

Urban Quality of Life and Capabilities: An Experimental Study

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Urban quality of life and capabilities: An experimental study

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Abstract

This work proposes a way to measure empirically the impact of capabilities and functionings on the residents' perception of quality of life (QoL). The paper assumes that QOL of residents in cities is a function of five domains -such as personal characteristics, environmental amenities, local amenities and disamenities and social interactions- all converted into capabilities and functionings. Capabilities measures accessibility/ presence of amenities, services, having friends, while functionings measures the frequency/time with which they are enjoyed. Residents of an Italian town were surveyed about QOL perception via face-to-face structured interviews. The findings show that what matters for QOL is not only the quantity and quality of amenities, but also accessibility to them as well as the individual allocation of time in daily activities.

JEL: B4, D6, H4, I31.

Keywords: capabilities, functionings, quality of life, time use

1. Introduction

Quality of life is a crucial element in the competitiveness of cities, regions, and states, as it represents a pull and retention factor for new people, firms, and resident populations. The latest evidence suggests that non-economic variables such as natural, public, and private amenities are key drivers of interregional migration. Recent studies find also that the growth of cities is dependent on the migration of highly skilled individuals who, in turn, require certain types of local amenities (Glaeser et al., 2001; Florida, 2002 a, b; Adamson et al., 2004; Shapiro, 2006). Hence, local quality of life (QOL) has become a key element of marketing policies 'to put an area on the map'

(Rogerson, 1999). Although how people live in cities is important *per se*, it is also, and perhaps predominantly, essential for the growth and survival of the cities themselves. In fact, the necessity to measure the quality of life and make comparisons among local, national, and international cities/regions and states has become increasingly important due to its potential use as a political tool. Within Europe, the European Union (EU) monitors and compares the quality of local life by means of a survey titled *Quality of life in cities*. The survey is administered in the context of the European Urban Audit, a specific program of the Directorate-General (DG) for regional and local policies.

Searching for possible measures of QOL is not an easy task because of the complexity of the concept. This is confirmed by the lack of a common definition in the academic literature and specifically in economics (for a literature review on quality of life, see Lambiri et al., 2007). Two interrelated issues, both linked to the multidimensionality of quality of life measures, complicate any investigation of this topic. One problem is that QOL depends on a set of exogenous characteristics such as quality and quantity of public services, built and natural environments, and cultural amenities, as well as more intangible factors such as human interactions and social and human capital. The second issue is that it depends also on endogenous characteristics of the resident population such as their status, gender, age, education, culture, and ethnicity. Thus far, two broad categories of indicators have been used to analyse QOL (Costanza et al. 2007), namely objective and subjective indicators. However, McCrea et al. (2006) point out that “*care should be taken when making inferences about improvements in subjective urban quality of life based on improvements in objective urban quality of life.*” Moreover, the literature can be classified according to the method used to investigate QOL. One stream of research uses questionnaires (Sirgy and Cornwell, 2002; Rogers et al., 2011; Mohan and Twigg, 2007) while another stream applies a more objective approach by measuring the quantity of amenities (Liu, 1976; Rogerson, 1999; Roback, 1982; Blomquist et al., 1988; Glaeser et al. 2001; Florida, 2002; Boshma and Fritsch, 2009, Brambilla et al., 2013). A further stream of research in quality of life is the literature on happiness. In the field of economics, this literature has been driven by the seminal work of Easterlin (1974), which investigates the cross-sectional and dynamic relationships between income and self-reported

happiness for a group of developed and developing countries. Overall, this literature considers self-reported happiness as a proxy for economic utility (Alesina et al., 2004).

A different approach is that one developed by Sen (1987, 1993). This approach investigates quality of life through capabilities and functionings instead of the utility approach. Veenhoven (2010) explains clearly that happiness is not the same as capability, although the two are linked. Capability is required for living a happy life, while happiness affects capability in several ways. Capability is conducive to happiness; and happiness enhances capability. However, how can the concept of capabilities and functionings be linked with quality of life in the cities?

None of the literature mentioned above, irrespective of the approach used, takes into account the accessibility and the frequency with which individuals can experience amenities. One possible exception is represented by the work of Brambilla et al. (2013), which extends the standard hedonic models used to analyse QOL by measuring the role played in Italian cities by accessibility and the uneven distribution of amenities at a neighbourhood level.

On similar lines, in the present work QOL depends on the possibilities of spatial interactions between individuals and the available amenities. Operationally, it means including in the analysis the actual freedom individuals have to access and to enjoy amenities that the city offers. For example, a pleasant park does not represent a good indicator of QOL *per se* if it is difficult to reach or if a large portion of the resident population is excluded from its use since their allocation of time in daily activities does not allow it.

