Before Entering Adulthood: Developing an Index of Capabilities for Young Adults in Bogota

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Abstract

QoL studies conceptualise urban well-being as a multidimensional process that is influenced by personal and environmental factors. A much less explored field in QoL has to do with the notion of capabilities and functionings as measurements to evaluate the level of quality of life that people experience in cities. By investigating the young adults category, this article develops a measurement of QoL based on the normative framework of the Capability Approach (CA) to capture urban domains that affect quality of life in Bogota. This study introduces a quantitative methodology to use secondary aggregated data to build a QoL measurement based on capabilities. A nonlinear categorical principal component analysis was used to explore the underlying factor structure of a calibration sample (n=6,998). Confirmatory Factor Analysis was conducted to validate identified factors, revealing a good fit (SRMR=0.033, CFI=0.910). The result is a Young Adult Capability Index (YACI) that empirically explores the use of capability achievements as a space for evaluating urban QoL in young adults. A multiple linear regression was calculated to predict YACI based on additional variables which are sensitive to inequality for young adults. Results show that capability scores are lower once young adults enter adulthood. Women arrive with better capabilities from childhood and adolescence than men, but rapidly undergo a marked process of decapitalisation of capabilities during their transition to adulthood, suggesting the need for more attention in the elaboration of public policies for this type of population.

Keywords Young adults · Capability approach · Urban quality of life · Bogota

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Introduction

People's well-being is to a significant extent lived in its maximum expression in today's cities. Historically, cities have played a central role as drivers of economic, social and cultural transformation. Within them, opportunities for social progress are available to residents who find in cities a natural space for advancing a better life. At the same time, cities are focal points for social interaction; they are the locus for the exchange of knowledge, culture and goods, they are hubs of regional and global communication and trade, they are the epitome of diversity and economic and social progress. Yet they are also spaces where stark inequalities between the poorest and the richest become clear, places of struggle and demand for improving human rights and dignifying the urban experience.

Within this dualism that the urban world provides, the assessment of urban well-being acquires paramount importance. For urban planners and policymakers, the effects of urban context on people's well-being have generally been approached from a perspective of resources. From this standpoint, the key feature of flourishing within the city is based on the quantity of urban inputs and outputs provided, rather than what people are actually able to do and be, in and with the city (Blečić et al., 2013). Quality of life studies have operationalised a battery of objective and subjective indicators which have employed a rather utilitarian normative direction that has precluded the assessment of alternative informational spaces of human advantage, as well as glossing over substantial interpersonal variations on how people convert urban resources into achievements.

Indeed, cities are not homogeneous units where the effects of quality of life can be placed equally across all type of urbanites. From a demographic perspective, urban quality of life in cities tends to be unequal if different gender and age groups are taken into account. Diverse outcomes in quality of life between individuals contradict the advantages that living in urban agglomerations are supposed to offer, such as differentials in access to health services, education, mobility, labour markets, water and sanitation, among other aspects. Urban poverty and inequality tend to have negative effects on vulnerable people, which are disproportionately felt by young people and women.

This paper is concerned with this latter aspect. The paper looks at the case of young adults (ages ranging from 18 to 28 years) in Bogota as a segment of the population for whom urban poverty has direct effects on their life trajectories. The research aim is to develop a measure of quality of life that can incorporate urban attributes to the domains of quality of life in a particular age group. This measure will be based on the normative framework of the Capability Approach (CA) as an alternative normative perspective to resource-based approaches to well-being that prevail in urban public policy.

The article is organised as follows. T following section introduces the Capability Approach as an emancipatory framework to assess urban quality of life from a perspective of opportunities and freedom. It explains why a measure of urban well-being is timely to understand current pressures that affect young adults' trajectories to adulthood. The data section explains the participatory methodology used to identify young adults' relevant capabilities as well as demonstrating how domains of quality of life were recovered from aggregated secondary data. The next section describes the methods used to construct. The Capability Index for Young Adults (YACI) and presents descriptive results from its application. The final section provides a discussion of major findings and general trends identified with a view to informing policymakers with regards to improving levels of urban QoL for young adults in Bogota.

Urban Quality of Life as an Expansion of Capabilities

The concept of QoL has been used to understand and model different aspects of people's lives. Both the importance of cities today and the impact that they have on how people live have proved alluring to QoL studies which have grown in number aiming to evaluate and model different aspects of urban life (Marans and Stimson 2011). Traditionally, urban planners and policymakers have conceptualised and operationalised quality of life as the degree of satisfaction that individuals, households and firms "receive from surrounding human and physical conditions" (Mulligan et al. 2004a, b, p. 729). A good example of this is, for instance, is the increasing number of rankings that attempt to assess the degree of liveability that certain cities provide for residents.

From a broader perspective, QoL studies conceptualise well-being as a multidimensional process that is influenced by personal and environmental factors (Schalock et al. 2007, p. 6). Common domains used in urban QoL studies are based on objective and subjective domains where physical, social and emotional components are assessed (Halvorsrud and Kalfoss 2007).

In terms of approaches to urban evaluation, urban QoL measurements have been dominated by the liberal and utilitarian perspectives of well-being. In the former, people flourish according to the level of resources they are able to command (monetary and non-monetary assets), a rather Rawlsian approach to the built environment where the provision of resources will rebalance uneven geographies. In the latter, quality of life is a function of subjective utility, where happiness or life satisfaction parameters are the common unit of evaluation (Robeyns and Der Veen 2007). In both streams of research, approaches used to investigate urban QoL clearly rely on the role that urban infrastructure and amenities play in shaping urban life, where conceptualisations and methodologies are drawn mainly from economics, giving little space for other disciplines to provide alternative perspectives (Mulligan et al. 2004b).

A much less explored field in urban QoL studies has to do with the notion of capabilities and functionings as measurements to evaluate the level of quality of life that people experience. The notions of capabilities and functionings are part of the conceptual framework of the CA, which defines well-being as the "freedom people have to enjoy valuable activities and states" (Alkire 2016). The CA, pioneered by Amartya Sen (1979), stipulates that neither resources nor happiness are satisfactory spaces on their own to evaluate QoL. In the case of the liberal perspective of QoL, not all resources are intrinsically valuable, rather they are instrumental to achieve other goals. From this perspective, quality of life should be conceptualised not as the presence or absence of resources but by what these resources enable people to achieve (Sen 1985). The concept of capabilities is relevant in discussing domains of urban quality of life as it enables the expansion of the informational space of evaluation, from the mere existence of urban amenities to aspects such as how distribution of resources are made or to ask "what they do to people's lives" (Nussbaum and Sen 1993).

The operationalisation of the CA requires that individual quality of life should be assessed by looking at functionings and capabilities, rather than focusing on the provision of resources or the utility achieved. Functionings refer to the various doings and beings that people intrinsically value and have reasons to pursue (effective realisations), while capabilities are related to the various combinations of functionings that people effectively can achieve (Sen 1992, 2005). By using the CA for investigating

how people achieve a better urban QoL, current evaluative frameworks of urban policy can be improved as the attention will move towards the effective capabilities people are able to achieve in urban contexts. As part of this discussion, Blečić et al. (2013) have coined the term "countability approach" to refer to these kinds of evaluative approaches in opposition to the "capability approach", which emphasises the effective abilities people have to promote or achieve valued goals.

The operationalisation of how urban QoL can be modelled by using functionings and capabilities is clearly one of the main challenges that researchers face in order to apply the framework empirically (Comim 2001). A recurrent alternative to operationalising the CA is based on the application of a bottom-up perspective where individuals directly identify those aspects that contribute to achieving a good quality of life. In the context of urban QoL, a bottom-up perspective would involve a direct consultation with stakeholders on those aspects that are decisive for achieving a good quality of life in urban environments.

Why Focus on Young Adults?

The measurement of young adults' urban QoL arises from the need to better understand the problems they face during their transition to adulthood. It has become increasingly evident that young adults' difficulties tend to be symptomatic of fundamental problems that occur within cities. Despite this, the young adult category has not been directly scrutinised by normative frameworks of well-being. During emergent adulthood, young adults exercise their identity to its fullest extent, where social, economic and cultural dynamics will play a fundamental role in the way they will capitalise the endowment of capabilities previously acquired in earlier developmental stages. Their status as unique individuals, which emerges when their needs and outlook on life are not easily classified by either adolescence or adulthood, as well as the social and economic challenges that surround their future, suggest the importance of understanding with greater depth which determinates are shaping young adults' well-being.

From a perspective of social gains, young adults are powerful agents for inducing change into societies. Their skills, motivation, resilience and interdependence behaviours are essential for societies to thrive and grow. Young adults face transitions in different behavioural domains, such as those related to the labour market, educational aspirations and family and relational life. These domains are often subject to rapid changes, whose effects contribute to an environment of uncertainty and instability for young adults.

Today, the situation of young adults is of particular concern. In terms of equal opportunities and open options, disadvantaged young adults are often deprived in their access to quality social services, such as health, education and employment, which ultimately restricts their independence and self-determination. According to the United Nations Economic Commission for Latin America and the Caribbean (ECLAC), within urban areas, one in three young people is poor, where deficient access to secondary education, poor mechanisms for social mobility and high levels of violence and discrimination contribute to worsening their life expectations (Trucco and Ullmann 2015).

In the case of Bogota, the young adult population group tends to suffer constraints in labour markets most dramatically, with the shortfall in formal labour opportunities disproportionately affecting them. According to the National Administrative

Department of Statistics (DANE 2018), an estimated 42% of the young working population is unemployed. From this total, 40% are young adults. The category of NEET (Not in Education, Employment, or Training) is more common among young adults, where lower school attendance rates and informal labour markets are present. Deprived young adults are more likely to be located in marginalised urban neighbourhoods where criminality is rampant and the likelihood of joining gangs or illegal armed groups is higher. Additional constraints associated with access to housing markets, social discrimination and lack of social protection obstruct their path to adulthood and many of them describe their living conditions as worse than those of their parents at a similar age.

