Building (back) better cities for aged people in Europe

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ABSTRACT

Covid-19 outbreak has mostly affected people in the second half of their lives, at risk of isolation and loneliness; in fact, the impact of the pandemic was even more severe for the well-being of the elderly. Such a recent event has to be framed within the challenge of the demographic increase of people aged 65 years or older, which is particularly relevant in the European context. This paper explores which gaps have to be filled up in order to make cities a suitable place for the elderly to live in, particularly after any emergence of dysfunction and fragility in health, employment, transportation and welfare systems due to the pandemic. We assess the relative contribution of each regressor to the explained variance, that may advise policy makers about which urban features are perceived to be the most relevant for the elderly, even before the pandemic, and must be implemented. Our results have several policy implications. The assessment should provide a contribution to European decision-making processes headed to improve the perception of age-friendliness in urban environments, implementing a paradigm for reference, given the great heterogeneity of features characterizing European cities.

1. Introduction

The phenomenon of ageing population, before the pandemic outbreak, highlighted the need to improve living conditions, productivity, participation in society, social protection and health care solutions (United Nations, Department of Economic and Social Affairs, Population Division, 2019). This set of goals becomes even more important since people in the second half of their lives are bearing the brunt of Covid-19 consequences. The pandemic uncovered the importance of investment and actions to foster healthy ageing and 'ageing in place', advancing the line of research established in early 2000s by the World Health Organization concerning the age-friendly city framework (WHO, 2007).

Covid-19 revealed distress and vulnerability in a wide range of systems, including health, long-term care and support, social welfare, information sharing, occupation and transportation, which are particularly marked in an urban context.

Actually, cities are meant to represent a hub in the search for novel solutions to face challenges and opportunities related to ageing population, since the latter "places increased demand on healthcare, recreation, transportation and other facilities for the elderly" (UN-Habitat, 2016: 10). Key lessons emerging from the aftermath are that urban areas must invest in preparedness, that is developing the economic, social,

environmental and institutional resilience to respond to a wide range of shocks, including having contingency plans for the most vulnerable groups (UN-Habitat, 2022). Moving from the general to the specific frame of reference, our study aims to identify the factors that affect senior European citizens' perception of living in an age-friendly city and how much each of these factors weighs in the overall assessment of inclusiveness. Specifically, we operationalize the framework proposed by the European Commission in 2018 for the urban context, aimed at identifying the features that enhance the liveability of European cities for the elderly. The relevant dimensions considered are the following: i) the development of an age-friendly built environment, ii) knowledge for an active and healthy lifestyle, iii) integrated care services and improved connectivity, iv) olderpreneurship, i.e. starting an entrepreneurial activity late in life. We use representative survey data for 83 cities located in 38 European countries in 2019, which a allows us to test our regression model on subsample as wells, selecting capital, non-capital cities and three size ranges. To this concern, Foglia and Pontarollo (2021), highlight the existence of heterogeneity of the suitability of cities for the elderly, i.e. capital cities tend to perform worse than non-capitals and middle-size urban areas outperform the others.

We show that the subjective agreement that an area is a good place for the elderly to live in is strongly correlated with characteristics of the urban environment and the neighbourhood. The latter are particularly

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relevant for medium and large cities. Moreover, factors related to the active and healthy ageing framework, like sport facilities, good air quality and a responsive provision of local services, are confirmed as significant indicators of the liveability of European cities and essential drivers to ensure a dignified ageing. The results may contribute to informed choices about the features of cities that matter to the elderly and how these could be better implemented to come back to a new "normal", enhancing living standards for this particular population group in the post Covid-19 world.

The rest of the paper is structured as follows: Section 2 reviews the relevant literature, Section 3 describes the data and presents the methodology. In Section 4 results are shown, Section 5 discusses the main findings and concludes.

2. What matters to the elderly?

The World Health Organization was the first promoter for the creation of age-friendly environments worldwide to manage the overlap of urbanisation and population ageing. In accordance with the Global Age-Friendly Cities project (WHO, 2007), incorporated into the Active Ageing Framework (WHO, 2002), the focus is about the development of strategies and initiatives which ensure policies, services and products that contribute to active ageing of older persons in urban settings. A further step was made by the European Commission (2018)[1] that highlights opportunities, challenges and identifies stakeholders that could boost the economic potential of ageing population and drive its future development. As mentioned in the introduction, we choose four main dimensions that are likely to affect the suitability of a city for the elderly.

As far as dimension i), age-friendly settings allow the promotion of healthy ageing by maintaining an individual's intrinsic capacity - mobility, cognition, vitality, vision and hearing - as long as possible and by empowering people to perform daily life activities in such a way that people with different levels of capacity can do the things they value (WHO, 2017). Age-friendly assessments by Gilroy (2008) highlight several architectural barriers within the environment, limiting older people's opportunities to conduct their lives and move around their neighbourhood. The creation of barrier-free public spaces and buildings to boost the ability to walk, associated with the accessibility of public transportation (Green, 2013), allow older people to enjoy outdoor spaces in their cities and foster the possibility for social interaction (WHO, 2017). Even the 2030 Agenda for Sustainable Development makes clear, with Goal 11, that cities and human settlements have to be inclusive, safe, resilient and sustainable by providing universal access to safe, inclusive and accessible green and public spaces, in particular for older persons. However, Buffel et al. (2012) identify the so-called "paradox of neighbourhood participation" as the situation in which older people, who are more likely to spend a lot of time in their neighbourhood, are rarely heard in decisions regarding their districts. Furthermore, living in cities with an ample and accessible endowment of amenities for the elderly, creates a sustainable path for an ageing society (European Commission, 2021), and fosters implementation of the action strategies suggested by the UN Decade for Healthy Ageing – the creation of age-friendly environments, delivering meaningful places for both younger and older people (Bhuyan et al., 2020).