Therefore, the present paper uses a broader definition of quality of life that is related to the capabilities approach of the Nobel Prize winner Amartya Sen (1987, 1993). Sen's work is based on the concepts of capabilities and functionings. Capabilities are "...real opportunities you have regarding the life you lead" (Sen, 1987, 36). In other words, they represent possibilities to do and to be, whereas functionings represent the real achievements or how people actually live (Gasper, 2007, 342). Applying this theoretical approach to QOL, this work distinguishes between the possibilities

individuals have to enjoy amenities (i.e., capabilities/accessibilities) from what they actually do (i.e., functionings/the frequency of use).

Overall, the novel aspect of the present paper is to provide an original way to approach QOL by linking together the literature on capabilities, quality of life, life satisfaction, happiness and time use. We postulate that QOL is strictly connected not only with the quantity and quality of amenities, but also with accessibility to them as well as individual allocation of time in daily activities. To explore the relationship between QOL and the aforementioned indicators, one questionnaire of *ad hoc* design was administered in person by means of structured interviews to the resident population in Alghero, a small town of Sardinia, Italy, located on the coast.

The paper is structured as follows. Section 2 focuses on the related literature. Section 3 illustrates the theoretical setting. Section 4 provides details on how capabilities and functionings are operationalized in the survey as well as in the empirical model. Section 5 presents the structure of the questionnaire, the case study and some descriptive statistics; section 6 illustrates the estimation technique. Section 7 presents results of the work and section 8 provides final conclusions.

2. Related literature

The literature on quality of life records contributions from many fields within social science such as psychology, economics, and sociology. In the economic field at a city level, studies of quality of life find their origins in the seminal works of Smith (1973) and Liu (1976), which produce composite measures of QOL in US Standard Metropolitan Statistical Areas (SMSAs). Another strand of the literature mainly uses the hedonic method to infer the implicit/shadow prices of non-traded components of QOL, such as the presence of various types of amenities or disamenities. These prices are then used to produce a composite quality of life index and rank cities accordingly (Rosen, 1979; Roback, 1982; Blomquist et al., 1988; Gyourko and Tracy, 1991; Khan, 2001; Colombo et al., 2012). This literature considers quality of life to be driven by economic opportunities and cost of living as well as natural amenities/ disamenities.

Within this framework, an interesting contribution is due to Brambilla et al. (2013), which extend the hedonic approach to investigate how revealed preferences of quality of life are affected by uneven accessibility of amenities in Milan, Italy. This strand of the literature evaluates quality of life through objective indicators not considering individual constraints such as amenities accessibility and time availability to enjoy them.

A further strand of the literature considers perceptions of wellbeing as a proxy for quality of life/happiness and thus uses *ad hoc* surveys to measure it (Easterlin, 2003; Diener and Suh, 1999). In economics, this approach finds its origins in the seminal work of Easterlin (1974), which analyses the cross section and dynamic linkage between income and happiness for nineteen developed and developing countries from 1946 to the 1970s. The works that follow this approach consider quality of life/happiness as a proxy for the economic concept of individual utility, or better, *experienced utility*, which is the utility deriving from consumption (for some instances, see Alesina et al., 2004, which compares the US and European cases; Lichtfield et al. 2012, which analyses life satisfaction in Albania). At local level, life satisfaction and quality of life are analysed among others by Sirgy and Cornwell (2002) for southwest Virginia, USA, McCrea et al. (2006) for Queensland, Australia, and Mohan and Twigg (2007) for UK cities. Sirgy and Cornwell (2002) test three models to explain how satisfaction with neighbourhood features affects residents 'quality of life. The findings support the hypothesis that community satisfaction affects individual perception of life satisfaction via different domains –i.e. physical, social, economic and neighbourhood features-. Building on the work of Sirgy and Cornwell, Costanza et al. (2007) present an integrative definition of quality of life that combines objective and subjective elements. Specifically, they “relate quality of life to the opportunities that are provided to meet human needs in the forms of built, human, social and natural capital (in addition to time)” (267). These opportunities fulfil the same role of capabilities as presented by Amartya Sen, even though the authors do not explicitly mention this approach. Indeed, the opportunities available to fulfil the human needs represent, as well as capabilities, possibilities to do and to be in different life domains. However, the approach of Costanza et al. (2007) does not consider real achievements - how people actually live-, while the capabilities literature explicitly defines them as functionings.

Conversely, there is a specific strand of literature that analyses the role capabilities play in influencing the quality of life of individuals (Anand and Van Hees, 2006; Krishnakumar, 2007; Chiappero-Martinetti, 2009; Van Ootegem and Spillemaeckers, 2010, Anand et al., 2011). Excluding the work of Anand et al. (2011), which focuses on a set of domains such as health, various measures of freedom, emotional capabilities, environmental and social relations, and discrimination, the literature does not offer a specific framework to investigate empirically the impact of capabilities and functionings on the perceptions of life satisfaction. Another drawback of this literature is that it does not consider the role played by amenities and disamenities. To fill this gap, the present study converts amenities and disamenities into capabilities and functionings. Furthermore, following other research on this strand (Rogers et al., 2011; Chiappero-Martinetti, 2009; Lelli, 2001; Anand and Van Hees, 2006), the present study considers also social interactions as well as the individual time use (Dolan et al., 2008; Krueger et al., 2009). Krueger et al. (2009) consider differences in individual feelings generated by a given set of activities. Overall, the authors highlight that the use of time by individuals represents a good indicator of overall life satisfaction.