From the perspective of youth studies, urban QoL studies and the CA have not worked together systematically on the age category of young adults. QoL studies have often involved specific demographic populations or vulnerable groups. These studies have used age-specific instruments for children (Landgfuf and Abetz 1997; Savahl et al. 2017) and adolescents (Apajasalo et al. 1996; Patrick et al. 2002; Salum et al. 2012). Despite this cumulative research, QoL studies on young adults have been much less common. Within the CA the situation is quite similar. Researchers have devoted extensive work to linking concepts of opportunities, agency and freedom to the field of child and adolescent development (Biggeri et al. 2006; Tommaso 2006; Crivello et al. 2008; Biggeri and Anich 2009; Wright 2012; Peleg 2013; Underwood et al. 2015), but empirical research on young adults is uncommon.

Materials and Data

Identifying Relevant Young Adults' Capabilities and Functionings

Having discussed the need for a measure of QoL to better understand the state of domains of well-being for young adults living in urban contexts, this section focuses on the operationalisation of the measure. The first task was to identify relevant capabilities and functionings among young adults living in the context of urban deprivation in Bogota. The identification of functionings and capabilities followed a process of public scrutiny and open debate where young adults directly conceptualised domains of human advantage based on an exercise of ordering and synthesising data from a qualitative perspective.

The methodology proposed for identifying the relevant capabilities for young adults has four main stages (Fig. 1) and was based on Robeyns' (2003, 2005) five criteria to identify basic capabilities[1]. The first stage consisted of creating an open list of relevant capabilities based on young adults' inputs using focus group discussions. The exercise

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[1] The five criteria are: (i) *explicit formulation*: have an explicit, discussed and defended list of relevant capabilities; (ii) *methodological justification*: justify the methodology that has been used to generate the list of relevant capabilities; (iii) *sensitive to context*: the identified list should seek to be both abstract and practical in order to satisfy different audiences; (iv) *different levels of generality*: identify relevant capabilities that are not only comprehensive of ideal domains of quality of life but that are also feasibly achievable; and (v) *exhaustion and non-reduction*: the list of relevant capabilities should include all dimensions that are important to well-being. Equally important under this criterion is that no dimensions identified should be reducible to other elements. By using Robeyns' criteria, the selection of domains of quality life attempts to reduce possible bias.
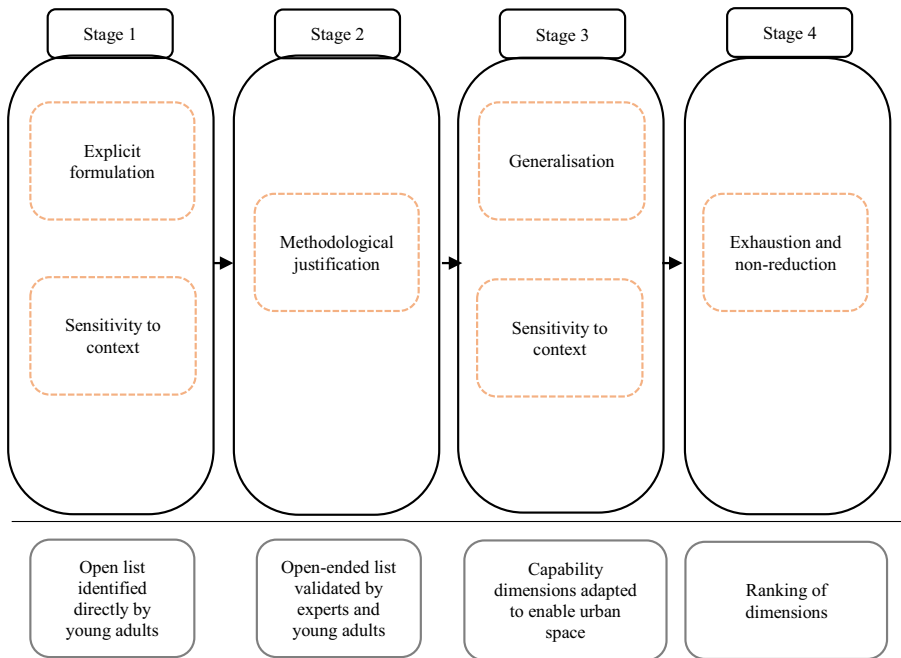
Fig. 1 Methodology sequence to identify relevant functionings and capabilities

prioritised the identification of capabilities directly with young adults instead of generating an open list of capabilities based on specialised literature or expert comments.[2]

The second stage consisted of validating the identified capabilities. This process contrasted the identified list with existing data or conventions of capabilities as well as assumptions based on expert experience (Alkire 2007). The third stage dealt with linking identified domains with the urban context. Participants were asked to select those capabilities from the identified dimensions that might be affected, positively or negatively, by the urban context. After conducting these three stages, all categories identified by the Focus Group Discussions (FGD) and interviews were grouped and listed in a total of 20 dimensions of quality of life for young people (see Table 1).

The fourth and final stage consisted of critically assessing identified domains and leaving only those that are considered relevant and important. In this stage, a process of exhaustion and non-reduction was applied through a process of assigning weights to each domain. During the FGDs, each young adult respondent was asked to prioritise the dimension of quality of life from the most important to the least important domain. Differential rankings between urban settings allowed the identification of those domains that are more sensitive to the urban context of Bogota. At this stage, 15 dimensions of quality of life were identified. Each dimension was grouped together with the relevant capabilities also identified and classified by young adults during the FGD. The outcome of this exercise is reported in Appendix 1.

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[2] This will ensure that the identification of capabilities will be not biased from expert opinion that can extrapolate young adults' priorities from categories previously identified for other age ranges.

Table 1 Domains of urban quality of life for young adults in Bogota

Domains of quality of life (not ranked)	
Tolerance	Ability to dream
Political participation	Shelter/housing
Security	Family and friendship
Leisure time	Education
Support	Ability to consume
Public space and mobility	Environment
Health	Culture
Food security	Success
Feel free to choose	Creativity and production of ideas
Work	Inclusion

FGDs

Data

Based on the final list of domains identified by young adults, secondary data were used to measure proxies for functionings and capabilities. These domains were used to analyse the results of random sample surveys with the intention of providing statistically representative findings for the entire young adult population of Bogota in terms of capability performance.

Population characteristics of young adults were obtained from the J14 Survey which is part of the 2014 District Youth Study. In this study, the survey was conducted in 19 out of 20 urban localities in Bogota, leaving out those localities that did not have an urban characterisation. The J14 survey constitutes the most recent data available with relation to socioeconomic characteristics of the young adult population in Bogota and was designed with a rights-based approach in mind. Table 2 presents a summary of the descriptive statistics from the J14.

The survey is part of the initiative by the Secretary of Social Integration, the District Institute for the Protection of Children and Youth (IDIPRON), and the Observatory of Cultures in Bogota to assess how young people in the city effectively exercise their rights. The survey was carried out under the administration of the Mayor of Bogota, Gustavo Petro during his 2012-2016 administration. The survey applied a stratified two-stage sample design to 10,939 young people aged from 14 to 28 years, during August to September 2014. The stratified sample used the same system of socioeconomic classification of strata used to classify buildings in the city. The sampling frame is made up from the cartographic inventory and the list of houses at block level. This framework is associated with a cadastral code (Codigo Homologado para Informacion Predial) that identifies every property in the city.

The survey collected data from Bogota's young adult population, making it the only focused survey that targets this population. Data from people between 18 and 28 years (young adult population) were retained from the dataset,

Table 2 Descriptive statistics J14 survey

Variable	Categories	Number (percentage)					
		1	2	3	4	5	6
Stratum	4: (1) Lower-low, (2) Low, (3) Lower middle, (4) Middle, (5) Middle high, (6) High	557 (7.18)	2,599 (33.52)	**2,723 (35.12)**	1,706 (22.00)	152 (1.96)	17 (0.22)
Gender	2: (1) Male, (2) Female	**3,937 (50.77)**	3,801 (49.02)				
Age	3: (1) 18 to <21 years, (2) 21 to <24 years, (3) 24 to 28 years	2,533 (32.66)	**2,913 (37.56)**	2,308 (29,76)			
Marital status	6: (1) Married, (2) Divorced, (3) Widowed, (4) Single, (5) domestic partner >2 years, (6) domestic partner <2 years	447 (5.76)	89 (1.15)	16 (0.21)	**5,561 (71.72)**	1,075 (13.86)	400 (5.16)
Ethnicity	7: (1) Black or African Colombian, (2) Roma, (3) White, (4) Indigenous, (5) Mestizo, (6) Raizal.	400 (5.34)	20 (0.27)	2,050 (27.36)	103 (1.37)	**3,470 (46.31)**	37 (0.49)
Second language	2: (1) No, (2) Yes	**6,227 (80.31)**	1,527 (19.69)				
Place of Birth	2: (1) Bogota, (2) Other	**5,558 (71.85)**	2,136 (27.61)				

J14 Survey

deleting 3,185 observations from a total of 10,939 observations.[3] Items from the J14 survey were used to identify the 15 constructs that determine young adults' quality of life. From the total range of dimensions identified in the FGD and ranked in the previous section, no relevant items in the questionnaire were identified for the dimensions of 'feel free to choose', 'environment', 'culture' or 'success'. Therefore, these dimensions were not considered in the analysis. Table 3 shows observable variables from the J14 survey which match dimensions of quality of life identified by young adults and subsequently used to calculate the YACI for this population.

Psychometric Testing for the J14 Survey

A reliability test was conducted to measure the consistency between the observable variables and the constructs the survey attempted to assess. A test of internal consistency was performed using Cronbach's alpha (α) (Clark and Watson 1995) to evaluate consistency among items.