As far as the issue of knowledge for an active and healthy lifestyle, the second dimension considered, WHO defines healthy ageing as "the process of developing and maintaining the functional ability that enables well-being in older age" (WHO, 2020: 1). Functional ability is made up of the intrinsic capacity of the individual (Araujo de Carvalho et al., 2017), the supportive environmental characteristics and their

interplay. Healthy ageing goes beyond lengthening life expectancy without any disease or impairment. Fernández-Mayoralas et al. (2015) prove that participation, a pillar of active ageing, is enhanced by spending time on leisure activities that benefit both physical and mental health and improve life quality. Thus, being socially active and connected to the community may influence the health and well-being of older adults, including fostering positive feelings like autonomy, dignity, achievement, hope and independence (Roberson & Pelclova, 2014). Active aged people are happier and have better mental health (Sala et al., 2019), able to maintain flexibility and physical strength (Orsega-Smith et al., 2012), and less subject to cardiovascular diseases (Petrella et al., 2005). Additionally, Covid-19 has demonstrated that older persons' pre-pandemic health status affects their susceptibility to serious disease, their ability to recover, and their long-term health and well-being. People with underlying illnesses that impair their immunological, cardiovascular, or pulmonary systems have a higher crude case fatality rate (WHO, 2020).

Moving forward to the integrated services and improved connectivity, our third dimension, it is straightforward to assume that a great presence of aged people has an impact on both private and public expenditures related to aid and healthcare. The demand for assisting technologies improving their quality of life (Demiris & Hensel, 2008), fostering their independence (Peek et al., 2017), monitoring remotely their health (Scoglio et al., 2019) and enabling real time communications with carers (Alexandru & Ianculescu, 2017) has increased in the past decade. Technological solutions bring about savings in terms of reduced number of physician's visits, hospitalization periods as well as lower costs of long-term care. Moreover, where an older person's capacity has fallen, provision of assistive technologies is also likely to be important (WHO, 2017). However, the crucial issue rests on the inadequate awareness of technology (Soar et al., 2020) or on the fact that elderly people affected by visual or auditory or even cognitive impairment might find some difficulties when using technology. Thus, older persons are more likely to have ongoing health needs that require medication and assistance, needing routine home-based visits and community care.

The last dimension, olderpreneurship, is defined as entrepreneurial activity under the heading of later-life entrepreneurs (Rogoff & Carroll, 2009) or 'silverpreneurs'. Regarding the ability to start an entrepreneurial activity at a later age, there are contrasting opinions about the strengths and weaknesses related to this topic. According to Schøtt et al. (2017) older individuals have the lowest confidence in their own ability to start and run a business and find it difficult to reconcile business and family commitments. On the other hand, Isele and Rogoff (2014) state that aged entrepreneurs are knowledgeable about the industry and have more intuition about which decisions would produce positive outcomes with respect to their younger counterparts. According to Kerr et al. (2017), both push and pull factors influence the decision of older workers to engage in entrepreneurship: the former includes low wage-and-salary employment prospects and financial hardship, related to the lack of social benefits in the form of a pension, whose amount is generally lower than the pre-retirement earnings (Garrouste & Perdrix, 2021). The latter includes the set of positive features making self-employment desirable for aged people, such as flexible working days and schedules, greater opportunity for intellectual enrichment, and being socially useful and independent. The pandemic may severely affect the incomes and living conditions of older people, who would rely on a variety of income sources, including pensions, savings, family support, paid work, and paid time off, all of which could be in peril because of COVID-19.

The set of reviewed studies is wide, ranging from land use planning, gerontology, health and urban economics to well-being and liveability. In comparison, our multi-faceted approach ensures a comprehensive evaluation of perceptions gathered on a wide sample of European senior citizens living in cities. Lastly, it is worth to stress that the four dimensions identified by EC (2018) fit in the second and third action areas

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[1] The research focuses on the assessment of 10 case studies, resulting from the investigation of policy initiatives at the European level, that demonstrates the heterogeneity of sectors, geographical coverage and growth prospects.

of the United Nations Decade of Healthy Ageing (2021–2030), namely developing communities in ways that foster abilities and deliver person-centred, integrated care and primary health services. These features are enclosed within the development of an age-friendly built environment and olderpreneurship, whose importance has been underlined in the review by van Hoof et al. (2021), addressing ten fundamental questions about the age-friendly cities and communities framework (WHO, 2007).

3. Data and methodology

Our data come from the survey on the quality of life in European cities (Survey on QoL in European Cities, 2019). The European Commission monitors, every three years starting from 2004, the quality of life in a number of European cities through a dedicated survey. The survey focuses on perceived quality of life, showing how satisfied people are with various aspects of urban life. For the 2019 edition, 700 complete interviews were carried out between July and September 2019 in 83 cities of 38 countries, listed in Table A1 - Appendix A, for a total of 58,100 completed interviews.[2]

From the full sample we select only respondents aged 65 years and over, for a total of 11,973 observations. In addition, following Foglia and Pontarollo (2021), to test for heterogeneity across cities, we test our model on two subsamples. In the first we distinguish between capital cities and non-capitals, and in the second we create three classes based on population size: <250 thousand inhabitants (small cities), between 250 thousand and 1 million inhabitants (medium-size cities) and >1 million inhabitants (big cities).