2.1 Indicator for amenities and disamenities

Since the 1980s, migration studies and quality of life literature have started including in the empirical models pure amenities such as weather or proximity to natural amenities (Graves, 1980; Blomquist et al., 1988). Currently, these two variables are still the main ones used in the empirical applications for their distinctive ability to be perfectly exogenous.

Other analysts started to consider other human-produced amenities including public services (Blomquist et al., 1988; Gyourko and Tracey, 1991) and social, cultural and skills-dependent amenities such as movie theatres, bars, museums, art galleries, restaurants and trendy shops (Glaeser et al., 2001; Florida, 2002a; Boshma and Fritsch, 2009), which appear to be particularly important in local contexts (Shapiro, 2006). The presence of the latter type of amenities along with

tolerant and open-minded inhabitants of cities is important to attract the so-called creative class, which consists of talented and creative people (Florida, 2002b). Among many others disamenities such as crime (Roback, 1982) and pollution (Blomquist et al., 1988) are the more commonly used in many applications.

Since 2004, the European Union (EU) has monitored and compared the quality of life in European cities by means of a survey titled Quality of life in cities. The survey was administered in the context of the European Urban Audit, a specific program of the DG for regional and urban policies. In the last edition of the survey (2013), 41,000 people in 79 EU cities expressed their opinion on the quality of services such as public transport, health care, education, cultural facilities as well as job availability, housing and general satisfaction of living in the city. The survey ask also questions on environmental factors among them includes possible source of disamenities such as air quality, noise, cleanliness of the city. Using the Urabn Audit, Rosu et al. (2015) analyse the perception of QOL in 79 European cities finding that the importance of amenities, environmental variables and socio-economic variables changes according to the type of cities. For instance, environmental amenities (including natural amenities and clean environment) are strongly correlated with the perception of QOL in Central and Western Europe and in touristic cities located in the Mediterranean sea, while amenities matter more for Southern cities.

However, as Graves (1983, p. 541) highlights ‘there is virtually no limit to the number of amenities which may enter preference functions. Moreover, many amenities are correlated..., and one is forced to choose between imprecise estimates of amenity impacts and omitted variables bias.’

It is worth noting that the main contribution of present work is to focus on the method to convert the dimensions affecting quality of life (including amenities and disamenities) into capabilities and functionings. For that reason, and also to reduce correlation problems among variables, a “reduced list” of amenities and disamenities has been introduced. Despite of this, the paper includes the most

used indicator for amenities/disamenities in afore mentioned quality of life studies such as natural amenities, public services, recreational amenities and disamenities such as crime and cleanliness.

3. Theoretical setting and methodology

As Anand et al. (2011) explain, the formal approach of Sen (1985) to capabilities is summarized using three related equations:

$$f_i = f_i(r_i) \tag{1}$$

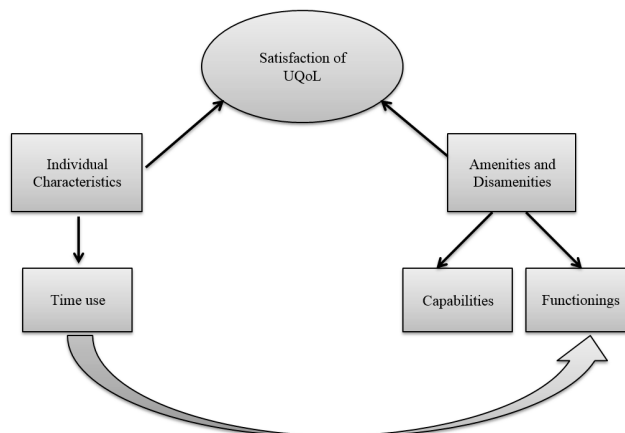
$$h_i = h_i(f_i) \tag{2}$$

$$Q_i \equiv \{f_{i1}, f_{i2}, \dots, f_{in}\} \tag{3}$$

where equation 1 indicates that the functionings (f_i) of individual i depend on his resource endowments (r_i). Equation 2 indicates that the level of individual happiness (h_i) depends on the set of functionings that are actually chosen. Equation 3 refers to the set of functionings (including the chosen ones) that, given the initial endowment of resources, the individual could have chosen. This last formulation is the measure of the possibilities (capabilities Q_i).

Given this theoretical sketch, Figure 1 shows the approach used in the present work to analyse the perception of QOL within the

Figure 1. Urban quality of life framework using capability approach



Source: author's elaboration.

