		
	56-60	0.034	- 0.161
	61-65	0.145	- 0.079
	66-70	0.246	- 0.050
	71-75	0.036	- 0.036
	76-80	- 0.094	- 0.252*
	81-85	- 0.192	- 0.132
	86 or older	- 0.156	- 0.343*
	Household size	- 0.143 ***	- 0.138 ***
	Marital status (ref. Being single):		
	Having a partner living in the hh	0.172 *	0.230 ***
	Having a partner living outside the hh	0.177	0.118
	Having at least 1 child	- 0.074	0.112
	Having at least one grandchild	0.289 ***	0.151 **
ECONOMIC STATUS	Education (ref. Low):		
	Medium	0.331 ***	0.252 ***
	High	0.312 ***	0.182 **
	Occupational status (ref. Retired):		
	Being worker	0.173 *	- 0.113
	Being homemaker	- 1.535 **	- 0.231 ***
	Other job status	- 0.808 ***	- 0.814 ***
	Household income (ref. 1st quintile):		
	2nd quintile	0.327 ***	0.303 ***
	3rd quintile	0.475 ***	0.335 ***
	4th quintile	0.625 ***	0.565 ***
	5th quintile	1.094 ***	0.924 ***
	Household real assets (ref. 1st quintile):		
	2nd quintile	0.100	0.239 ***
	3rd quintile	0.413 ***	0.496 ***
	4th quintile	0.710 ***	0.656 ***
	5th quintile	1.047 ***	1.095 ***
	Household financial assets (ref. 1st quintile):		
	2nd quintile	0.811 ***	0.503 ***
	3rd quintile	1.179 ***	0.800 ***
	4th quintile	1.441 ***	1.152 ***
	5th quintile	1.478 ***	1.387 ***
	Not seeing doctor due to costs	- 1.412 ***	- 1.383 ***
	Not seeing doctor due to waiting times	- 0.780 ***	- 0.448 ***

Note: *** = 1%; ** = 5%; * = 10%

Table 2 (continued): Point estimates of the model with the total value of AAI 2016 (Model I)

Group	Variable	Point estimates	
		Men	Women
PHYSICAL & MENTAL STATUS	Reported chronic disease:		
	A hearth attack	- 0.401 ***	- 0.419 ***
	High blood pressure	- 0.214 ***	- 0.185 ***
	High blood cholesterol	- 0.214 ***	- 0.106 *
	A stroke	- 0.567 ***	- 0.433 ***
	Diabetes	- 0.210 **	- 0.191 **
	Chronic lung disease	- 0.515 ***	- 0.228 **
	Cancer	- 0.534 ***	- 0.143
	Stomach ulcer	- 0.526 ***	- 0.304 **
	Cataracts	0.035	- 0.186 *
	Hip, femoral or other fractures	- 0.062	0.159
	Alzheimer or other affective disease	- 1.397 ***	- 1.648 ***
	Rheumatoid arthritis	- 0.507 ***	- 0.363 ***
	Osteoarthritis or other rheumatism	- 0.352 ***	- 0.309 ***
	Other diseases	- 0.472 ***	- 0.300 ***
	Having at least one ADL limitation	- 0.354 ***	- 0.160
	Having at least one IADL limitation	- 0.725 ***	- 0.941 ***
	Mobility or arm function limitation	- 0.490 ***	- 0.464 ***
	Being depressed (EURO-D scale)	- 3.888 ***	- 3.652 ***
COGNITIVE ABILITIES	Ten words list test – immediate	0.097 ***	0.108 ***
	Ten words list test – delayed	0.102 ***	0.082 ***
	Numeracy – math performance	0.205 ***	0.206 ***
SOCIAL NETWORKS	Looking after grandchildren	- 0.042	0.154 **
	Received practical help from outside hh	- 0.371 ***	- 0.156 **
	Gave practical help to outside hh	0.113	0.150 **
LEVEL-2	Global AAI	0.234 ***	0.268 ***
	Intercept	27.637 ***	27.079 ***
	Level-1 variance	20.700	21.447
	Level-2 variance	2.423	2.184
	ICC	10.48%	9.24%

Note: *** = 1%; ** = 5%; * = 10%

Table 3: Estimates of the level-2 variable parameters based on the overall AAIs, divided by men and women samples

AAI variable	**Model I**		**Model II**		**Model III**		**Model IV**		**Model V**		**Model VI**	
	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women
Global AAI	0.207 **	0.242 ***	0.252 ***	0.288 ***								
Global AAI variation			- 0.941 *	- 0.948 *								
Men AAI					0.226 **		0.258 ***			0.261 ***		0.295 ***
Men AAI variation							- 0.292					- 0.322
Women AAI						0.215 ***		0.244 ***	0.181 **		0.209 **	
Women AAI variation								- 0.274			- 0.258	
ICC	11.47%	10.31%	9.84%	8.67%	11.19%	10.77%	10.53%	10.00%	11.90%	10.10%	11.20%	9.30%

Note: *** = 1%; ** = 5%; * = 1%

Estimates of level-1 parameters are not reported, but available on request.