The dependent variable regards the subjective assessment of urban liveability for the elderly. Precisely, it is a dichotomous variable taking value 1 if the respondent agrees with the statement "The city where I live is a good place for elderly people", zero otherwise. The choice of the dependent variable follows the relevant macro dimensions discussed in Section 2, derived by EC (2018) and illustrated in Table A2 in Appendix A.[3] A set of econometric models has been used, specifically a linear probability model, estimated via Ordinary Least Squares (OLS), a logit model with city fixed effects, a linear mixed model and a logit mixed model with city random effects. The models correct for specific issues regarding the data structure, and they are compared via the AIC criterion to establish our preferred one. We estimate the following benchmark equation:

$$y_{i,j,c} = b_0 + b_1 \mathbf{X}_{i,j,c} + b_2 \mathbf{A}_{i,j,c} + b_3 \mathbf{B}_{i,j,c} + b_4 \mathbf{C}_{i,j,c} + b_5 \mathbf{D}_{i,j,c} + \boldsymbol{\varepsilon} \quad (1)$$

where y is the target variable equal to one if the respondent i living in city j of country c agrees with the statement "The city I live in is a good place for elderly people", and zero otherwise; $\mathbf{A}_{i,j,c}$, $\mathbf{B}_{i,j,c}$, $\mathbf{C}_{i,j,c}$, $\mathbf{D}_{i,j,c}$ are vectors of predictors related to age-friendly built environment, knowledge for an active and healthy lifestyle, integrated care services and improved connectivity, and olderpreneur, respectively. The coefficients

$b_1, ..., b_5$ have to be estimated. $\boldsymbol{\varepsilon}$ is a vector of i.i.d. residuals. In addition, vector $\mathbf{X}_{i,j,c}$ includes a set of socio-economic characteristics such as the individual's gender, educational level and household composition (presence of children). Vector $\mathbf{A}_{i,j,c}$ includes seven variables. The first regards the satisfaction with public spaces, like pedestrian areas and squares, because the study by Romero-Ortuno et al. (2010) underlines that the issue of safety of aged pedestrians affects several cities; in addition, walkability allows city's inhabitants to access services and meet their basic needs within a commutable distance from their homes (Un-Habitat, 2022). The second variable measures the satisfaction on cultural facilities like museums or libraries, since they may be used to increase the quality of life in old age (Buffel et al., 2012). The third regards the contentment with green public spaces, since the study by Kabisch et al. (2021) demonstrates that people aged over 60 years old, spending time and doing exercise outside in parks, are less exposed to cardiovascular risk. Along this line, the spread of Covid-19 has uncovered the necessity of investing in parks and public gardens in cities, as a feature enhancing human wellbeing, having beneficial psychological and physical effects (United Nations, 2020). The fourth dimension included in vector $\mathbf{A}$ is the satisfaction with public means of transport. Since the impact of Covid-19 on transport systems was significant (OECD, 2020), and transport systems are linked to aged people's mobility and independence (Chudyk et al., 2015), we had as a result that this part of the population has particularly suffered in the past two years. The remaining regressors enclosed in vector $\mathbf{A}$ include satisfaction with safety in the city, in the neighbourhood and trusting the neighbours. A large body of research (see, for example, Lee, 2021) shows that these three dimensions are drivers of social inclusion, affecting the elderly's well-being and participation in society. To highlight the importance of these three regressors in a post pandemic view, we have to stress that closure of public spaces heavily affected the chance of social gathering for the elderly, adding to the inability to reach places with public transportation (Martínez & Short, 2021). Fear of infection most probably was a main cause. Vector $\mathbf{B}$, that includes four variables, regards the propension to a healthy and active ageing, whose importance was uncovered during the pandemic as a precondition for avoiding severe infection, which are measured by the respondents' evaluation of the quality of the air, since the latter is responsible for a number of diseases and could foster or inhibit outdoor activities.

The risk of adverse health effects of air pollution (causing or exacerbating respiratory conditions) is greater for the elderly, where the susceptibility of infection and mortality from Covid-19 increases with exposure to higher levels of particulate matter (Ali & Islam, 2020; Coker et al., 2020). Moreover, we ascribe to vector $\mathbf{B}$ two additional individual variables referred to the possibility of walking and using a bike, as a mode of transport on a typical day, because the former is widely recognized as the most feasible physical activity that benefits balance, strength and mental state (Okubo et al., 2014), and the latter positively affects cognition, well-being (Leyland et al., 2019) and bloodstream, reducing the fear of falling (Batcir & Melzer, 2018). The limitation or discouragement of physical activity, during Covid-19 outbreak strongly impacted on physical health of the elderly, who are less functionally fit compared to younger adults (Wang et al., 2023), suffering from constraints in the amount of exercise that they would exert routinely (United Nations, 2020). In addition, the qualitative study by Maula et al. (2019) showed that satisfaction with sports facilities, like indoor halls, may enhance social interaction and promote physical activity maintenance.

In vector $\mathbf{C}$, integrated care services and improved connectivity, we include three variables on satisfaction with healthcare facilities, with time needed to get a request solved by local Public Administration (PA), and with easiness of procedures by local PA, respectively, that contribute to the assessment of inclusiveness. Satisfaction with hospitals and other health services matters in the analysis since the rising demand of medical care is due to changing health needs and chronic conditions of ageing populations (Beaglehole et al., 2003). Furthermore, regarding

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[2] The Survey employs a dual-frame sampling approach, using both mobile and fixed-line telephone numbers. For more information, see: https://ec.europa.eu/regional_policy/en/information/maps/quality_of_life (Last access: 12 July 2022). The sample is weighted in each country using a post-stratification weight, calibrating for age and gender, and a design weight to control for unequal selection probabilities of sample units, based on phone type ownership (whether mobile phone, landline, or both). Weighting benchmarks for age and gender (which are also used during the fieldwork for monitoring of the sample performance) are based on Eurostat data for all cities within the EU and the United Kingdom.