The perception of QOL depends not only on the quantity and quality of public, private, and natural amenities, but also on the possibilities for spatial interactions between individuals and the amenities and on the individual allocation of time use.

Following Sirgy and Cornwell (2002) and Costanza et al. (2007), we postulate that, *ceteris paribus*, five domains influence the perception of QOL:

$$UQoL = f(P, E, A, D, SI) \quad (4)$$

where:

P= *Personal Characteristics*;

E= *Environmental Amenities*;

A= *Amenities*;

D= *Disamenities*;

SI= *Social Interactions*.

For each domain, we propose the corresponding indicator of capability and when possible the equivalent functionings in terms of time use.

4. Operationalization of capabilities and functionings: the empirical model

Table 1 provides details of the capability and functioning variables for each domain. The capabilities for *Personal Characteristics* are age, gender, education, civil status, children, employment and income. All these variables may influence the possibility to enjoy life from a personal perspective.

Functionings are measured by the *Time dedicated to childcare* for the capability *Children* (having children), and by the *Time dedicated to sleep* as a generic functioning in the domain. Recently, the literature on self-reported wellbeing has found that time dedicated to sleep affects perceptions of QoL as a whole (Krueger et al., 2009). *Environmental Amenities* are represented by the presence of public green spaces and blue amenities as capabilities. The associated functionings relate to the actual frequency of use. The presence of *green space* is not measured in terms of the general quantity of parkland available in the city, but rather in terms of the accessibility of the *green space* within a 15-minute walking distance. This measure is used as a proxy of the capability to enjoy

green space. It must be noted that the chosen distance is merely representative and depends on the size of the town being analysed. As such, it could be easily transformed into metro distance, bus distance, or even an increased walking distance. As our case is represented by a small town with very limited public transport walking distance seemed the most representative. Furthermore, the presence of blue amenities is used as a proxy for capabilities/accessibility because the underlying assumption is that living in a neighbourhood with blue amenities should improve QOL. *Amenities* measure accessibility to local services such as local education, health services and public transport. The selected capability for *Local Education* is *School*, for *Health Services* is *Pharmacy* and for *Public Transport* is *Transport* (Blomquist et al., 1988; Gyourko and Tracy, 1991, European Union, 2013). Among the functionings, we measure the *Use of public transportation*. In the *Disamenities* domain, capabilities are represented by the disamenities — *Crime* and *dirtiness of the street* that are commonly used as indicators of disamenities in studies on QoL (Roback, 1982; Lambiri et al. 2007; European Union, 2013) — that measure the capability to move and live in a safe and easy way within the area in which the respondents reside. *Social Interactions* (Sirgy and Cornwell, 2002; Dolan et al. 2008) are measured by opportunities such as having friends and the related functioning is the *Time dedicated* to them and the *Time dedicated to recreate (recreation)*. It is worth noting that the indicators of time use are classified as functionings, because they refer to the activities in which individuals actually are engaged, often during the day. Specifically, sleeping and childcare measure home activities while time dedicated to friends, to gardening or leisure are examples of outside activities.

Table 1. Quality of life domains and indicators of capabilities and functionings

<i>Domains</i>	<i>Indicators of Capabilities</i>	<i>Indicators of Functionings</i>
Personal characteristics	Age Gender Education Civil status Children Employment Income	Time dedicated to childcare Time dedicated to sleep
Environmental Amenities	Green amenities Blue amenities	Frequency of use
Amenities	Local education Health services Public transportation	Use of public transportation
Disamenities	Dirtiness Crime	
Social Interactions	Having friends Recreational activities	Time dedicated to social relationships such as friends and to recreational activities

Following Table 1, the empirical model is specified as follows:

$$\begin{aligned}
UQoL_i = & \beta_1 Age_i + \beta_2 Age^2_i + \beta_3 Male_i + \beta_4 Married_i + \beta_5 Divorced_i + \beta_6 Widowed_i + \beta_7 Upper\ Secondary_i + \\
& \beta_8 University_i + \beta_9 1\ Child_i + \beta_{10} 2\ Children_i + \beta_{11} 3\ or\ more\ Children_i + \beta_{12} Childcare_i + \beta_{13} Income_i + \\
& \beta_{14} Employed_i + \beta_{15} Sleeping_i + \beta_{16} Green\ amenities_i + \beta_{17} Blue\ amenities_i + \beta_{18} Green\ zero_i + \\
& \beta_{19} Green\ once_i + \beta_{20} Blue\ once_i + \beta_{21} Public\ transport_i + \beta_{22} School_i + \beta_{23} Pharmacy_i + \\
& \beta_{24} Use\ public\ transport_i + \beta_{25} Crime_i + \beta_{26} Dirty\ streets_i + \beta_{27} Friends\ zero_i + \beta_{28} Friends\ once_i + \\
& \beta_{29} Recreation_i + \beta_{30} Gardening_i + \varepsilon_i
\end{aligned} \tag{5}$$

A complete description of the variables used is shown in Table A in the Appendix.

