From the neighbourhood to the square. Capturing *(and comparing)* perceptions on subjective well-being at two different scales.

Abstract

The paper presents a methodology employed to measure the subjective dimension of quality of life (QoL) responding to subjective well-being (SWB), based on the perceptions of people using and interacting with the urban and social space. To check the levels of satisfaction, two surveys were created using the fundamental human needs of the Human Scale development paradigm as study categories. The selected places constituting the case study refer to two different scales of the same urban area corresponding to i) Vila de Gràcia neighbourhood and ii) Virreina square, of the Gràcia district of Barcelona (Spain). Results show scores per need and in total (SWB) are lower for the neighbourhood scale. The classification of questions per need favours the identification of potential problems and can be used to implement measures of improvement. By using combined intervention axes we prove that an average 20% increase in SWB is possible for both cases.

Keywords

Subjective well-being, perceptions, need satisfaction, Human Scale Development; social space; urban places

1. Introduction

Humans exist in natural space. Natural space becomes a social phenomenon, or social space, once people begin to use it, boundaries are put on it, and meanings (including ownership, price, etc.) are attached to it. It becomes a lot or a plot, and if residential users obtain control over the bounded space, it becomes their place (Gans, 2002). Space converts then into a complicated set of interlocking physical and social relations, patterns, and processes rather than an even, undifferentiated plain on which investment unfolds (Harvey, 1985; Lefebvre, 1974; Massey, 1984, 1994). It can be seen as an unavoidably social product created from a mix of legal, political, economic, and social practices and structures (Lefebvre, 1974). While it has a material reality as environment, it is also experienced and conceptualised through the organisation of social life (Massey, 1992). A spatial analysis—particularly one that recognises the social production of space, as in (Lefebvre, 1974)—recognises the inherent and multiple social meanings of space and the spatiality of all human activity (Martin et al., 2003). Consequently, the use of space needs to be carefully planned in line with a comprehensive, holistic vision (Timmermans et al., 2013). Researchers should focus on the causal relations between space and society referring to (i) the few but important ways in which natural space affects social life and collectivities and (ii) the innumerable ways in which these collectivities turn natural space into social space and shape its uses (Gans, 2002). Both depersonalisation of space and the obvious assumption that all social life exists in space should be avoided. Individuals and collectivities shape natural and social space by how they use these, although each kind of space, and particularly the social, will also have effects on them.

Concerns associated with one's satisfaction with her residential environment have long been a major research subject in social policy and sociology, planning and related disciplines (Amérigo and Aragonés, 1997; Hur et al., 2010; Hur and Morrow-Jones, 2008; Lee et al., 2017; Marans, 1976; Marans and Rodgers, 1974; Mesch and Manor, 1998; Weidemann and Anderson, 1985). It is clear that perceptions on space may influence the level of satisfaction with where people live, affecting one's health and well-being (Leslie and Cerin, 2008). In other words, a social space or place not only forms part of who we are but is capable of influencing our emotional and physical state (Berry and Okulicz-Kozaryn, 2009; Kennedy and Adolphs, 2011; Lederbogen et al., 2011; Moro et al., 2008; Veenhoven, 2007). Concepts such as sense of place (i.e., people's relationships with places), place identity (i.e., beliefs about the relationship between self and place), place attachment (i.e., emotional connection to place) and place dependence (i.e., the degree to which the place in relation to alternative places is perceived to underpin behaviour) (Jorgensen, 2010) are broadly found in the literature relating one's or a collectivity's perception on space and their satisfaction related to it.

Following the previous rationale, we focus this study on examining perceptions associated with satisfaction with two types of social spaces or places, that of a neighbourhood and that of a square. The methodology applied is based on the subjective dimension of quality of life (QoL) presented in (Papachristou and Rosas-

Casals, 2019b) and is mainly built on the Human Scale development (HSD) paradigm (Max-Neef et al., 1991) applying the suggestions proposed by (Costanza et al., 2007). To check the levels of satisfaction, the fundamental human needs of the HSD paradigm were used as study categories. Drawing on the cases of Vila de Gràcia neighbourhood and Virreina square of the Gràcia district in Barcelona and given the primacy of needs in SWB, we seek to develop an easily applicable methodology in order to achieve a higher level of SWB for urban places. The paper is organised as follows. Section 2 presents a literature review on the subjective dimension of well-being and its connection with human needs. Section 3, materials and methods, includes the methodology proposed for the compilation and classification of data, the calculation of the final result on SWB and the creation of future scenarios of improvement. Section 4 presents the results, including the survey analysis, the results per study category (or need) and the final outcome on SWB, along with possible intervention axes for the selected cases and a potential SWB improvement result. The paper ends with Section 5, where discussion and conclusions are drawn.