[3] As far as the independent variables, answers are possible over a Likert scale on an ordered 4-level scale, from totally agree (the highest level) to totally disagree (the lowest level). We are interested in the positive opinion about the issues, without distinguishing between the degrees of satisfaction. Therefore, we build dichotomous categories for all the variables whose value 1 indicates agreement with a given statement, or a positive judgement, while 0 means disagreement, or lack of satisfaction.

the issues of affordability and discrimination faced by older people in accessing health services, the spread of Covid-19 has raised inequity in health systems and their further marginalisation (Lloyd-Sherlock et al., 2020). The two dimensions related to local public administration responsiveness, i.e. satisfaction with the time needed to get a request solved and ease of procedures, play a decisive role in creating a supporting environment for citizens (Vigoda-Gadot, 2000). Related to this issue, the COVID-19 pandemic, mining the provision of public service, touched a cardinal principle of public service, that of continuity (UN/DESA, 2020). Finally, variables belonging to vector **D** are referred to satisfaction with the income of household, material help, and corruption in local PA, all related to the possibility of becoming self-employed and beginning an entrepreneurial activity even in later age. On this topic, the Global Entrepreneurship Monitor (Schøtt et al., 2017) shows that older individuals, whose financial status is somewhat stable, have a potential for becoming an entrepreneur. Regarding the possibility to obtain material help if needed, Birley (1985) points out that the presence of formal and informal networks can push the entrepreneurial venture. Moreover, the evaluation of corruption in local administrations can significantly affect the entrepreneurial environment because a corruptive environment instils a low trust culture and prevents business growth (Bagautdinova et al., 2013).

To conclude this section, we have to stress that the use of an OLS estimator allows us to quantify the 'relative importance' of each predictor. To achieve this result, the R-squared is decomposed in order to identify the relative contribution of each variable in the right-hand side of Eq. (1), following the method proposed by Grömping (2006, 2015).[4]

4. Results

The regression results are presented in Table 1. Column (1) presents the outcomes for the LPM model, column (2) for the logit, column (3) for the linear mixed model and column (4) for the logit mixed model.

All the seven classes of urban features included in vector **A** are statistically correlated with the suitability of cities for the elderly. First of all, neighbourhood satisfaction is significant with the expected positive sign, and increases the probability of agreeing about liveability of cities by around 10 % and accounts for 6.40 % of the explained variance, as shown by Fig. 1, panel A. Such a finding is important because being satisfied with the neighbourhood contributes to the overall assessment of liveability by the sample. This is particularly true for non-capital cities in which the relative importance of this regressor is twice as much as for capital cities (Tables A7 and A8). On the other hand, the estimates by city size (see Tables A4 to A6) do not particularly differ from those of the full sample. Neighbourhood quality can be perceived through the ease to get services and the interaction with those living nearby, thus referring to the notion of "neighbourhood service accessibility" (Stoeckel & Litwin, 2015). This is a measure of social inclusion that contributes to the perception of residing in a hospitable environment, particularly relevant for older adults. The concept becomes all the more important as the survey has been conducted just before the Covid-19 pandemic and our

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[4] Introduced by Lindeman, Merenda, and Gold (LMG) (1980), the relative importance metric consists into a decomposition of the overall R-squared (or R^2) of the model into non-negative contributions of each predictor term. This approach is based on sequential R^2's obtained accounting for the additional contributions of a variable towards the total R^2. The additional contribution is calculated considering all possible degrees of contribution of a variable in all subset models under the original model. The LMG removes the dependence on orderings that bias stepwise regression by averaging over orderings. Note that the relative importance of the regressors is independent from the statistical significance of the explanatory variables. This means that we could have some regressors that explain a high share of the overall R^2 in spite of being not significant, and the vice-versa. Therefore, in commenting the contribution of each variable to overall R^2, we stress the results only for variables whose coefficients are found statistically different from zero.

Table 1
Determinants of the probability to be satisfied in the city.

|	LPM	Logit	Mixed linear m.	Mixed logit
	(1)	(2)	(3)	(4)
Constant	0.298***	−1.568***	0.360***	−1.084***
	(0.042)	(0.282)	(0.024)	(0.186)
Vector X: socio-economic characteristics				
Female	−0.007	−0.073	−0.007	−0.072
	(0.007)	(0.054)	(0.007)	(0.054)
Household with no children	0.018	0.136	0.019	0.143
	(0.012)	(0.097)	(0.012)	(0.096)
Household with children with <25	0.060	0.556	0.060	0.554
	(0.041)	(0.372)	(0.041)	(0.370)
Household with children >25	0.005	0.023	0.006	0.027
	(0.015)	(0.118)	(0.015)	(0.117)
Secondary education	0.015*	0.095	0.014	0.082
	(0.009)	(0.073)	(0.009)	(0.072)
Tertiary education	0.012	0.065	0.010	0.047
	(0.009)	(0.075)	(0.009)	(0.074)
Vector A: development of an age-friendly environment				
Satisfaction with public transport	0.025***	0.160**	0.027***	0.168**
	(0.009)	(0.070)	(0.009)	(0.069)
Satisfaction with cultural facilities	0.024**	0.126	0.023**	0.120
	(0.010)	(0.078)	(0.010)	(0.077)
Satisfaction with green spaces	0.027***	0.164**	0.027***	0.163**
	(0.009)	(0.071)	(0.009)	(0.070)
Satisfaction with public spaces	0.044***	0.285***	0.044***	0.284***
	(0.009)	(0.067)	(0.009)	(0.067)
Satisfaction with safety of the city	0.028***	0.187***	0.029***	0.194***
	(0.008)	(0.062)	(0.008)	(0.061)
Satisfaction with trusting other people in the city	0.042***	0.294***	0.043***	0.306***
	(0.008)	(0.061)	(0.008)	(0.060)
Satisfaction with neighbourhood	0.102***	0.573***	0.102***	0.567***
	(0.011)	(0.079)	(0.011)	(0.078)
Vector B: knowledge for an active and healthy lifestyle				
Satisfaction with sport facilities	0.028***	0.207***	0.029***	0.209***
	(0.010)	(0.074)	(0.010)	(0.073)
Satisfaction with quality of the air	0.035***	0.245***	0.036***	0.257***
	(0.008)	(0.060)	(0.008)	(0.060)
Mode of transport on a typical day – foot	0.010	0.091	0.010	0.089
	(0.007)	(0.059)	(0.007)	(0.059)
Mode of transport on a typical day – bike	0.005	0.021	0.005	0.024
	(0.012)	(0.100)	(0.012)	(0.099)
Vector C: integrated services and improved connectivity				
Satisfaction with health facilities	0.045***	0.304***	0.047***	0.309***
	(0.008)	(0.063)	(0.008)	(0.062)
Satisfaction with time needed to get a request solved by local PA	0.050***	0.385***	0.051***	0.389***
	(0.008)	(0.063)	(0.008)	(0.063)
Satisfaction with easiness of procedures in local PA	0.040***	0.315***	0.041***	0.315***
	(0.008)	(0.060)	(0.007)	(0.060)
Vector D: olderpreneur				
Satisfaction with household income	0.023***	0.144**	0.024***	0.146**
	(0.008)	(0.063)	(0.008)	(0.062)
Chances of receiving material help	0.072***	0.530***	0.072***	0.529***
	(0.008)	(0.060)	(0.008)	(0.059)
Corruption in local PA	−0.030***	−0.242***	−0.032***	−0.252***
	(0.008)	(0.065)	(0.008)	(0.064)
City fixed/random effects	Yes	Yes	Yes	Yes
Observations	11,973	11,973	11,973	11,973
R^2	0.178			
Adjusted R^2	0.169			
AIC	8942.172	9415.914	9350.051	9538.881