5. The survey, the case study and the descriptive statistics

Empirical data on the residents' perceptions of quality of life (QOL) are gathered via face-to-face structured interviews held in November and December of 2013 in Alghero located in the region of Sardinia (Italy). The survey consists of 41 questions that are organized into three blocks. The first section is a sequence of questions about the socio-demographic and economic characteristics of the respondent; the second section collects information regarding services, leisure activities, and means of transport within the town, such as car, public transport, bike, motorbike, etc.; the third section is comprised of specific questions about the income and employment of the respondent and a set of questions about quality of life.

As in previous works, the questionnaire asks the respondents to rank their degree of satisfaction with their life in the city (i.e., “How satisfied are you with the quality of life in the city in which you live?”). A five-point Likert scale (0 to 4) is used. The response options are as follows: 0 = not at all satisfied, 1 = not very satisfied, 2 = do not know, 3 = quite satisfied and 4 = very satisfied.

The town of Alghero is located on the northwest coast of Sardinia, Italy, one of the largest islands in the Mediterranean Sea. Alghero has approximately 44,000 inhabitants, and its economy relies on services, agriculture, construction, manufacturing, and satellite activities associated with the tourism sector. To capture heterogeneous demographic features and to take into account differences within the town, respondents were selected using a random quota sampling procedure. Based upon official data provided by the National Institute of Statistics (Istat) on the website (1 January 2012) <http://demo.istat.it/pop2012/index.html>, the population was segmented by first dividing by gender and age groups. The age groups identified are: 18-30 years, 31-45 years, 46-65 years and over 65 years. Based on the proportion of residents in these classes divided by gender, a minimum number of 500 participants is set as a target, having taken into account a confidence interval of 95% and an error of $\pm 3\%$. Afterwards, the targeted sample was stratified by areas. Based on the number of residents in each of the 14 areas in Alghero, a representative percentage (3%) of the above age groups (by gender) was selected as objective. The questionnaire has been administered by trained interviewers in public offices, cafes, streets and other open spaces. A total of 508 interviews were successfully collected. Of the 508 respondents, 50.6% are female.

The majority of the respondents have a high school education, are married, and earn a yearly income equal to or below 15,000€ (Table 2).

Table 2. Characteristics of the sample of respondents

Gender		Civil status	
Female	50.6%	Single	28.35%
Male	49.4%	married	53.15%
Age		Cohabiting	5.31%
Mean	49.7	Separate/Divorced	5.91%
Min	18	Widowed	5.91%
Max	85	No answer	1.38%
Education		Income	
No title	0.2%	≤15,000 €	57.45%
Primary school	8.27%	15,001-28,000 €	32.39%
Lower Secondary school	32.28%	28,001-55,000 €	8.98%
Upper school	42.52%	55,001-75,000 €	0.71%
University Degree	14.17%	>75,000 €	0.47%
Second Degree – Higher education	2.56%		
QOL Perception			
Not at all satisfied	7.87 %		
Not very satisfied	21.06 %		
Not know	4.72 %		
Quite satisfied	52.36 %		
Very satisfied	13.98 %		

As anticipated before, the specific question regarding QOL asks respondents to indicate their degree of satisfaction with their life in the city. Table 2 indicates that the majority of the respondents are quite satisfied with the quality of life in Alghero.

Table 3 shows the descriptive relationship between the perception of QOL and the indicators of capabilities and functionings. It is noted that amenities, such as the presence of green space within 15 minutes walking distance are positively linked to QOL, while disamenities such as crime and Dirty streets are negatively linked to QOL.

Table 3. Quality of Life Perception and the presence of amenities

QOL perception	Green			Crime			Dirty streets		
	mean	sd	<i>corr</i>	mean	sd	<i>corr</i>	mean	sd	<i>corr</i>
not at all satisfied	0.68	0.47	-0.14	2.20	1.24	0.05	3.85	1.35	0.15
not very satisfied	0.76	0.43	-0.15	2.50	1.41	0.26	3.83	1.21	0.17
not know	0.58	0.50	-0.24	1.92	1.32	-0.08	3.13	1.39	-0.18
quite satisfied	0.77	0.42	-0.04	1.95	1.03	-0.06	3.52	1.30	-0.08
very satisfied	0.85	0.36	0.17	1.62	0.88	-0.26	3.34	1.58	-0.08

Another important aspect that affects QOL is the use of time. Specifically, we ask how much time respondents devote to certain activities, namely childcare, gardening, sleeping, and recreational activities.

6. The empirical strategy

As highlighted in the previous section, our dependent variable is the five-point Likert scale used to assess residents' opinions regarding their degree of satisfaction with the QOL.