The first level of analysis consisted of testing for reliability α for the entire instrument. The J14 survey measures a set of nine rights of the young population in Bogota (Education, Work, Health, Life, Freedom, Equality, Culture, Participation, and Habitat). Internal consistency of the whole survey was found to be highly reliable (303 items; $\alpha = .93$), which suggests that the scale is unidimensional. At the second level, dimensions of quality of life for young adults identified previously in FGD's and which matched *items* of the J14 survey, were used to assess their reliability. For this level, the reported α was found to be also highly reliable (56 items, $\alpha = 0.78$). At the third level, a new reliability test was conducted after applying a mode imputation to missing data at a threshold of 30%. For this level, internal consistency obtained a moderate alpha (63 items, $\alpha = .68$), which suggests that *items* selected from the J14 survey are suitable for measuring young adult's capabilities based on dimensions found during the FGD.

Methods

Exploratory and Confirmatory Factor Analysis

For the construction of the YACI, a multivariate data reduction technique was put in place to aggregate data following identified dimensions of quality of life in young adults. Observable variables from the J14 questionnaire were used to reduce data to a small number of indices or factors. By carrying out an Exploratory Factor Analysis (EFA), components that account for the maximal amount of explained variance, and that can extract domains of quality of life for young adults using the specification given by the FGD, were identified. The EFA was implemented using factor extraction through Principal Component Analysis (PCA). As an exploratory exercise, the aim was to explore if predefined domains of quality of life could be extracted coherently from the J14 survey, investigating similarities between the explored underlying factor structure (latent constructs) of the survey and the domains identified previously by young adults.

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[3] Data for those aged 14 to 17 were not considered in the analysis.

Table 3 Observable variables from the J14 survey and identified dimensions of Urban QoL for young adults

	Identified domains of Urban Quality of Life for you adults						
	Tolerance	Political Participation	Security	Leisure time	Support	Health	Food security
Items from J14 Survey	Neighbourhood conflict Conflict among young groups of young people Street fights Cooperation Discrimination by way of talking	Political participation Political incidence Active complaints Freedom of expression Equality of participation Leadership at work or at the study site Entrepreneur	Robbery and assault Presence of armed groups Presence of gangs State security Police action Security in the neighbourhood Safety in the city	Enjoyment of public space Sports and artistic activities	Institutional support Family support Neighbourhood Support Support from friends Government support Support from illegal groups Anguish	Discrimination due to illness Discrimination due to permanent limitation or disability Affiliation social security (health) Perception of social security (health)service	Food Freedom Precarious food Discrimination for food practices Meals per day

	Identified domains of Urban Quality of Life for you adults						
	Work	Shelter/Housing	Family and Friendship	Education	Public space and mobility	Inclusion	Work
	Job selection Second language Employment	Equality to have a home State of the facade of the house State of green areas State of sidewalks	Independence to choose occupation Independence to choose sexuality Neighbourhood	Level of studies attained (Secondary) Level of studies attained (Tertiary) Educational quality	Use of public space Auditory quality status State of air that is breathed State of hygiene State of the streets State of the cycle paths	Discrimination on the grounds of: race, gender, sexual orientation, physical or aesthetic appearance,	Job selection Second language Employment

Table 3 (continued)

and footpaths	*Level of studies you want and believe you will achieve (technical)* *Level of studies you want and believe you will achieve (university)* *Level of studies you want and believe you will achieve (postgraduate)*	*urban tribe in young people (customs or cultural practices), spatial discrimination in relation to income, internal displacement condition, pregnancy condition and NEETs*

At this point, correlations between variables will describe relationships, and no causation between variables and constructs is claimed. Based on the high α from the reliability test of the J14 Survey, the administration of the PCA is recommended. The justification for using this data reduction technique was based on the idea that PCA extracts components that are not correlated with each other, which means that they measure unrelated dimensions of the data.

After conducting an exploratory analysis, a confirmatory exercise was conducted based on Structural Equation Modelling (SEM) to examine how well structural coefficients conformed to the theoretical model proposed by the results of the PCA (Jöreskog and Sörbom 1978). Confirmatory Factor Analysis (CFA) was conducted to measure relationships between constructs and latent variables, and path analysis to show relations between variables. The rationale for running a SEM was to determine and validate the urban quality of life constructs identified during the exploratory test – testing the overall theoretical model. SEM is a covariance analysis that tests statistical relationships between latent variables (Yeh et al. 2010). Unlike the PCA, SEM shows the interrelation and covariation between latent variables (the structural model) in addition to the measurement model, which identifies relationships between observed variables and latent constructs (Fig. 2).

SEM is often visualised by path diagrams showing relationships of dependency between latent constructs and observed variables. Paths are direct relationships between variables and can be interpreted as regression coefficients (straight arrows). Covariances are correlations between latent variables and are represented by curved arrows. The measurement model in SEM is a confirmatory exercise while the structural model is the combination of measurement and path dependency relationships (Mcdonald and Ho 2002). The structural model identifies *endogenous* (dependent) and *exogenous* (independent) variables. Independent variables exert an influence on other constructs,
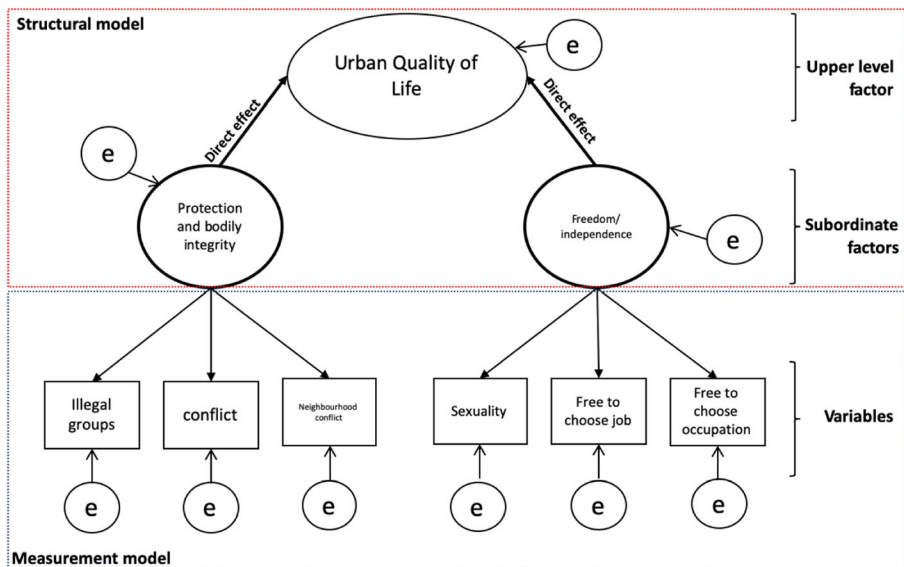

Fig. 2 Structural and measurement model in Structural Equation Modelling

while dependent variables are those constructs that are influenced by exogenous and endogenous variables (Schreiber et al. 2006).

In the example of Fig. 2, the constructs 'Protection and bodily integrity' and 'freedom/independence' are exogenous variables as they have a direct effect on the latent variable of Urban Quality of Life (dependent variable). In addition to SEM, a regression model was tested to predict the YACI based on sociodemographic variables, such as age, gender, location, ethnicity and stratum. Care was taken to not include any of the variables of the aggregated measure as predictors of the regression model. For all the techniques applied, measures of goodness of fit were calculated.

Regression Analysis

It could be the case that differences between levels of capabilities in terms of gender, age and strata are technical artefacts of correlation between other variables that constitute well-being among young adults, and that were not captured by the YACI. A Mann-Whitney U one-way analysis[4] of variance to test differences in medians between the YACI and sociodemographic variables was conducted. The test confirmed that differences in scores between genders, strata, age groups and ethnicities are all statically significant, meaning that the YACI is sensitive to inequalities.

Table 4 shows a general overview of differences for each component of the index in relation to gender, age, race and strata. In univariate analysis, young adults' genders explain differences in terms of security, independence, education and health. For the case of age group, there are significant differences between young adults and older young adults in areas associated with discrimination and leadership. Inequalities associated with strata are significant in almost all components of the index. This shows that those living in lower strata report greater limitations in achieving dimensions of quality of life in Bogota.

**Significant at 1% level; *Significant at 5% level

[a] Mann-Whitney U Test

[b] Kruskal Wallis Test

In order to determine whether significant differences shown in Table 4 are independent, a multiple linear regression was calculated to predict the YACI based on additional variables which are sensitive to inequality for young adults. A reduced form of socioeconomic variables is such that:

$$YACI_i = C_0 + \beta_1\,\alpha_i + \beta_2\,\delta_i + \beta_3\,\theta_i + \beta_4\,\vartheta_i + \beta_5\,\mu_i + \beta_6\,\eta_i + \beta_7\,\zeta_i + \varepsilon \qquad (1)$$

$$i = 1, \ldots, I.$$

where, $YACI$ is the reported quality of life of individual i, α is the gender of the individual, δ is the group age, θ is the socioeconomic strata, ϑ is the ethnicity group, μ is the marital status, η is a dummy variable of speaking more than one language, ζ is the place of birth and ε is the error term of individual i.

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[4] A Kruskall-Wallis test was conducted for independent variables with more than two groups.

Table 4 Differences in terms of gender, age, race and strata for the YACI

	Gender[a]	Age[b]	Ethnicity[b]	Strata[b]
Protection and bodily integrity	-2.87**	6.082*	24.839**	1334.05**
Protection and bodily integrity	-1.033*	91.207**	53.234**	452.183**
Freedom and independence	-3.568**	150.665**	26.613**	156.288**
Occupation	-2.65**	7.242*	4.503	77.341**
Food security	-3.144**	347.841**	19.037**	60.908**
Equality and non- discrimination	-1.448	103.139**	10.285	3.073
Right to Education	-4.946**	47.085**	13.338*	180.228**
Leadership and participation	1.33	221.197**	12.954*	24.869**
Love, support and affection	1.493	5.211	10.829	20.543**
Health and life	-3.057**	20.274**	7.496	62.796**
Capability Index	-4.378**	5.498	14.223*	407.019**

Results

Principal Component Analysis

The first hypothesis for testing was that a relationship between observed variables (items and indicators of the J14 survey) and the urban QoL domains identified for young adults in Bogota (underlying latent constructs) exists. To do this, Principal Component Analysis (PCA) was used to explore the possible underlying factor structure using only the items from the questionnaire that related to young adults' quality of life domains.