Notes: For all variables, the answer category "don't know/refuses" has been included as a separate one to preserve the sample size. For the sake of brevity, these variables are not reported in the tables. Standard errors in parentheses.
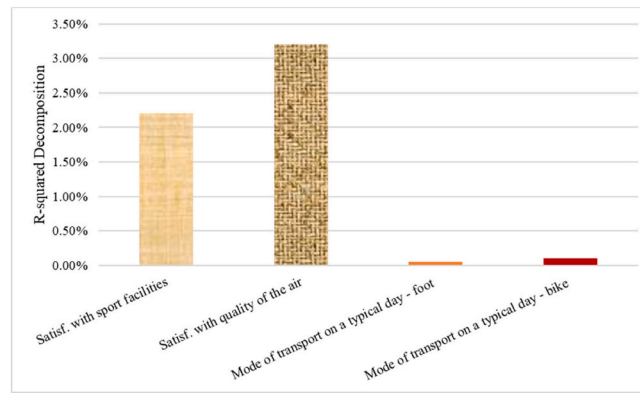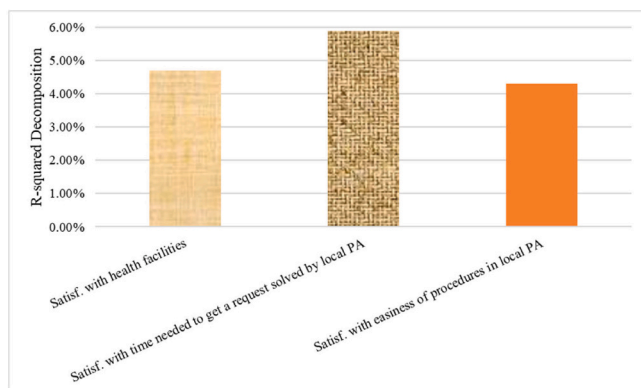* $p < 0.10$.
** $p < 0.05$.
*** $p < 0.01$.

A) Vector **A** - Development of an age-friendly environment
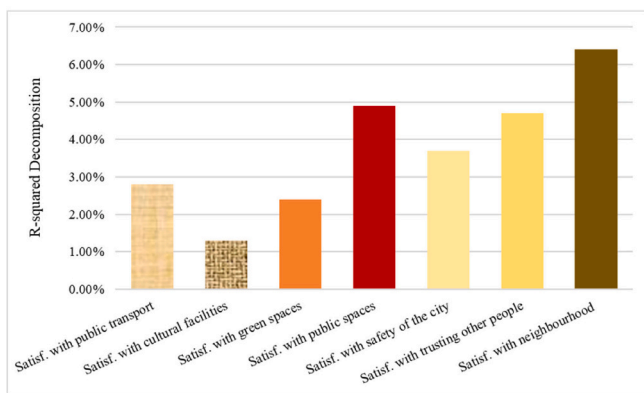
B) Vector **B** - Knowledge for an active and healthy lifestyle

C) Vector **C** - Integrated services and improved connectivity
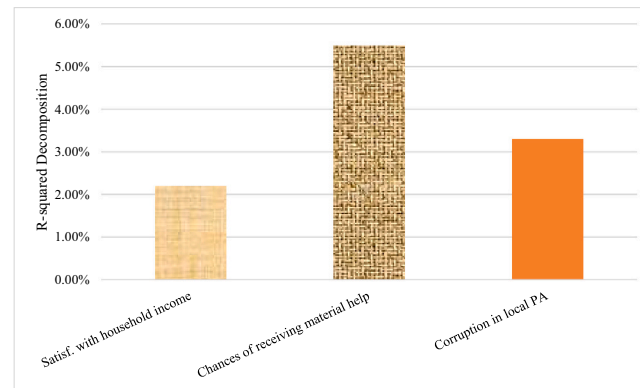
D) Vector **D** – Olderpreneur

Fig. 1. Relative importance of the regressors. Notes: Decomposition is based on the estimation of Eq. (1) reported in column (1), Table 1.

result may serve as an indication of how important is the sociality and how much attention policy makers should put on designing services shaped for older generations, that were hit the most. These include, for example, age-friendly neighbourhood services,[5] reachable by aged people with mobility impairments, that could be experienced when health status worsen, and with age. The empirical finding is confirmed by the narrative related to the urban configuration during the pandemic, highlighting the central role of neighbourhood in big cities like Paris.[6] Second, urban liveability for aged people positively and strongly correlates with the agreement about trusting people who live in the same city, with a probability increase equal to 4.20 %. In addition, the relative importance of this feature is 4.70 % of the overall R^2, as graphically represented in Fig. 1, panel A. This result is verified also when we account for city size, or for capital and non-capital cities. Having a relationship with other individuals or the society, like the feeling of trusting others and feeling others trusting you, has also a significant impact on the wellbeing of the elderly. This age group, indeed, is generally more vulnerable and individuals may tend to isolate themselves. Initiatives that foster inclusion in the decision-making process, like for example the

District Councils for the Elderly promoted by the Municipality of Barcelona,[7] may go to the right direction.