Treating the ordinal nature of the dependent variable and the difference between the levels as rankings, an ordered logit model is implemented. Accordingly, the model consists of the following latent regression:

$$\begin{aligned}
 Y^* &= \beta_0 + \beta_1 X_1 + \varepsilon & (6) \\
 Y &= 0 \text{ if } Y^* \leq 0 \\
 Y &= 1 \text{ if } 0 < Y^* \leq \mu_1 \\
 Y &= 2 \text{ if } \mu_1 < Y^* \leq \mu_2 \\
 Y &= 3 \text{ if } \mu_2 < Y^* \leq \mu_3 \\
 Y &= 4 \text{ if } \mu_3 < Y^* \leq \mu_4
 \end{aligned}$$

where Y^* is not observable and Y are the observed values, or indicators, that have a censoring specification. The μ_i are the unknown parameters that are to be estimated together with β .

The ordered logit specification assumes that the coefficients that express the relationship between the lowest indicator versus all higher indicators of the dependent variable are the same as those that describe the relationship between the next lowest category and all higher categories, and so on. In

other words, because it is assumed that the relationship between all pairs of groups is the same, a sole set of coefficients is estimated. Under this condition, the parallel regression holds.

However, it is also possible that different regressions must be estimated to explain the relationship between each pair of outcome groups. In this case a generalized ordered logit (*gologit*) regression must be implemented (Williams, 2006). The output of the *gologit* regression can be transformed and interpreted as an odds ratio that is commonly reported as an exponentiated coefficient ($\exp(\beta)$). Specifically, an odds ratio greater than one is associated with positive estimated parameters and indicates a higher probability that the respondent is in a higher category of *Y*. On the contrary, an odds ratio less than one is associated with negative estimated parameters and indicates that higher values on the explanatory variable increase the chance of being in a lower category.

7. The results

Table 4 reports the results of the regression analysis. As the table shows, among the personal characteristics domain, variables such as *Age* and *Age*² are statistically significant and negatively (*Age*) and positively (*Age*²) correlated with the perception of QOL. As already found in the literature, these results confirm the U-shaped relationship between life satisfaction and age (Alesina et al., 2004; Dolan et al., 2008). *Male* individuals in Alghero report a positive perception of QOL, it worth noting that the literature has found mixed results (Alesina et al. 2004; Anand and Van Hees, 2005; Mohan and Twigg, 2007).

Among the education variables, *University* displays a positive and significant coefficient, meaning that individuals with a higher education show a higher probability to be more satisfied respect to those with lower levels of education (odds 2.438). In line with previous findings, having one or more children does not affect the perception of QOL (Mohan and Twigg, 2007; Dolan and Metcalfe, 2012). The variable *Income* is positive and significant: individuals with higher income levels show a higher probability to be more satisfied with respect to those with lower levels (odds

1.648). This positive relationship in cross-sectional analyses has been well reported in the literature (Dolan et al., 2008). Furthermore, employed people have a higher probability to be more satisfied than the unemployed (odds 1.739). Moreover, the present study finds that the relate functionings of this domain reveal that is not simply having children that affect the QOL, but rather the time dedicated to them (*Childcare*) as well as the time dedicated to sleep (*Sleeping*). On a similar line, Anand et al. (2011), measuring the relationship between happiness and capabilities a negative impact shortage of sleep.

Among the environmental amenities domain, *Blue amenities* are statistically significant and exhibit the expected sign. Their presence have a positive effect on QOL perception such that for a one unit increase in blue space within a 15-minute walk from the resident's home, the odds of high satisfaction with respect to the combined middle and low categories is 12.68 greater. The statistical significance and signs are then in line with the literature. Indeed, Rosu et al. (2015) found that environmental amenities are strongly correlated with the perception of QOL mainly in touristic cities located in the Mediterranean Sea and in Central and Western Europe. Furthermore controlling also for the relate functioning we find that having green space but do not have the possibility to enjoy it (*Green zero*) decreases the probability of reporting high satisfaction (odds 0.439).

The *Amenities* domain considers the provision of basic local services available in the local area. The positive and statistically significant coefficient of the variable *School* implies that residents report high satisfaction when educational facilities are easily reachable from their place of residence. This result is in line with Brambilla et al. (2013), who in extending the standard hedonic approach conclude that uneven accessibility to amenities is detrimental for QOL.

In line with QOL literature (Roback, 1982; Lambiri et al. 2007), among *Disamenities*, the variable *Crime* reports a negative and statistically significant coefficient meaning that the perceived crime rate in the area negatively affects satisfaction.

Finally, *Social Interactions* especially with friends are found to be very important to improve QOL. Results confirm what postulated in the theoretical setting that it is not simply the quantity of friends that matters but rather having contact with them at least once a week (*Friend once*), this increases the probability of high satisfaction (odds 1.583), while not having contact decreases the probability (odds 0.126). The importance of social interactions with friends has been highlighted by many studies on happiness and life satisfaction as indicated by Dolan et al. (2008) that offer a useful and comprehensive literature review on the findings of this strand of studies; and by Sirgy and Cornwell (2002) studying neighbourhood life satisfaction in a variety of communities located in southwest Virginia.