The data were screened for missing values by using simple mode imputation. The same protocol for missing values applied to the internal consistency coefficient was used in this section. The minimal amount of observation required for PCA was satisfied. As the questionnaire reports qualitative and quantitative data (mixed measurement level data), a nonlinear PCA (Categorical PCA or CatPCA) was conducted. An optimal quantification exercise (optimal scaling) quantified the qualitative data by assigning numeric variables to categorical observations (discrete categories) (Linting et al. 2007). CatPCA used Multiple Correspondence Analysis in 6,998 observations. All data were non-negative and dichotomous to ensure that the cross-tabulation of variables produced scales in the same direction.

The factorability of 14 dimensions of quality of life for young adults was examined by calculating a matrix correlation and an anti-image correlation. Different criteria for the factorability were used. Firstly, the suitability of the quality of life domain data for CatPCA was tested. The measurement of sampling adequacy of Kaiser-Meyer-Olkin (KMO) was adequate, with a result of 0.84. Secondly, a test of variable redundancy was performed to see how the observed correlation matrix diverged from the theoretical matrix. Bartlett's test of sphericity was significant (χ^2 (1711) = 1.14e+0.5, p < .001), meaning that correlations between items were sufficiently large for CatPCA (Table 5).

The initial 16 eigen values indicated that the first five components explained 30% of the variance. Components from 5th to 16th had eigen values over one, and all together explained 26.96% of the variance. All components were examined using oblimin

Table 5 Test of appropriateness for CatPCA

Bartlett test of sphericity	Chi-square = 1.14e+05
	Degrees of freedom = 1711
	p-value = 0.000***
	H0: variables are not correlated
Kaiser-Meyer-Olkin Measure of Sampling Adequacy	KMO = 0.844

*, **, and *** indicate significance levels of 5%, 1% and 0.1%, respectively

(promax) and orthogonal (varimax) rotation of the loading matrix after performing CatPCA. Both rotation strategies rendered similar results (results were even similar to the unrotated solution), however a varimax rotation was selected as this rotation maximizes the factor loadings, assuming no correlation between the components and showing loads in only one possible component (Linting et al. 2007).

During the rotation of the loading matrix, two components did not contribute to the factor structure as they did not have more than three variable loadings which is the recommend level for retention (Spector 1992). Items where retained on a component if loadings were .30 or greater (Tabachnick and Fidell 2006). Factor structure showed clean intercorrelations among variables and no major cases of cross-loading[5] between components was produced (Appendix 3), satisfying criteria for convergent and discriminant validity. Additionally, face and content validity was confirmed with experts and young adults (during the previous FGDs) to evaluate whether the factors retained appeared to measure a global measure of quality of life (Haywood et al. 2006). As the objective of the exercise was to create a composite index that addresses different aspects of a measured trait, all items that contributed to a specific factor were considered in the analysis. A total of 14 components were retained and renamed in the final analysis structural equation modelling (Appendix 4).[6]

Results from the exploratory analysis with CatPCA were used to apply a confirmatory exercise using Structural Equation Modelling (SEM). Data preparation to run SEM was done by using the same criteria as for CatPCA. Data were calculated for young adults between 18 to 25 years old and missing data were handled through mode imputation. Correlations between observed variables were tested previously during the CatPCA through measures of sampling adequacy, such as the Kaiser-Meyer-Olkin test (KMO) and Bartlett's test of sphericity. As a model specification, a single-factor measurement model and a multiple factor measurement model were put in place to understand all the underlying structure of items and latent variables.

For the measurement model, data points were calculated between observed variables and subordinate factors. CFA was conducted for each construct identified by the

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[5] From the total of items, cross-loadings were identified in two items. They were dropped as there were other strong loaders on each component (Costello and Osborne 2005).

[6] Factor retention was drawn on the results of the eigenvalue-greater-than-1 rule method (K1) (Kaiser 1960). K1 was contrasted with results from Parallel Analysis (PA) (Velicer 1976) and Minimum Average Partial (MAP) (Horn 1965), as suggested by an anonymous reviewer. Results from PA suggested extracting 14 principal components which were comparable with the results of K1. In contrast, MAP method suggested to retain 4 principal components. Based on the multidimensionality that is expected to be captured by a measure of quality of life, the decision for retention was based on the results of PA rather than MAP. PA seems preferable to MAP as this latter method has a tendency to severely underestimate the number of factors (underfactoring) (Zwick and Velicer 1986).

exploratory exercise. For each model component (endogenous variable), a goodness-of-fit test was used to identify the plausibility of the model and to see if some components could be omitted in the final model. By assuming that the sample follows a multivariate normal distribution, Maximum Likelihood (ML) estimation was considered for the regression. Results of goodness-of-fit-test on component 4, 9 and from 11 to 14 showed discrepancies between the observed and expected value. Those components were omitted to create a more parsimonious model.

For the structural model, subordinate factors were examined towards a latent variable or upper level factor. A total of 703 parameters (37 observed variables and 666 covariances) were analysed. The method of estimation was significant in both the test of targeted model against saturated model (χ^2 (602) = 7437,05, p < .001) and the test of baseline model against saturated model (χ^2 (666) = 76733,1, p < .001), meaning the null hypothesis can be rejected and the alternative hypothesis accepted, indicating that there is a significant difference between observed variables and the theoretical model. At this point, it is important to report that χ^2 is sensitive to sample size, meaning that small sample sizes tend to obtain a better fit than large samples.

Three additional tests of goodness-of-fit were carried out to measure how well the specification model fit the data. The Comparative Fit Index (CFI), the Tucker-Lewis Index (TLI) and the Root Mean Squared Error of Approximation (RMSEA) were used. The CFI compares the model to the fit of the baseline mode while TLI assigns penalties for each parameter added to the model (Bentler 1990). RMSEA assesses how well the given model approximates to the true model. As a general recommendation values for CFI and TLI >0.9 and values for RMSEA <0.5 indicate a good fit. The results of SEM for the young adults' model showed a good fit to a single-factor model (CFI = 0.91, TLI = 0.901, RMSEA = 0.04 [90% CI = 0.03, 0.04]). The theoretical model obtained a close fit as lower bound, at 90% confidence interval, was below 0.05 and a good fit as the upper bound was not above 0.10 (Browne and Cudeck 1992). (Table 6)

Table 6 Summary of fit indicators for the Capability Index

Fit statistic	Values	Description
Likelihood ratio	7437.058	model vs. saturated
chi2_ms(602)	0.000***	baseline vs. saturated
p > chi2	76733.184	
chi2_bs(666)	0.000***	
p > chi2		
Population error	0.040	Root mean squared error of approximation
RMSEA	0.039	Probability RMSEA <= 0.05
90% CI, lower bound	0.041	
upper bound	.	
Pclose		
Baseline comparison	0.910	Comparative fit index
CFI	0.901	Tucker-Lewis index
TLI		
Size of residuals	0.033	Standardized root mean squared residual
SRMR	1.000	Coefficient of determination
CD		

*** p<0.01, ** p<0.05, * p<0.1

Results from exploratory and confirmatory exercises were used to construct a capability index for young adults in Bogota. A normalisation process was put in place to scale a unique dimensionality on the composite indicator. Constructs were standardised (z-scores) to have a mean of zero and a standard deviation of one, so all items will have a similar dispersion across respondents (Nardo et al. 2005). To estimate a final capability index for young adults, outcomes for each component were calculated by identifying maximum and minimum values.

$$Index = \frac{(real\ value) - (Maximum\ value)}{(Maximum\ value) - (Minimun\ value)}.$$

All results were weighted by the respective survey expansion factors and final scores were calculated by averaging procedures, allowing substitutability between dimensions (Kuklys 2005)

Descriptive Results of the Capability Index

On a scale of 0 to 100, the capability index for young adults in Bogota was 57%, showing a tight difference between men (58%) and women (56%). A Mann-Whitney test[7] indicated that the score of the YACI was greater for men (Mdn=3937) than for women (Mdn= 3801), where the distributions of scores of the YACI in both groups differed significantly (Mann-Whitney $U = 7.1674615e6$, P<0.05, two tailed).

With respect to the scores for each component, the component of "Right to education" contributed most in the construction of the index (Figur. 3). Equally important was the Occupation component, which registered a relevant level of significance in the Borda Count and was the dimension that contributed least to the total result of the index. Findings were clearer taking into account socioeconomic stratification. Strata differentiation by residential location showed clear differences in terms of capabilities between young adults living in stratum one and two (54%) and young adults living in places where the strata is higher (65%, 66%) (Fig. 4).

A box plot of the distribution of scores among strata suggests that young adults from stratum one to four have obtained different results on the index, showing a large dispersion among the data (Fig. 5). For the case of strata five and six, it is interesting to observe that their scores were much less dispersed than within other strata. Similarly, scores from strata six did not report values as high as the other strata, suggesting that young adults living in locations with higher socioeconomic strata tend to internalise adaptive preferences to a lesser extent. Having said this, these results need to be interpreted with care as further research is required to confirm the findings.