Third, looking at satisfaction with safety, it increases by 2.70 % the probability of agreeing that the city is a good place for elderly people. This dimension explains 3.68 % of the R^2. This dimension is particularly important for non-capitals and big cities in which it explains >5 % of the R-squared, while it is not significant for small cities and capitals, linking to the relationship between the perceived safety and the perceived crowding, especially in large urban areas. Fourth, satisfaction with public transportation coincides with the assessment of an age-friendly, easily accessible city. Because urban public means of transport are wide and varied, there is no single policy for prioritising one of them, and yet the focus should be based on comprehensive solutions that include easy ticketing procedures, accessibility, integration, maintenance and safety of vehicles, timing, and periodic evaluation of service quality through surveys. However, given a lower share of the explained variance, equal to 2.90 %, this dimension can be considered currently relatively less important than the previous ones. In addition, when looking at the effect of this variable by city type, we observe that it is statistically significant only for medium size cities. A potential explanation is that capillarity of public transportation might be higher for capitals than for other cities within the same country (Mariotti et al., 2021), thus reducing variability. The same may be true for big cities, while for the smaller urban areas public transport could be less relevant

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[5] The city of Vaasa in Finland, for example, has started an extensive mapping of the accessibility of the outdoor environment that provides the ground for the planning of accessibility improvements. The focus of the mappings is specifically on streets and crosswalks, pedestrian and bicycle lanes, as well as entrances of crucial public buildings. https://extranet.who.int/agefriendlyworld/afp/mappings-of-the-accessibility-of-the-outdoor-environment/ (Last access: 01/07/2022).

[6] Paris turned into a 15-min city, splitting into small towns, because citizens couldn't venture further than a kilometre from their homes. https://www.theguardian.com/us-news/2023/jan/25/15-minute-city-urban-planning-future-us-cities (Last access: 05/06/2023).

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[7] Older women and men can collaborate in their district with older people's councils, with the aim to promote active and healthy ageing of older people, improving their well-being and building a city for all ages. (https://ajuntament.barcelona.cat/personesgrans/es/canal/consells-de-gent-gran-dels-districtes Last access: 01/07/2022).

than other aspects. In sum, the perception of a high quality local public transportation system is likely to positively affect the suitability of the city for the elderly.

Another feature is the assessment of age-friendly public spaces, which provide an important contribution to the explained variance equal to 3.30 %. The size and significance of coefficient is the same in columns (1) and (3) and we have that being satisfied with public spaces improves by 2.70 % the chance that the city is a good place to live. Thus, prioritising pedestrian areas in city centres and historic, cultural and social sights, should include provision of benches and restricting vehicles traffic. Indeed, walkability increases walking benefits of the society in the areas of public health, social well-being and environmental sustainability (Gehl, 2010; Li et al., 2021). Concrete actions that local public administration could take to keep the situation monitored include walkability audits sent out to interest groups and regular pavement maintenance. Moreover, the implementation of Jan Gehl's guideline for lively environments, including the construction of high-quality façades that may encourage walking activities,[8] and the regeneration of urban spaces through beautification projects, may raise opportunities for social inclusion by ensuring that the elderly enjoy the outdoors and participate in such projects (EC, 2010). These interventions enhance their effects by smoothing economic and social inequalities which rapidly rose during the pandemic (Aspachs et al., 2022), especially when targeted to marginalized neighbourhoods (Ferranna, 2019). The contribution of the variable related to the satisfaction with green areas is limited, although its importance in the literature is remarkable. Indeed, within the European urban context, the assessment of accessibility of such spaces to the elderly is heterogeneous but is considered as a driver of well-being, especially during the pandemic (Carpentieri et al., 2020). Last, satisfaction with cultural facilities, like theatres and museums, is significantly different from zero for both the whole sample and for capital cities, contributing relatively little to the overall R^2: 1.2 %.

When considering cities by size, we observe that these three variables are not significant for smaller cities, highlighting that these are probably already endowed with these amenities. When we distinguish between capital and non-capital cities, in the latter the relative importance of these variables tends to be higher than in the former. Regarding vector **B**, i.e. "knowledge for an active and healthy lifestyle", the coefficients of satisfaction with sport facilities and with air quality are both statistically significant with the expected sign. Because walking is the main mode of aerobic exercise among older adults, it is included in this category. However, this feature is not statistically different from zero and, coherently with the results from Table 1, the proportion of explained variance is negligible, around 0.05 %. Neither the use of bikes as a transport mode on a typical day is significantly different from zero, and accounts for 0.10 % of the explanatory power, as shown in Fig. 1, panel B. These results hold when we consider capitals and non-capitals and cities by size. On the other hand, the level of satisfaction with air quality has a substantial significance and contributes to 3.20 % of the R^2. The regressor confirms its significance and contribution to the explained variance when subsampling for capital cities and for city size. As exposure to air pollution has been demonstrated to be a crucial factor related to Covid-19 mortality (Coker et al., 2020), it is essential to tackle this issue in the post-Covid-19 era, also to reduce the risks for people from future pandemics. Another regressor contributing to the liveability of the city in an active way is the satisfaction with sport facilities, as a good work-out environment contributes to the wellbeing of aged people. In fact, the explanatory power of being satisfied with sport facilities reaches a value equal to 2.20 %. Empowering senior citizens to take active responsibility for their own ageing and creating a healthy life is the aim of several organisations, ranging from associations to municipal

councils (Scheele et al., 2019). However, the variable when considering subsamples based on cities size. The comparison between capitals and non-capitals highlights that it is significant only for the latter, in which it accounts for 4 % of R^2. Thus, we suppose that capital cities have a higher endowment of sports facilities, or a greater accessibility level that makes easier for the elderly to avail them. The goal of active ageing strategies entail engaging in physical activity that has the potential to maintain muscle strength and cognitive functions, to reduce anxiety and depression, to prevent diseases and to reduce the risk of coronary heart disease, diabetes and stroke (WHO, 2015: 70).