Table 4. QOL ordered logistic regression

	Capability		Functionings	
	β	Odds	β	Odds
<i>Personal Characteristics</i>				
Age	-0.0986** (0.0453)	0.906** (0.0411)		
Age2	0.00152*** (0.000445)	1.002*** (0.000446)		
Gender	0.641*** (0.221)	1.898*** (0.419)		
Married	0.144 (0.351)	1.154 (0.405)		
Divorced/Separated	-0.270 (0.528)	0.763 (0.403)		
Widowed	0.0583 (0.516)	1.060 (0.547)		
Upper secondary	0.101 (0.235)	1.106 (0.260)		
University	0.891*** (0.319)	2.438*** (0.777)		
1 Child	-0.424 (0.419)	0.655 (0.274)		
2 Children	-0.364 (0.408)	0.695 (0.284)		
3 or more Children	-0.272 (0.464)	0.762 (0.353)		
Childcare			0.00158*** (0.000584)	1.002*** (0.000585)
Income	0.500*** (0.155)	1.648*** (0.256)		
Employed	0.553** (0.245)	1.739** (0.427)		
Sleeping			0.00358*** (0.00121)	1.004*** (0.00121)
<i>Environmental Amenities</i>				
Green amenities	0.142 (0.266)	1.153 (0.306)		
Blue amenities	2.540** (1.075)	12.68** (13.63)		

Green zero			-0.824**	0.439**
			(0.325)	(0.142)
Green once			0.172	1.188
			(0.235)	(0.279)
Blue zero§			-	-
Blue once			-0.749	0.473
			(1.366)	(0.646)
<i>Amenities</i>				
Public transport	0.0690	1.071		
	(0.0834)	(0.0893)		
School	0.224**	1.252**		
	(0.114)	(0.143)		
Pharmacy	0.140	1.151		
	(0.152)	(0.175)		
Use of public transport			0.571	1.770
			(0.512)	(0.906)
<i>Disamenities</i>				
Crime	-0.279***	0.757***		
	(0.0907)	(0.0687)		
Dirty streets	-0.0333	0.967		
	(0.0851)	(0.0823)		
<i>Social Interactions</i>				
Friends zero			-2.072**	0.126**
			(0.829)	(0.104)
Friends once			0.459*	1.583*
			(0.254)	(0.401)
Recreation			-0.00162*	0.998*
			(0.000941)	(0.000940)
Gardening			0.00130	1.001
			(0.00177)	(0.00177)
N		417		
Aic		987.8		
Bic		1125.0		

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

§ dropped because of multicollinearity

8. Conclusions

The mainstream approach to QOL performs empirical modelling with objective indicators. Some works follow a more subjective method by using perception surveys. The common denominator of these approaches is that they measure the total quantity of items and disregard the possibilities/accessibilities people may have to reach them. Furthermore, they do not consider -or barely consider- the allocation of time and the importance of social interactions. Overall, this paper provides an original approach to investigate QOL by linking together the literature on capabilities, quality of life, life satisfaction, happiness and time use. This approach can be useful for the evaluation of several aspects concerning the quality of life in cities. The present paper represents an experimental study where the main purpose is to offer a way to operationalize the theoretical

concept of capabilities and functionings in empirical models on quality of life. It aims to point out that the perception of quality of life is highly dependent on the choices people can actually make in cities. These choices are strictly connected with accessibilities to services, individual allocation of time and also on the social interactions people can really enjoy.

Operationally, the work investigates the perception of QOL for a sample of residents of a coastal town in Italy. The choice of the city is purely of convenience. A shortcoming might be that findings could be driven by the chosen case study. Moreover, the list of the items to consider in the evaluation of QOL for each domain is much wider and could change according to the type of city under analysis. As far as the present experiment is concerned, it is worth noting that, the main contribution has been the operationalization of capability and functioning in the analysis of quality of life in cities. At this regard the case study, and also the included amenities, merely represents an example of application. However, in spite of these issues, many of the obtained results are consistent with previous applications to different types of cities. Indeed, findings suggest that the perception of life have a U-shaped relationship with age, a positive relationship with gender (for male individual), income, education, and with the presence of natural amenities and schools. Conversely, the presence of crime has a negative impact. However, the main finding of the paper regards the role of accessibility. It does matter for the perception of residents' quality of life in cities as well as social interactions.

In general, the results of this exercise suggest the need for extending the empirical analysis of quality of life by using a more comprehensive approach and type of variables (i.e. considering time use, accessibilities to services/amenities and social interactions). It would be interesting to replicate this work in different contexts to see whether the role of each domain changes according to the features of cities. Indeed, Rosu et al. (2015) remark that spatial contexts play a key role on the general perception of QOL given that it is highly dependent on the local setting. Likewise, our findings imply that, other than specific features, the QOL examination should also take into account

how amenities, disamenities, services etc are evenly distributed and accessible. Moreover, a further development of the present work might analyse the influence of the institutional environment on time use and QOL perception.