With regards to domains of quality of life, most of the components followed the rationale that the higher the strata, the higher the result on the CI. This is true for 'Protection and bodily integrity', 'Freedom and independence', 'Food security', Equality and non-discrimination', 'Right to education' and 'Health and life'. However, as a multidimensional index, the YACI also showed trade-offs in certain domains for those who are normally described as better off. This is the case for domains such as 'Habitat and built environment', 'Leadership

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[7] This test has been used as observations from the data are rankings and not direct measurements.
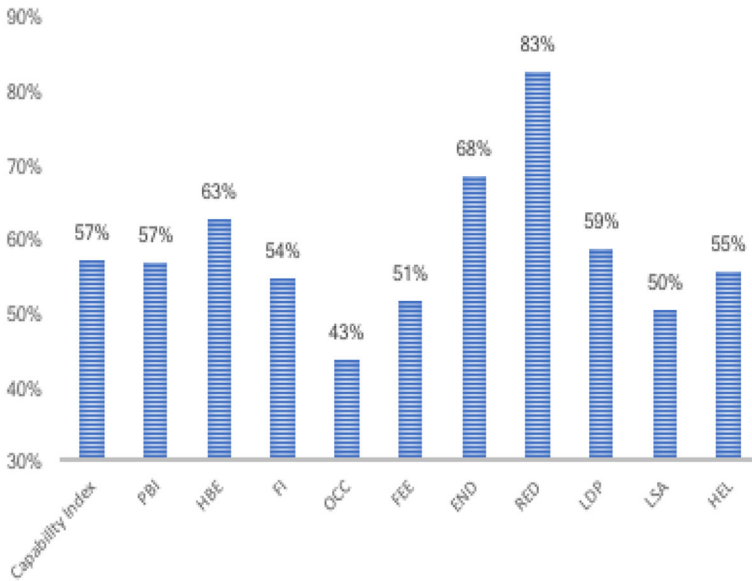
Fig. 3 YACI by dimensions of quality of life

and participation'. For these domains, there is a detriment in term of capabilities for young adults who inhabit "better" areas in the city (Fig. 6).

When comparing variables of gender and age, the YACI showed additional differences. For younger adults, the YACI was higher for women than for men. This pattern was similar for the case of older young adults (25 to 28 years old), where women also performed better than men. The pattern was reversed for young adults between 21 and 24 years old as men score higher than women on the index (Fig. 7). The difference of
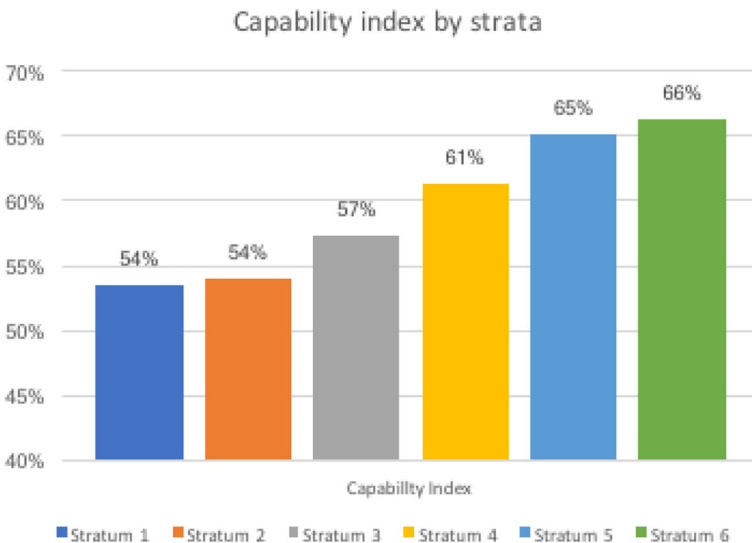

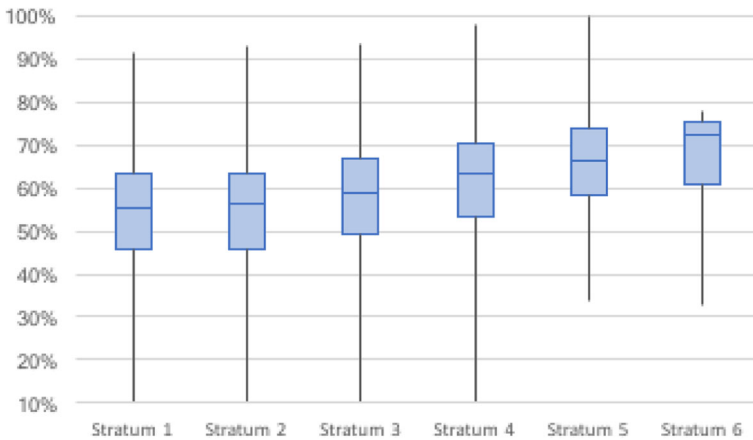**Fig.4** YACI by each socio-economic strata

Fig. 5 Box plot of YACI by dimensions of quality of life

the YACI scores between young adults aged 18 to 20 and between 21-24 was significant accordingly to the Mann-Whitney test (U= 3.575248e6, p<0.01).

In terms of components of quality of life, the scores obtained followed the tendency of the overall index, in which gender differences are not marked (Fig. 8). With respect to age groups, younger adults faced more difficulties in the following domains: accessing features of the built environment, food security and inequality and discrimination. Aspects regarding 'Freedom and Independence' and 'Leadership and Participation', tended to diminish as the young adult advances into adulthood (Fig. 9). A Kruskal-Wallis test confirmed that there are statistically significant differences between all three age groups of young adults with regards to their scores on the YACI (χ^2 (6.568), p=0.037).

More interestingly, the YACI shows different patterns if a place-based perspective is introduced into the analysis. The consideration of location showed that from a gender
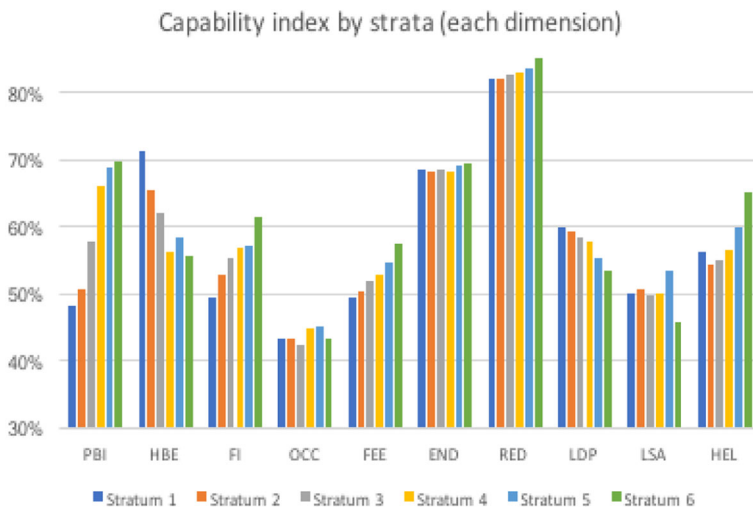

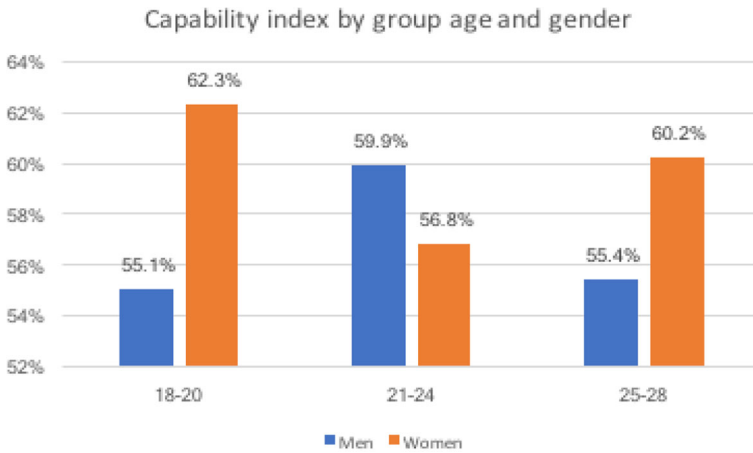Fig. 6 YACI by strata (per dimension of quality of life)

Capability index by group age and gender

Fig. 7 YACI by gender and age

perspective, men obtain better scores in capability achievements than women (Fig. 10). Regardless of the socioeconomic stratum, women experience a lower level of capabilities than men. Unlike the results displayed in Fig. 8 above, the consideration of strata directly affects the level of young adults' capabilities. In particular, if the stratum is considered, the YACI will show a different level of achievement among women and men. The application of a Kruskal Wallis test showed that there was a statistically significant difference between the scores obtained by young adults living in each stratum (χ^2 (126.377), p<0.01).

Indeed, if we consider strata as a proxy for the qualities of place, the location of residents plays a fundamental role in explaining how capabilities are exercised. For the case of strata one and two, capabilities were much more modest than for the other strata (Fig. 11). An additional Kruskal-Wallis test was conducted to identify statistically significant differences between strata groups and scores on the YACI (χ^2 (103.417), p<=0.01). Although there were significant differences between results of the YACI and all strata, further research is required to compare demographic differences between young adults.
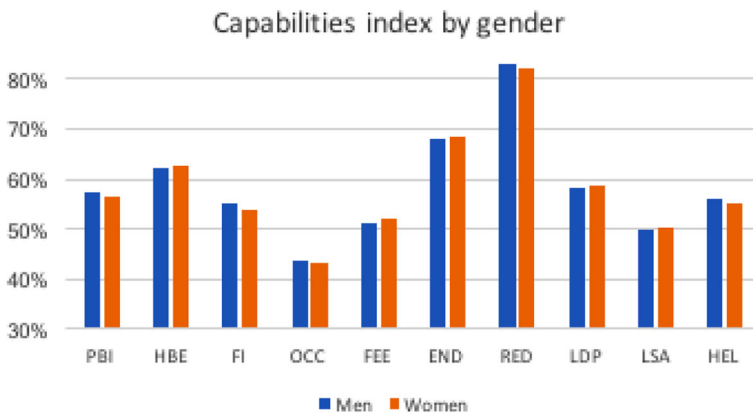
Capabilities index by gender

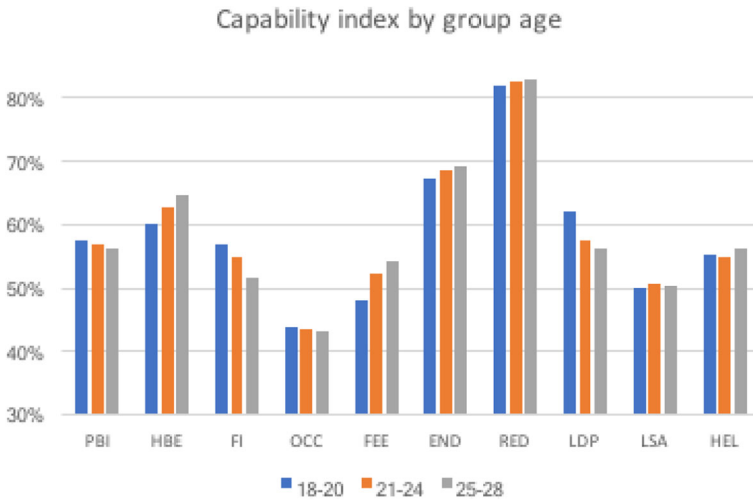**Fig. 8** YACI by gender and dimensions of quality of life

Fig. 9 YACI by group age and dimensions of quality of life

Regression Analysis

The J14 survey does not include any variable of income performance that can be regressed in the model, so differences between capabilities and income were not computed. As there was no compelling reason to exclude outliers and scores with high leverage (heteroscedasticity) from the analysis, robust standard error regression was used to deal with them. The regression model incorporated effects of clustered data for the case of each urban locality of Bogota (Sumapaz locality was excluded), as some capabilities do not affect observable data individually but affect observations uniformly within each group. Equally, the regression model was also run using fixed effect models in order to control for variables that cannot be observed (Allison 2009).