Table 4: Estimates of the level-2 variable parameters based on the domain-specific global AAIs, divided by men and women samples

AAI variable	**Model VII**		**Model VIII**	
	Men	Women	Men	Women
Global AAI employment	–	–	–	–
Global AAI participation	–	–	–	–
Global AAI independence	0.308 ***	0.323 ***	0.301 ***	0.323 ***
Global AAI capacity	–	–	–	–
Global AAI employment variation			-0.318 *	–
Global AAI participation variation			–	–
Global AAI independence variation			–	–
Global AAI capacity variation			–	–
ICC	6.61%	6.09%	5.65%	6.09%

Note: *** = 1%; ** = 5%; * = 1%

Estimates of level-1 parameters are not reported, but available on request. Only statistically significant level-2 parameters are reported.

Table 5: Estimates of the level-2 variable parameters based on the domain- & gender-specific AAIs, divided by men and women samples

AAI variable	**Model IX**		**Model X**		**Model XI**		**Model XII**	
	Men	Women	Men	Women	Men	Women	Men	Women
Men AAI employment	–		–			–		–
Men AAI participation	–		–			–		–
Men AAI independence	0.325 ***		0.325 ***			0.341 ***		0.341 ***
Men AAI capacity	–		–			–		–
Men AAI employment variation			–					–
Men AAI independence variation			–					–
Men AAI capacity variation			–					–
Women AAI employment		–		–	–		–	
Women AAI participation		–		- 0.165 **	–		- 0.096 *	
Women AAI independence		0.304 ***		0.490 ***	0.289 ***		0.530 ***	
Women AAI capacity		–		–	–		–	
Women AAI employment variation				–			- 0.334***	
Women AAI independence variation				- 0.579***			- 0.603***	
Women AAI capacity variation				-0.368 **			–	
ICC	6.13%	6.65%	6.13%	2.53%	7.18%	5.57%	2.35%	5.57%

Note: *** = 1%; ** = 5%; * = 1%

Estimates of level-1 parameters are not reported, but available on request. Only statistically significant level-2 parameters are reported.

Appendix B

Active ageing index: list of domains and indicators

1. Employment
    - 1.1. Employment rate for the age group 55–59;
    - 1.2. Employment rate for the age group 60–64;
    - 1.3. Employment rate for the age group 65–69;
    - 1.4. Employment rate for the age group 70–74).
2. Participation in society
    - 2.1. Voluntary activities (percentage of population aged 55 + providing unpaid voluntary work through the organizations);
    - 2.2. Care to children and grandchildren (percentage of population aged 55 + providing care to their children and/or grandchildren, at least once a week);
    - 2.3. Care to older adults (percentage of population aged 55 + providing care to elderly or disabled relatives, at least once a week);
    - 2.4. Political participation (percentage of population aged 55 + taking part in the activities of a trade union, a political party or political action group);
3. Independent, healthy and secure living
    - 3.1. Physical exercise (percentage of population aged 55 + who engage in physical activity and sport at least five times a week);
    - 3.2. Access to health and dental care (percentage of population aged 55 + who report no unmet need for medical and dental examination);
    - 3.3. Independent living arrangements (percentage of persons aged 75 and older living in single or couple households);
    - 3.4. Financial security (ratio of the median equivalised disposable income of people aged 65 + to the median equivalised disposable income of those aged below 65; percentage of people aged 65 + who are not at the risk of poverty using 50% of the national median equivalised disposable income as the poverty threshold; percentage of people aged 65 + not severely materially deprived);
    - 3.5. Physical safety (percentage of population aged 55 + who are not worried about becoming a victim of violent crime);
    - 3.6. Lifelong learning (percentage of older persons aged 55–74 who received education or training in the 4 weeks preceding the survey);
4. Capacity and enabling environment for active and healthy ageing
    - 4.1. Remaining life expectancy achievement of 50 years at age 55;
    - 4.2. Share of healthy life years in the remaining life expectancy at age 55;
    - 4.3. Mental well-being (for older population aged 55 +, using EQLS 2011 and using WHO's ICD-10 measurement);
    - 4.4. Use of ICT by older persons aged 55–74 at least once a week, including every day;
    - 4.5. Social connectedness (percentage of older population aged 55 + who meet friends, relatives or colleagues at least once a month);
    - 4.6. Educational attainment of older persons (percentage of older persons aged 55–74 with upper secondary or tertiary educational attainment).