From an policy perspective, it means that first local governments should create opportunities for heterogeneous individuals to meet human needs strictly related to their lives within their neighbourhood; and second, that simply to measure local quality of life disregarding accessibility and/or frequency of use of amenities and time use may yield misleading information on the quality of life in terms of real capabilities for all residents. The aim of the policy makers should be improving the empowerment of people to enjoy life. The present approach must be useful at a local level to understand which domain represents a weakness that requires effort and investments.

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Appendix

Table A. Variables Description

Variable	Description
<i>Dependent Variable</i>	
QOL	Discrete var. The response options are: 0 = not at all satisfied, 1 = not very satisfied, 2 = not know, 3 = quite satisfied and 4 = very satisfied.
<i>Personal Characteristics</i>	
Age	Continuous var. that accounts for age of respondent.
Age ²	The square of Age.
Male	Dichotomous var. that takes the value one if male; zero otherwise.
Married	Dichotomous var. that takes the value one if the respondent is married; zero otherwise.
Divorced/Separated	Dichotomous var. that takes the value one if the respondent is separated or divorced; zero otherwise
Widowed	Dichotomous var. that takes the value one if the respondent is widow; zero otherwise
Upper secondary	Dichotomous var. that takes the value one if the respondent has an upper secondary education; zero otherwise. It corresponds to the Italian diploma.
University	Dichotomous var. that takes the value one if the respondent has a first or secondary degree; zero otherwise. It corresponds to the Italian laurea or post-lauream.
1 Child	Dichotomous var. that takes the value one if the respondent has one child; zero otherwise.
2 Children	Dichotomous var. that takes the value one if the respondent has two children; zero otherwise
3 or more Children	Dichotomous var. that takes the value one if the respondent has three or more children child; zero otherwise
Childcare	Continuous var. that takes into account the time (in minutes) that the respondent devotes to childcare in a day.
Income	Discrete var. The response options are: 1= up to 15,000€, 2=15,001-28,000€, 3=28,001-55,000€, 4=55,001-75,000€, 5=over 75,000€
Employed	Dichotomous var. that takes the value one if the respondent works at the moment of the interview; zero otherwise.
Sleeping	Continuous var. that takes into account the time (in minutes) that the respondent devotes to sleep in a day.
<i>Environmental Amenities</i>	
Green amenities	Dichotomous var. that takes the value one if the respondent lives less than a 15 minute walk from a green area (parks, gardens, beaches, promenades, etc); zero otherwise.
Blue amenities	Dichotomous var. that takes the value one if the respondent lives in an area of Alghero 15 minute walk from the sea; zero otherwise.
Green zero	Dichotomous variable that takes the value one if the respondent does not enjoy green areas; zero otherwise.
Green once	Dichotomous var. that takes the value one if the respondent enjoys green areas at least once a week; zero otherwise.
Blue zero	Dichotomous variable that takes the value one if the respondent does not enjoy blue amenities; zero otherwise.
Blue once	Dichotomous var. that takes the value one if the respondent enjoys blue amenities at least once a week; zero otherwise.
<i>Amenities (Local Services)</i>	
Public transport	Discrete variable regarding the accessibility to public transportation. The response options are: 1=no difficulties, 2=low difficulties, 3=not know, 4=medium difficulties, 5=high difficulties.
School	Discrete variable regarding the accessibility to schools. The response options are: 1=no difficulties, 2=low difficulties, 3=not know, 4=medium difficulties, 5=high difficulties.
Pharmacy	Discrete variable regarding the accessibility to pharmacy. The response options are: 1=no difficulties, 2=low difficulties, 3=not know, 4=medium difficulties, 5=high difficulties.
Use of public transport	Dichotomous var. that takes the value one if the respondent uses public transport; zero otherwise.
<i>Disamenities</i>	
Crime	Discrete var. The response options are: 1=no risk, 2=low risk of crime, 3=not know, 4=medium risk of crime, 5=high risk of crime.
Dirty streets	Discrete variable. The response options are: 1=no Dirty streets, 2=low Dirty streets, 3=not know, 4=medium Dirty streets, 5=high Dirty streets.
<i>Social Interactions</i>	
Friends zero	Dichotomous var. that takes the value one if the respondent does not see friends; zero otherwise.
Friends once	Dichotomous var. that takes the value one if the respondent sees friends at least once a week; zero otherwise.
Gardening	Continuous var. that takes into account the time (in minutes) that the respondent devotes to gardening in a day.
Recreation	Continuous var. that takes into account the time (in minutes) that the respondent devotes to recreational activities in a day.