A significant regression equation was found (F (9, 18) =130.06, p<0.001, with a R^2 0.0655). A multivariate regression was also undertaken for each component of the YACI. The regression results are presented in Table 7. The pairwise relationship from Table 4 and
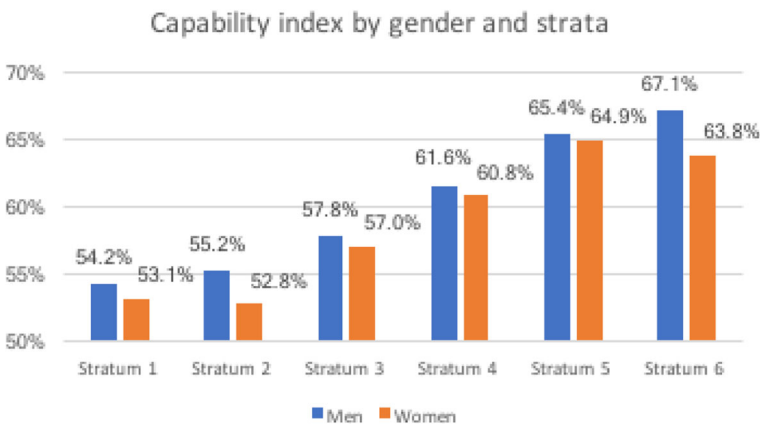

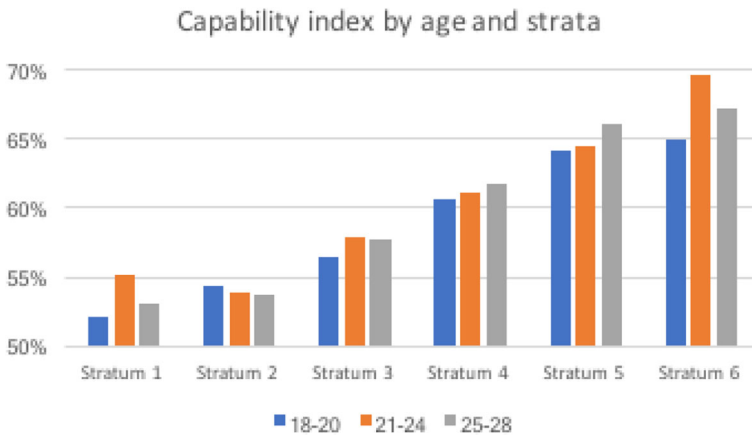Fig. 10 YACI by gender and socio-economic strata

Fig. 11 YACI by group age and socio-economic strata

the multivariate regression held for the case of gender and strata to predict YACI. Additional variables of sensitivity to inequality, such as 'Dominance of a second language' and 'Place of Birth' were also significant in the regression (at 5% and 1% level, respectively). Conversely, the relationship between 'Group Age', 'Marital status' and 'Ethnicity' and the YACI was ambiguous. The multivariate regression also calculated coefficients for age groups (18-20, 21-24 and 25-28 years old) and for lower, medium and high strata.

With regards to specific components of the index, male young adults obtained a better level of education and health than women. There was a significant relationship between the degree of access to urban services and being a man. The older the young adults are, the better the achievement of capabilities, particularly in terms of 'Food security' and 'Health'. However, older young adults showed a reduction in their capability levels of 'Freedom and independence' as well as in 'Leadership and Participation' in comparison with younger peers. To move to adulthood means assuming more responsibilities and commitments which tend to negatively affect the capacity 'to make own decisions' and reduce the ability 'to influence political agendas' and 'to produce participatory spaces'. Another important finding lies with the improvement of the capability of 'Equality and non-discrimination' once young adults become older. This finding is in line with the argument that the entrance to adulthood is marked by processes of inequality and discrimination for the youngest of the young adults (Webster et al. 2004).

There is also a significant relationship between the capability of 'right to education' as young adults become older. There is no evidence that inhabiting a better stratum increases the level of capabilities in terms of education. Although it is interesting that the relationship between better capabilities in education and occupation were not significant. In theory, it would be expected that better educational capabilities would result in better job options for young adults. In this regard, it could be hypothesised that having better educational capabilities is not enough to secure their labour security, as today it is more difficult to find a job or have financial independence than before.

Regression results showed a positive and significant relationship between better socioeconomic strata and capability index scores as young adults belonging to higher strata doubled the score of the index in comparison with their peers in lower strata. Stratification positively affected capabilities associated with 'being able to feel safe' and

Table 7 Fixed effect regression model for each component of the YACI (differences by predictors)

Variables	Capability Index	Protection Bodily integrity	Habitat/built environment	Freedom/ independence	Occupation	Food Security	Equality Non-discriminati	Right to education	Leadership Participation	Love_supp_affection	Health/ Life
Gender	0.014***	0.006	0.012***	-0.000	0.00326*	-0.006**	-0.002	0.008**	-0.004	-0.005*	0.008***
	(0.004)	(0.005)	(0.004)	(0.004)	(0.002)	(0.003)	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)
Age (20-24)	0.007**	-0.006*	0.020***	-0.013***	0.000	0.039***	0.012***	0.007***	-0.042***	0.006	-0.002
	(0.003)	(0.003)	(0.005)	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)	(0.004)	(0.004)	(0.003)
Age (25-28)	0.007	-0.007**	0.031***	-0.038***	-0.004	0.055***	0.0172***	0.001***	-0.055***	0.003	0.010***
	(0.004)	(0.003)	(0.006)	(0.005)	(0.004)	(0.003)	(0.002)	(0.002)	(0.005)	(0.005)	(0.003)
Strata (Medium)	0.042***	0.088***	-0.039***	0.011	0.005	0.019***	0.004	0.003*	-0.001	-0.009*	0.008*
	(0.005)	(0.0127)	(0.011)	(0.008)	(0.007)	(0.005)	(0.002)	(0.002)	(0.005)	(0.004)	(0.004)
Strata (High)	0.086***	0.136***	-0.039***	0.020***	0.008	0.036*	0.000	0.009	-0.016	0.023***	0.046***
	(0.005)	(0.009)	(0.007)	(0.006)	(0.007)	(0.019)	(0.004)	(0.006)	(0.030)	(0.007)	(0.004)
Marital status	0.006	0.021***	-0.051***	0.048***	0.0136***	-0.019***	-0.011***	-0.003	0.012**	0.005	-0.004
	(0.005)	(0.005)	(0.005)	(0.005)	(0.003)	(0.004)	(0.001)	(0.002)	(0.005)	(0.003)	(0.004)
Ethnicity	0.007**	0.005	0.001	0.010**	0.001	-0.000	-0.001	0.001	0.011***	-0.007*	0.005
	(0.003)	(0.004)	(0.005)	(0.004)	(0.004)	(0.003)	(0.002)	(0.001)	(0.003)	(0.004)	(0.003)
Language	0.0135**	0.031***	-0.097***	0.056***	0.0146***	0.011***	0.002	0.013***	-0.021***	-0.005	0.015***
	(0.005)	(0.008)	(0.007)	(0.006)	(0.004)	(0.003)	(0.003)	(0.002)	(0.005)	(0.004)	(0.004)
Place of birth	-0.011***	-0.013**	-0.047***	0.027***	0.0193***	-0.006*	-0.006***	0.006***	0.005*	-0.009**	0.001
	(0.004)	(0.005)	(0.006)	(0.004)	(0.004)	(0.004)	(0.002)	(0.002)	(0.003)	(0.004)	(0.003)
Constant	0.529***	0.502***	0.715***	0.484***	0.403***	0.492***	0.686***	0.808***	0.607***	0.514***	0.540***
	(0.006)	(0.009)	(0.008)	(0.007)	(0.006)	(0.004)	(0.002)	(0.002)	(0.007)	(0.004)	(0.006)
Observations	7,680	7,680	7,680	7,680	7,680	7,680	7,680	7,680	7,680	7,680	7,680

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

'enjoying public space'. Young adults living in areas with better strata showed marginally higher capabilities in terms of 'Health and Life' than those living in more impoverished neighbourhoods. Strata also played a significant role in young adults' capabilities to be able to feel free and independent in the city, which also means that young adults living in deprived areas are forced to experience a more restricted life in the city. This result is consistent with the perception disadvantaged young adults have of law enforcement agencies such as the police who are perceived as prejudiced and discriminatory institutions (World Values Survey 2012). Conversely, there was a negative association between better strata and the ability to interact with urban services (Habitat and Built Environment). Equally important is the finding that strata were not significant in aspects related to discrimination and inequality in the city. This result is consistent with previous research (Bogliacino et al. 2015), whose findings point out that urban stratification is more dominant in the production of stigmas rather than causes of inequality.