2. Literature review

Although concepts such as SWB and well-being are considered rather new in the urban studies field, entering it not earlier than 2011 and 2002 respectively (Papachristou and Rosas-Casals, 2019a), their empirical study have been growing in prominence over the last 30 years (Diener et al., 1999). During this period of time an increasing recognition appeared that measures of SWB directly index evaluations and feelings associated with QoL (Tay et al., 2015), looking to self-reported levels of happiness, pleasure, fulfilment, and the like (Costanza et al., 2007; Diener and Lucas, 1999; Easterlin, 2003). SWB refers both to people's cognitive and affective evaluation of their lives (Diener, 2000), which reflect the sense of wellness of individuals (Diener, 1984). The cognitive component refers to the individual's overall life evaluations while the affective one refers to the presence of positive emotions and the absence of negative emotions. These components can be easily measured using self-reports in a valid and reliable manner (Diener et al., 2013), usually through the use of short measurement scales. Those scales can be one-item such as the Global Happiness Item (GHI) (Bradburn, 1969) and the Delighted-Terrible Scale (DTS) (Andrews and Withey, 1976) or multi-item such as the Satisfaction with Life Scale (SWLS) (Diener et al., 1985), the Positive and Negative Affect Schedule (PANAS) (Watson and Clark, 1994) and the Scale of Positive and Negative Experience (SPANE) (Diener et al., 2010). New and innovative measurement ways also appeared during the past years such as the Day Reconstruction Method (Kahneman et al., 2004).

One fundamental early contribution to the re-conceptualisation of the economic development in terms of well-being from a systemic perspective came about with the Human Scale development approach (HSD) in the 1980s (Max-Neef et al., 1986, 1989). Central to this paradigm is a systemic re-conceptualisation of human needs and an attempt to place this discussion at the centre of the development debate (Cruz et al., 2009). In

the HSD it is suggested that the best development process will be the one enabling improvement in people's QoL, allowing both people and communities to be coherent within themselves (Max-Neef, 1986). The axis of this central thought is that HSD concentrates on, and is sustained by, the satisfaction of fundamental human needs and the generation of growing levels of self-reliance (Max-Neef, 1992). It acknowledges that due to our common human nature, humans need to satisfy these fundamental human needs – common to all – in order to sustain a rich and meaningful life. Maslow (1954) and later Ryff and Keyes (1995) and Ryan and Deci (2000), among others, also proposed that there are universal human needs whose fulfilment is likely to enhance a person's feelings of well-being. Furthermore, the association between the fulfilment of needs and SWB has been recently examined and need fulfilment was found to be consistently associated with SWB across world regions (Tay et al., 2015). Results from a different study also indicate that place attachment increases need satisfaction associated with belonging, self-esteem, and meaning, while contributing to individuals' well-being (Scannell and Gifford, 2017). In like manner, Diener et al. (2013) stated that SWB can be categorised by different life domains and satisfactors and experienced emotions in these domains constitute domain-level SWB. Meanwhile, Costanza et al. (2007) related QoL to the opportunities that are provided to meet human needs in the forms of built, human, social and natural capital (in addition to time) and the policy options that are available to enhance these opportunities. HSD's fundamental human needs are chosen in this study to measure SWB over other types of needs for the following reason: HSD differs from other need theories such as Maslow's (1968), the International Labour Organization's (1976) and Streeten's (1981), mostly because of the utilitarian view observed within them which usually favours whatever maximises individual happiness (Cruz et al., 2009) and promotes selfish decisions rather than collective ones (von Borgstede et al., 2013). This research focuses on the well-being of collectivities associated with a social space rather than the well-being of the individual.

In the HSD, the needs are seen as finite, few and classifiable, changing only in a slow pace along with the evolution of our kind (Elizalde, 2003; Max-Neef et al., 1989). What changes over time and between cultures are not the needs per se, but the satisfiers of these needs. Moreover, there is no one-to-one correspondence between needs and satisfiers. One satisfier may contribute to the satisfaction of different needs or, conversely, a need may require various satisfiers to be met. These relations are not fixed, they may vary according to time, place and circumstances (Max-Neef et al., 1991). Each economic, social and political system adopts different methods for the satisfaction of the same fundamental human needs. In every system, they are satisfied (or not satisfied) through the generation (or non-generation) of different types of satisfiers.

3. Materials and Methods

The methodology applied in this study is based on the subjective dimension of QoL presented in (Papachristou and Rosas-Casals, 2019b) and is mainly built on the HSD paradigm (Max-Neef et al., 1991) applying the

suggestions proposed by (Costanza et al., 2007). It is employed to measure this subjective dimension of QoL responding to SWB, as a result of the perceptions of people using and interacting with the urban and social space. Figure 1 shows the general steps followed during the assessment.