Concerning vector **C**, as in Fig. 1 panel C, satisfaction with the time required for having a request solved by a local PA is the overall strongest predictor of a city's liveability, contributing to 5.90 % of the R^2. The value overcomes 7 % when we perform the same regression for the largest and the capital cities, highlighting that time in these areas has a value also for the elderly. Indeed, high expectations are found to be more prominent in capital cities, with respect to other urban areas. Empirically, larger local public administration, which are more likely to respond to a greater catchment area, are found to be more efficient by Walker and Andrews (2015). This aspect goes hand in hand with the ease of local public administration procedures, because aged people rely mostly on local officials to get their daily requests solved and accomplished in a timely manner. Moreover, the widespread use of the internet in the provision of information concerning public administration procedures and requests has threatened older people' accessibility to a range of electronic services.[9] Among United Nations regions, Europe has the highest development of eGovernment (UN DESA, 2012: 29), however, special attention towards the technological integration of service providers and final users needs to be paid to ensure that older people are not excluded. Social networks and face-to-face contacts are among the means of support for older people to foster their adoption of eGovernment services (Righi et al., 2011). For example, several structural reforms announced in the national recovery and resilience plan include administrative simplification and more competences at local level in Belgium and digital PA in Italy.[10] Further dimensions include being satisfied with health care services and doctors, that increases the chances of agreeing that the city is a good place for elderly people by 4.60%and accounts for 4.70 % of the R^2. Despite clinical conditions of people in their late sixties and more are very heterogeneous when it comes to health status assessment, their needs include a broad range of health services, from acute care to long term care. An effective intervention over time requires a high level of coordination, both between health professionals and across treatment levels and settings like hospitals or doctors' offices, resulting in better services' accessibility, better orientation to carers and patients, clear performance evaluation and better exchange of information between doctors and patients. The result for the full sample is confirmed for the subsamples of cities.

Among the features that are related to the fourth and last vector, i.e. "oldepreneurs" - vector **D**, surveyed people who affirm that if they needed material help they could receive it from relatives, friends, neighbours or other persons they know, they exhibit a probability of finding the city more suitable for older people 7.20 % higher than those who affirm that they would not receive material help. Moreover, as shown in Fig. 1, panel D, having the possibility to ask for material help is, overall, the second strongest predictor of older people's quality of life in European cities, contributing to 5.50 % of the explained variance of the regression model. This indicator accrues to 7.10 % if we take into

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[8] See https://gehlpeople.com/ (Last access: 01/07/2022). Among cities that followed Jan Gehl's guideline there are the City of New York (2013) and the City of Helsinki (2016).

[9] Choi and DiNitto (2013) discuss the benefits that the internet offers to older adults also in terms of physical and functional decline and social isolation. They suggest that computer/internet training for this group of people could play an important role in their social capital.

[10] In their Resilience and Recovery Plan, Belgium has among its objectives the public administration simplification of administrative procedures, while Italy has the digitalisation of the PA, to which it devotes € 6.1 billion.

account the subsample of urban areas with <250 thousand citizens, confirming that an urban-sensitive social protection is more likely to occur in smaller contexts, especially after experiencing the pandemic. Indeed, Seifert and König (2019), employing data from the Survey of Health, Ageing and Retirement in Europe (SHARE), discovered that old people had more chance to receive help outside big cities. Because the possibility of being self-employed creates less security in comparison to a regular job, aged entrepreneurs could need the material support of both family members and local government as a business facilitator. An entrepreneurship-friendly culture can be developed via the private and public sectors, including incubators/accelerators and chambers of commerce acting like start-up networks.

Again, corruption reduces the likelihood of believing that the city is inclusive for aged people by 3.20 % compared to those that think that PA is not corrupted. Corruption in the local public administration adversely affects the liveability of European cities and accounts for 3.30 % of the explained variance. These results are confirmed also when the model is estimated for subsamples of cities. The Covid-19 outbreak, and the consequent restriction measures had an impact on businesses, because of the standstill due to the imposition of social distancing and lockdown, raising the potential issue of government corruption. Research by Gugiu and Gugiu (2016) proves that the public opinion perceives higher levels of corruption especially during tough economic times, due to the fact that the government plays a role as a business facilitator. Such a powerful involvement could tempt some officials to abuse their position for personal gain. Finally, satisfaction with household income is confirmed to be positive and significant.

Vector **X**, capturing socio-demographic characteristics, is not significantly affecting the agreement about city liveability for aged citizens, and its overall explanatory power of the R^2 is almost null. We only observe that individuals living in households without children have a slightly positive perception of better city conditions, as well as individuals with secondary education. Overall, demographic features do not matter in expressing one's own agreement about a good place to live.

Finally, we note that country fixed effects account for about 40 % of the predicted variation, depending from the model and that, as observed in Table A3 in Appendix A, the results hold even when controlling for both city and country fixed or random effects.

5. Discussion and conclusions

After a first overview of the main factors that can boost the economic potential of ageing population and drive its future development, the article focuses the attention on 83 European cities in 38 countries on the basis of a recent survey conducted by the European Commission, named QoL Survey in European Cities 2019. Based on EC (2018), we identify four main areas of policy intervention as a key to improve the life of the elderly, i.e. the development of an age-friendly environment, awareness of an active and healthy lifestyle, integrated services and improved connectivity, and olderpreneurship.