There was a marginally positive association between being single and the level of 'Employability' and 'Freedom and Independence'. For the case of female young adults, this result accounts for the burden that early and unplanned pregnancy can have on future employability. The 'Ethnicity' variable was controlled for in the case of young adults who described themselves as mestizos. Although being single was not significant in relation to YACI, marital status determined achievements in 'Food security' and reduced the level of 'Discrimination and Inequality' for young adults. This result can be interpreted as a kind of 'singlism' or the stigmatization of adults for being single (B. M. DePaulo and Morris 2005; B. DePaulo 2006), for instance when looking for job opportunities or housing (Morris et al. 2007). In the case of ethnicity, regression results were not significant in most of the components of the index, except for the ability to participate in and lead social processes. The dominance of a second language was a good predictor for most of the components of quality of life for young adults. Being a young adult with dominion of a second language significantly predicted all components of the YACI except for the capability of 'Love, support and affection', "Equality and Discrimination" and 'Protection and Bodily Integrity'. Bilingualism was correlated with better levels of education, normally private schooling, and educational attainment, suggesting an association between bilingualism and household income. This result contradicts Anglo-American studies (Carliner 1981; Grenier 1997; Henley and Jones 2005; Shapiro and Stelcner 1997) where bilingualism tends to be associated with income disadvantages[8]. In the Bogota context, the acquisition of a second language (English) is perceived as a mechanism to improve employment prospects[9], access better education and raise social status (British Council 2015).

For the components 'Love, Support and Affection' there was no significant relationship with socioeconomic factors, apart from the case of young adults living in better strata. Qualitative data gathered from FGDs suggested that young adults feel anxious about their future and despite major advances in social, economic and technology domains, they perceive that their life is tougher compared to that of previous generations.

The ability to speak a second language was significant for being able to 'Feel free' and having better labour opportunities. Finally, place of birth was also a good predictor

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[8] Here it is important to consider the context of multilingual societies where migration flows have an effect on the labour market. In these contexts, bilingualism may have a relationship with earning disadvantages (Henley and Jones 2005).

[9] According to a survey carried out by the British Council (2015) on the state of bilingualism in Colombia, 59% of respondents and 54% of employers consider that English skills improve employability.

of domains of quality of life for young adults. The regression model showed that being born in Bogota has a significant positive relationship with the degree of 'Freedom and independence', 'Employability' and 'Right to education' achieved. Conversely, young adults who were born in Bogota tend to have lower capabilities in domains related to 'Habitat and built environment' and 'Equality and non-discrimination'.

Discussion

This paper reports a measurement of urban QoL based on secondary data. The instrument is an aggregated measurement of ten constructs of quality of life for young adults in Bogota. The result is the YACI, a composite capability index which attempts to broaden methodological approaches that are currently used to design and test measurements of urban QoL. It is important to stress that this capability index does not constitute a psychometric test as it is not based on primary data. In contrast, the index is a methodological construction which uses previously identified young adults' domains of quality of life to extract observable values from secondary data, that allow the construction of domains of urban QoL for this population.

The YACI provides two elements to the burgeoning literature in QoL studies. On the one hand, there is a methodological contribution to the operationalisation of the CA as a QoL measure; and on the other hand, an informative contribution to improving policy interventions involving young adults in Bogota. In the first case, the YACI is the result of linking qualitative and quantitative data (secondary survey data) to identify proxy measurements of capabilities for young adults. Researchers interested in applying the methodology presented here should be aware that identified domains of quality of life are context-specific and further applications of YACI require the identification of contextual capabilities.

The YACI assesses quality of life in young adults using ten items and provides a general score for the entire population of 57% on a scale of 0 to 100. The construction of the YACI relies on secondary data. The index was assessed by testing reliability in each of the constructs previously identified during FGDs. The methodological sequence includes exploratory analysis for data reduction and confirmatory analyses to identify latent variables. Unlike other indices of QoL, which are based mostly on physical, social and emotional components, the YACI includes domains related to tolerance, democracy, equality and habitat.

The YACI is also an informative tool for the study of QoL of young adults. Research into QoL of this particular demographic group is very limited. Measurements of QoL of young adults become fundamental as they describe to what extent these populations are enjoying a "good quality of life" (D'Agostino and Regoli 2013). In Bogota, knowledge about the situation of young adults has improved considerably, after having been treated as a residual group within a larger demographic population for some time. Bogota now has a normative and policy framework aimed at improving the quality of life of young people based on a human-rights approach (Gutiérrez 2014). The current public policy empowers young people to exercise mechanisms of civil participation more actively. The vision of 'no future', inherent to the 80's and 90's where young people were stigmatized and defined as 'dangerous', has been progressively substituted by more progressive visions that explicitly recognise the need for youth citizenship as well as designing suitable public policies to resolve ongoing challenges. Despite the transition towards the design of a better policy framework, the approaches used to collect data still omit multidimensional components of

QoL. Within this context, the YACI becomes a tool that seeks to broaden the informational basis of judgements through evaluating different spaces of well-being in young adults. More importantly, results from YACI demonstrate the need to refocus public policy towards strengthening the role of a human development perspective as a core element of urban well-being. YACI can be used as an informative instrument to policymakers to develop capability-driven interventions where additional spaces of wellbeing are reported. Additionally, this paper urges other researchers to identify domains of quality of life directly with beneficiaries instead of relying exclusively on data from experts or public agendas that tend to extrapolate findings from younger age groups, particularly from the childhood and adolescent periods, onto the young adults group.

Starting from this framework, the YACI presented here is the first attempt, to the best of the author's knowledge, to build a composite indicator of urban QoL for young adults in Bogota that satisfies Sen's requirement of public reasoning and discussion for selecting relevant capabilities (Sen 2004). Chen et al. (2004) have developed a quality of life instrument for young adults, aged 18 to 25 years old, using a sample from upstate New York counties. The instrument is comprised of 14 multi-items scales which assess aspects related to physical health, social relationships, role functions and environmental context. However, QoL categories were not identified during a process of public scrutiny, which would have given young adults the opportunity to define categories of quality of life which they have reason to value. In the case of external validity, the lack of aggregative quality of life outcomes on young adults in Bogota hampers the assessment of predictive validity. To test the quality of YACI as a predictor of young adults' quality of life outcomes further research is needed to either test other instruments against YACI or validate YACI against theoretically related constructs.

The interpretation of the YACI must be carried out while keeping in mind the results of each of the dimensions. Differences in age, sex and stratum vary across dimensions, making the analysis more complex and informative. Domains of 'Education', 'Equality and Discrimination' and 'Habitat and built environment' are the constructs that contribute most to the YACI respectively. The high score of the domain 'Education' is understandable for its 'intrinsic value' for development. Unlike human capital theory (Becker 1962), which focuses mainly on the economic value of schooling in terms of the acquisition of skills and competences, education in the YACI is seen more in terms of its role in encouraging aspects of human flourishing and social change (Sen 1997). For young adults, the capability to be able to access and receive quality education is central to improving their quality of life before entering adulthood. Young adults with higher strata and closer to adulthood show slightly higher levels of capabilities in terms of equality and non-discrimination. A different scenario is observed in the domain of 'Habitat and built environment' as results show that young adults from higher strata obtain lower results in their capability scores. Issues regarding bodily integrity, security and mobility may negatively affect the capability scores for this population. This last relationship is an important finding and should be pursued in further research.

Results suggest that men have a slightly better score on the YACI than women. The paper found strong evidence that men have better capabilities to operate in the city, achieve a better level of education and are healthier than women. In contrast, results also show that women obtained better results for capabilities than men when they are grouped by age category, with younger women more capable than their older peers. This finding is important as it seems that women arrive at early adulthood with better capabilities from childhood and adolescence than men, but rapidly undergo a marked process of decapitalization of capabilities

during their transition to adulthood. This result is in line with other studies (Grisales and Arbeláez 2008; Grisales Romero et al. 2014) which have found that women demonstrated a higher level of youth development in comparison with males during adolescence. In this way, the YACI highlights the relevance of reducing gender inequalities between young adults in Bogota. Women experience lower levels of capabilities in all the domains of the index, showing a systematic gap in terms of capability achievement compared to men.

Comparisons between different age groups support previous empirical findings that QoL declines when people become older (Grisales Romero et al. 2014). For example, results confirmed that capability scores are lower once young adults enter adulthood. Likewise, their ability to practice an economic activity, demand actions of local government (civil participation) and access quality education correlate negatively when young adults grow older or enter adulthood.

As expected, there is strong evidence that young adults with better socioeconomic strata double their capability scores compared to other groups. Other indices of youth development have shown that scores of quality of life increase as social status is higher (Grisales and Arbeláez 2008; Commonwealth Secretariat 2016). Living in "advantageous" places has important and enduring repercussions in life trajectories for young adults. Findings also suggest that there is a higher variation of capability achievement among young adults who inhabit more deprived areas of the city (stratum 1 and 2), in which they report low and high scores at the same time. Those young adults living in more advantageous areas of Bogota (stratum 5 and 6) have a lower probability of obtaining a low level of capability achievement, and therefore scores vary to a lesser degree. In this respect, the YACI shows serious differences between groups of young adults, particularly if location is considered. This finding suggests the need to explore further the role of place in shaping capabilities. Results showed that if strata (a proxy of location) are considered, levels in the capability score change. Therefore, and taking into consideration the results of this paper, considering a place-based approach to the index of quality of life will render additional insights to understand the relationship between quality of life and capabilities.