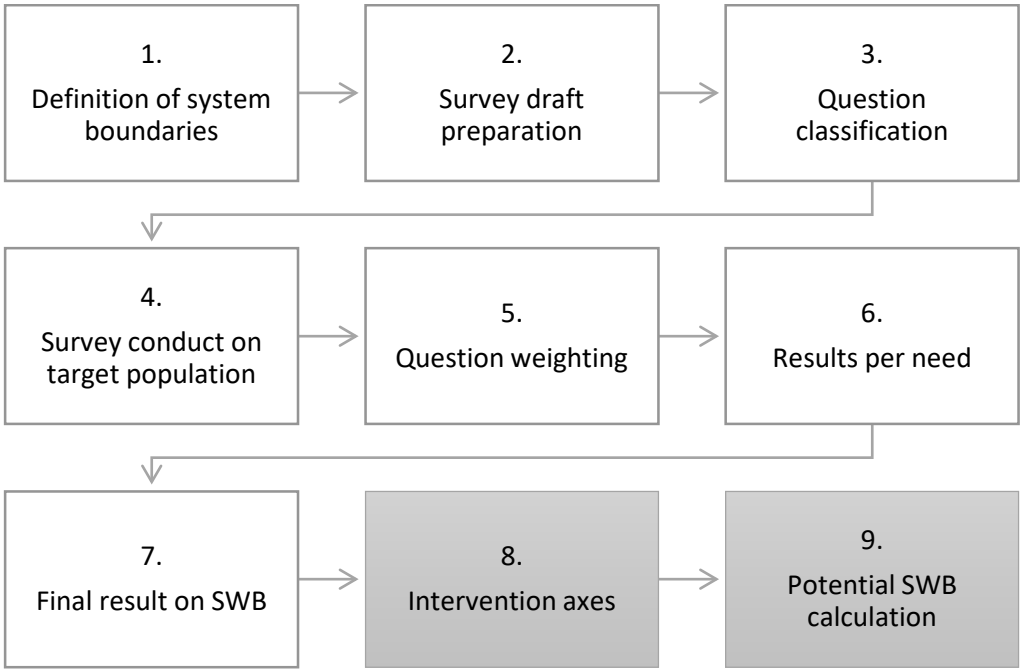


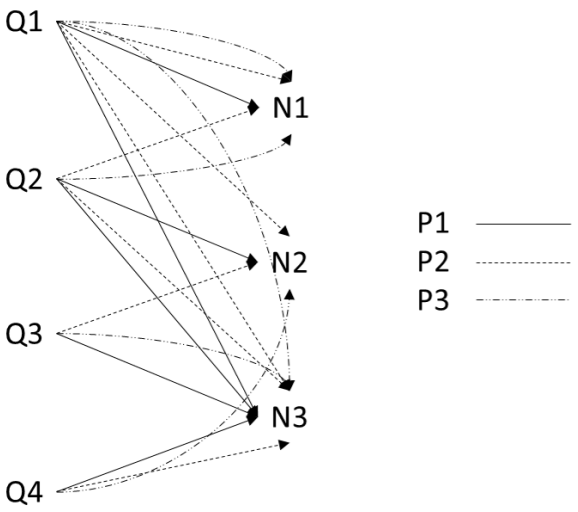
Figure 1: General methodological process. Steps 1 to 7 explain the procedure for the calculation of the partial results per need and the final result on SWB for the selected place and time, while steps 8 and 9 allow the calculation of a potential scenario of improvement for the future.

- **Step 1**. Definition of one´s (urban) system boundaries (time, space, culture, history, etc.) (Papachristou and Rosas-Casals, 2019b). The selected places constituting our case study refer to two different scales of the same urban area corresponding to Vila de Gràcia neighbourhood (Gn) and Virreina square (Vs) of Barcelona, Spain. Both Gn and Vs pertain to the Gràcia district, located at the north of the city. They were chosen for their cohesive urban and social fabric that provides high levels of participation and public engagement. Gn is characterised by an irregular urban grid with narrow streets and 16 public squares, many of which are considered to be emblematic[1]. The neighbourhood occupies the third position in terms of population in the city of Barcelona, with 50,448 inhabitants[2] out of 120,273 living in the Gràcia district, distributed within 1.3 km^2 and with a population density of 38,806 inhabitants/km^2. It is characterised for preserving its 'village' identity with (still) strong social cohesion. The use of public spaces in this neighbourhood is very intense and subject to high demand, often creating the need for balance between the well-being of the residents and the activities conducted in the public space. One of its most emblematic public spaces is Plaça de la Virreina. Vs was built in 1878 (when Gràcia was still a village at the outskirts of Barcelona) and continues to be one of the places within the area that gives the neighbourhood its "sense of village"[3]. This impression is created by the

parish church of Sant Joan and a set of low-rise houses located to the right of the square, originally inhabited by workers from Vila de Gràcia's once very important textile industry.