Our empirical findings suggest that, among the urban features under analysis, those linked to the urban environment and the neighbourhood strongly correlate with the subjective agreement of the city being a good place to live in for the elderly, confirming the wide literature about the opportunity of enhancing the quality of life in age-friendly contexts. These results are mainly driven by medium and big cities, where, despite a greater availability of amenities, citizens do not always consider them better than smaller cites (Eurofound, 2020), also because of accessibility problems. Moreover, positive expectations towards the provision of public spaces and cultural facilities are particularly prominent in capital cities. In smaller ones, in fact, the urban environment does not affect the perception that a city is a good place to live in for the elderly, probably because their compactness makes various destinations in the cityscape reachable (Wolday, 2023). Our results can be considered as a possible guideline for *building back better cities for elderlies* after the Covid-19 pandemic. Indeed, we operationalize the guidelines set by the European Commission (2018) identifying the main priorities.

The importance of being satisfied with the neighbourhood, which embraces both a physical and social dimension, is in line with the "15-Minute City" concept by Carlos Moreno.[11] Indeed, it would be too simplistic to interpret this satisfaction as the mere ability to reach services and facilities like groceries and pharmacies, as it also fosters a sense of belonging to a community, enhanced through social interaction with neighbours. Similarly, the availability of sport facilities and the spread of a bicycle sports culture or an improvement of the habits of movement, for example triggered by electric bicycles at low or free prices for the over 65 individuals, together with the possibility of breathing clean air, particularly relevant in capital cities, where residents are more likely to report problems with air quality (Eurofound, 2020), prove to be important elements for the liveability of European cities and essential drivers towards a dignified ageing. Moreover, healthier lives could reduce pressure on health systems and improve the sustainability of public spending (Cavill et al., 2006). The issue of satisfaction with medical facilities should receive further attention due to the spread of Covid-19 and hospitalization, leading to unintended consequences like staffing shortages and delayed or cancelled procedures. Furthermore, the strong correlation between items pertaining to the provision of services by the local public administration and healthcare facilities and the statement "the city where I live is a good place for the elderly" validates the importance of designing citizen-centred solutions and benefits, accounting for the needs of vulnerable age groups. Results are corroborated by the analysis of Guida and Carpentieri (2021), which is centred on the accessibility of urban healthcare facilities for the elderlies, and detects a vulnerable situation worsened by the spread of the pandemic in a densely populated city like Milan. To better prepare for the future, public administrations should use the COVID-19 pandemic's problems as a chance to develop measures that will increase the resilience, effectiveness, and responsiveness of the public sector and the services they provide. Finally, the assessment of features associated with the possibility to start an entrepreneurial activity in later age, as well as the possibility of receiving material help when needed, test as strong predictors of the perception of living in an inclusive city. Thus, it is desirable to find alternative solutions to face the workforce ageing phenomenon that could provide flexibility and better work-life balance. Our results confirmed that both the institutional setting and informal ties can play a role in the venture initiation, as stated by the reviewed literature. However, with our approach, we are able to rank those dimensions that contribute more to explain the feeling of living in a city suitable for elders, providing, eventually, guidance to policy makers regarding the interventions that should be prioritized, especially in the framework of the resilience and recovery plans financed by the European Commission. Indeed, considering such a multifaceted context, the effort required by institutional players is substantial although there could be positive spillovers enjoyable by the community as a whole. Kohijoki and Koistinen (2021), for example, show that measures aimed at improving the age-friendliness of a city can also benefit younger generations. Having in mind the harmful consequences of the COVID-19 pandemic, whose effects have threatened both the lives and safety of older people (UN, 2020), the relevance of considering and analysing the factors affecting urban liveability and inclusiveness for the elderly becomes even clearer. This proves true as cities are often living the so-called "paradox of neighbourhood participation", a situation in which older people, who are more likely to spend a lot of time in their neighbourhood, are rarely heard in decisions regarding their districts (Buffel et al., 2012). Indeed, we must apply the lessons from the past to the

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[11] https://www.moreno-web.net/la-ville-du-%C2%BC-dheure-pour-un-nouveau-chrono-urbanisme%E2%80%AF-pr-carlos-moreno/#:~:text=%E2%80%93%20Pr%20Carlos%20Moreno&text=Nos%20villes%2Dmonde%2C%20partout%20sur,et%20l'urbanisme%20en%20g%C3%A9n%C3%A9ral. (Last access: 01/07/2022).

current situation in order to better prepare cities for the future. To continue to make cities more resistant to pandemics in the future, we should seize the chance to create a livelier, more engaging, and more equitable post-pandemic social environment. It should be every government's strategy to have in place institutional arrangements, policies, systems, infrastructure, plans, including contingency plans, and resources to foresee, identify and quickly respond to pandemics and other crises. Finally, our study could be further developed by assessing the aftermath of the pandemic and making comparisons between the relevance of each parameter before and after the recovery phase. Indeed, despite there may be limitations embedded in perception measures compared to "objective" ones, well-being and liveability indicators have been incorporated into official statistics (Mackie & Smith, 2015) not just because of data availability and frequent disclosures, but because they allow policy makers to comprehend how people value the 'compositional amenities' associated with the characteristics of their cities. Our conclusions are true for a wide sample of European cities, but they fail to capture their specificities playing an important role in public policies adaptation.

CRediT authorship contribution statement

Carolina Foglia: Conceptualization, Writing – original draft, Writing – review & editing. **Maria Laura Parisi:** Writing – original draft, Writing – review & editing. **Nicola Pontarollo:** Methodology, Formal analysis, Writing – original draft, Writing – review & editing.

Declaration of competing interest

The authors declare no conflict of interest.

Data availability

Data freely available here https://ec.europa.eu/regional_policy/information-sources/maps/quality-of-life_en

Acknowledgments

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.cities.2023.104479.

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