Limitations

This study employs a data-driven approach which uses secondary data to describe general capability trends in Bogota. Despite the potential uses of a capability index for the young adult population in Bogota, results should be treated with care. The use of secondary data restricts the assessment of capability categories as variables in surveys are designed to measure specific constructs, reducing the researcher's ability to identify correct capabilities in this population. By using secondary data, unknown study constraints or errors in data collection can hinder the interpretation of variables. The incompleteness produced by using secondary data that were not designed to measure capabilities highlights the need for new survey instruments or the development of indicators that contribute to a more comprehensive assessment of the state of young adults' capabilities. Finally, although the use of secondary data has clear advantages for research (use of large-scale surveys, available data for specific groups and reduction of data collection costs), its use is not without drawbacks. One major limitation was that some domains identified by young adults in the FGDs were not identifiable with the data available. These results, therefore, need to be interpreted with caution.

Compliance with ethical standards

Appendix 1

Table 8   List of urban quality of life domains for young adults in Bogota

Domains	Capabilities
1. Tolerance, respect and membership To be able to accept and be accepted by members of different communities	To be able to live in harmony within the context and the community To be able to accept and be accepted by others To be able to respect the life of others To be able to respect, love and value others' lives To be able to be tolerant To be able to be a good human being
To be able to be recognised as a person with an individual identity and to be able to express it freely	To be able to accept responsibilities as a citizen To be able to interact with other young people To be able to create cultural spaces To be able to express oneself freely To be able to be respected as an artist
2. Political and social participation To be able to demand action from local authorities	To be able to influence political agendas To be able to produce participatory spaces To be able to transform the economic and social city model To be able to transform the social reality To be able to hear and be heard
3. Security To be able to live safely	To be able to move around the city without restrictions (stigmatisation from the police) To be able to feel safe To be able to enjoy public spaces To be able to enjoy secure spaces To be able to be quiet in public spaces To be able to have nights without fear
4. Leisure time and recreation To be able to have joy in life	To be able to exercise autonomy in the allocation of time To be able to spend time with family To be able to use leisure time to study personal subjects
5. Love, emotions and support To be able to receive affection and to be able to benefit from having the support of family, friends and the state	To be able to provide support to family and friends To be able to love one's family To be able to benefit from family, communitarian and state support
To be able to love and be loved by those around me	To be able to give and receive social support To be able to give and receive love

Table 8 (continued)

| Domains	Capabilities
6. Public space and mobility To be able to enjoy public spaces and to be able to mobilise without restriction in the city	To be able to use and enjoy public spaces To be able to enjoy more green spaces To be able to move from one place to another without physical restrictions
7. Life and health To be able to achieve a reasonable level of good health without restricting new experiences	To be able to be healthy To be able to establish limits To be able to have healthy habits
To be able to connect with the nature and the environment	To be able to have a clean environment To be able to respect the environment
8. Food security To be able to meet dietary needs	To be able to be well nourished To be able to produce local goods
9. Occupation To be able to practise an activity with economic remuneration	To be able to work based on an entrepreneurial idea To be able to create new ideas to work To be able to have a decent job To be able to have economic stability To be able to satisfy personal needs and interests To be able to create associations To be able to produce economic gains from independent work To be able to become an entrepreneur
10. Shelter/housing To be able to live in a comfortable space, adapted to one's needs	To be able to live in a comfortable place To be able to be sheltered
11. Independence, autonomy and social relations To be able to participate in social networks and to be able to get ahead	To be able to choose friends To be able to have social relations with others To be able to make own decisions To be able to identify one's own 'life project'
To be able to be independent and feel like one has control over one's own life	To be able to express oneself To be able to choose one's spirituality To be able to make errors and mistakes
12. Knowledge and learning To be able to receive quality education	To be able to gain an academic title To be able to study To be able to obtain a quality education
13. Consumption To be able to have enough money to buy what one wants	To be able to buy
14. Success and prosperity To be able to achieve aspirations	To be able to improve as a person To be able to dream To be able to realise one's role in society
15. Inclusion and equality To be able to be recognised as a member of society with rights and duties	To be able to not be stigmatised or 'singled out' To be able to receive decent treatment To be able to be treated with dignity To be able to obtain a fair distribution of economic resources To be able to not be ignored

Appendix 2
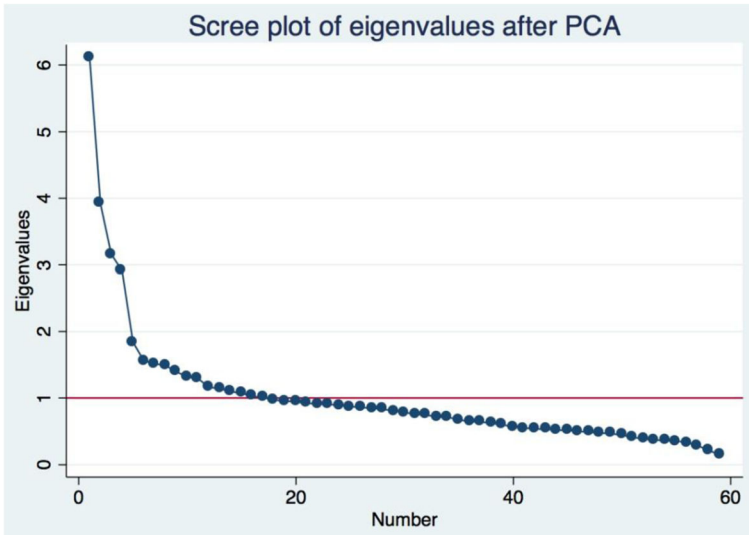
Fig. 12 Scree plot from of non-linear PCA using K1. On the y-axis the eigenvalues of the correlation matrix of the quantified variables

Appendix 3

Table 9 Pattern matrix principal component analysis

Items	Comp1	Comp2	Comp3	Comp4	Comp5	Com6	Com7	Comp8	Comp9	Comp10	Comp11	Comp12	Comp13	Comp14	Unexplaine
p12_depend~_			0.346												0.647
p29_actual~_			0.548												0.258
p17_asiste~c			0.549												0.213
p15_nivel_~_					0.418										0.402
p26_1_nive~_					0.591										0.184
p26_2_nive~_					0.582										0.213
p31_recibi~_															0.748
p46_servic~_														-0.575	0.443
p43_afilia~l														0.732	0.334
p48a_calif~_															0.586
p65_dificu~_															0.629
Jovenes_ho~r															0.665
p15a_anos_~s															0.625
p52a_robos_															0.539
p52b_pandi~_	0.333														0.453
p52c_grupo~_	0.359														0.452
p52d_fuerz~_	0.346														0.499
p52h_confl~_	0.363														0.417
p52i_confl~_	0.389														0.400
p52j_const~_	0.382														0.436
p52j_rinas~_	0.363														0.386

Table 9 (continued)

Items	Comp1	Comp2	Comp3	Comp4	Comp5	Com6	Com7	Comp8	Comp9	Comp10	Comp11	Comp12	Comp13	Comp14	Unexplaine
p54_vida_p~_													0.327		0.660
p55_proteg~a													-0.685		0.367
p67_apoyo_~_												0.529			0.583
p68_espa~io_								0.480							0.541
p68_espac~a_								0.533							0.384
p68_espa~go_								0.659							0.360
p72_1_con~a_															0.652
p72_1_con~b_		0.318													0.540
p72_1_con~c_		0.366													0.432
p72_1_con~d_		0.374													0.424
p72_1_con~e_		0.369													0.445
p72_1_con~f_		0.352													0.454
p72_1_con~g_		0.397													0.362
p72_1_con~h_		0.357													0.480
p19_1_comi~a						0.591									0.359
p19_1_comi~c						0.615									0.312
p19_1_comi~e						0.511									0.489
p20_1_recu~b															0.709
p27_1_prac~s										0.534					0.557
p39_algun_~o										0.409					0.589
p64_discri~o										0.338					0.647
p69_parte_~n										0.523					0.612
p53_opone_~s															0.717
p55_proteg~b															0.351

Table 9 (continued)

Items	Comp1	Comp2	Comp3	Comp4	Comp5	Com6	Com7	Comp8	Comp9	Comp10	Comp11	Comp12	Comp13	Comp14	Unexplaine
p55_proteg~f									0.629						0.423
p55_proteg~g									0.635						0.373
p57_peli~dio							0.558								0.380
p57_pelig~jo							0.622								0.334
p57_peli~rio							0.464								0.450
p58_libres~a			0.346												0.515
p58_libres~n			0.421												0.367
p58_libre~jo			0.412												0.370
p58_libres~d			0.439												0.315
p58_libre~po			0.421												0.367
p58_libres~s			0.395												0.437
p63_joven_~c											0.6936				0.326
p63_joven_~n											0.687				0.330

Extraction method: Principal component analysis. Rotation method. Varimax

Appendix 4

Table 10 Reduction of domains from FGD to component extraction

Domains of Urban QoL FGD	Components after CapPCA
1. Tolerance	Comp1_Protection and bodily integrity (PBI)
2. Political participation	Comp2_Habitat and built environment (HBE)
3. Security	Comp3_Freedom and independence (FI)
4. Leisure time	Comp4_Occupation (OCC)
5. Support	Comp5_Right to education (RED)
6. Public space and mobility	Comp6_Food security (FEE)
7. Health	Comp7_Protection and bodily integrity (PBI)
8. Food security	Comp8_Leadership and participation (LDP)
9. Feel free to choose	Comp9_Love, support and affection (LSA)
10. Work	Comp10_Leadership and participation (LDP)
11. Ability to dream	Comp11_Equality and no discrimination (END)
12. Shelter/housing	Comp12_Health and life (HEL)
13. Family and Friendship	Comp13_Love, support and affection (LSA)
14. Education	Comp14_ Health and life (HEL)
15. Ability to consume	
16. Environment	
17. Culture	
18. Success	
19. Creativity and production of ideas	
20. Inclusion	

FGDs

Appendix 5

Fig. 13 Path Diagram Structural Equation Modelling (Confirmatory exercise). (1) Protection and Bodily Integrity (PBI), (2) Habitat and built environment (HBE), (3) Freedom and Independence (FI), (4) Occupation (OCC), (5) Right to Education (RE), (6) Food security (FEE), (7) Security (SEC), (8) Leadership and Participation (LP), (10) Love, support and affection (LSA)

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