- **Step 2**. Survey draft preparation according to the socioeconomic and geographical characteristics of the chosen places (i.e., Gn and Vs). At this stage, all possible subjects assumed to affect individual and collective well-being were taken into consideration "in order to capture the perceptions of the dwellers and in relation to the selected places" (Papachristou and Rosas-Casals, 2019b). The survey – when applied – answers directly to the subjective dimension of well-being.
- **Step 3**. Question classification into categories[4]. As such, Max-Neef et al.'s (1991) axiological needs were used, with categories corresponding to Subsistence, Security, Affection, Understanding, Participation, Leisure, Creation, Identity, Freedom and Spirituality or Transcendence[5]. The matching of the questions to one or more needs is a subjective choice related to personal understanding and interpretation. In order to classify the survey questions into the ten fundamental human needs, the authors worked on the draft along with a study group of experts formed by researchers of the Sustainability Measurement and Modelling Lab[6] (SUMMLab) and the University Research Institute for Sustainability Science[7] (IS.UPC), both at the Universitat Politècnica de Catalunya–Barcelona Tech. They were selected considering their knowledge on subjects associated with sustainability issues. Questions (and groups of questions) associated to satisfiers before the group of experts weighted them into needs can be found in the Appendix A, Table A1. The selected study group was asked (i) to review the questionnaires in order to detect any missing aspects, and (ii) to match the given questions to the needs. The first task was undertaken in group, while the second was performed individually, bearing in mind that a question could be classified to more than one need, according to each individual's personal point of view (e.g., a question such as "How satisfied are you with your health?" can be categorised under Subsistence, Security, Freedom, and/or Spirituality/Transcendence).
- **Step 4**. Conducting the survey on the target population of the selected place. For our case study and in order to capture the perceptions of the locals related to SWB, two surveys were conducted in the aforementioned two levels (Gn and Vs) of the same urban area of Barcelona, Spain. They could be completed both online and in person, following an accessible and anonymous format, under Dillman et al.' s (1998) survey principles. They were made available between May-June 2012 for Gn and between September-October 2014 for Vs, leading to a total number of 174 and 51 responses respectively.
- **Step 5**. Question weighting inside each need. The process can be better understood by the use of an example. In Figure 2, three individuals forming the study group were invited to classify four questions into three needs. Considering Need 1, all three of them assumed that it is assessed by Q1 while two of them argued that it is also assessed by Q2. The Question weight is the ratio between the number

of people selecting that need and the total number of individuals performing the selections. In this case, the Question weights for this specific need (N1) would be 3/5 for Q1 and 2/5 for Q2.



Need	Question	# People	Question weight
N1	Q1	3	3/5
	Q2	2	2/5
N2	Q1	1	1/4
	Q2	1	1/4
	Q3	1	1/4
	Q4	1	1/4
N3	Q1	3	3/9
	Q2	2	2/9
	Q3	2	2/9
	Q4	2	2/9

Figure 2: Correspondence of questions (Qi) to needs (Ni) according to the perceptions of the different people (Pi) included in the study group. In this case, the study group consists of 3 people (P1 – P3), each of them expressing her perceptions on the classification of questions per needs. For example, considering N1, all of them believe that it is assessed by Q1 while P2 and P3 believe that it is also assessed by Q2. The Question weights for this specific need are 3/5 for Q1 and 2/5 for Q2, where 5 is the sum of the selections people made for that need.

Source: (Papachristou and Rosas-Casals, 2019b).

- **Step 6**. Calculation of the percentage of satisfaction for each need. To do so, a matrix per need is created, where, in addition to the columns presented in Figure 2, four new ones are added corresponding to: (i) a threshold for each question, (ii) the answer (in percentage) coming from the surveys, (iii) the threshold satisfaction and (iv) the total score. Taking for instance N3 from Figure 2, and knowing both, the responses to the questions classified in it and the threshold related to each question, we can proceed to the calculation of its satisfaction as shown in Table 1. Q2 for example does satisfy the threshold as it reaches an 82% which is higher than the 50% of the threshold. As a result, the threshold is recorded as satisfied ("Yes") and the question weight is added to the final column of the total score. When the answers for a question do not satisfy the threshold (as in the cases of Q1 and Q3 of Table 1), their weight is not added to the total score. The need satisfaction is the sum of the total scores per question associated with that need. For example, for N3 we have a total score of 4/9.

Table 1: Example for the calculation of the satisfaction per need.

Need	Question	# People	Question weight	Threshold	Answer	Threshold satisfaction	Total score

N3	Q1	3	3/9	> 50%	37%	No	0
	Q2	2	2/9	> 50%	82%	Yes	2/9
	Q3	2	2/9	< 50%	52%	No	0
	Q4	2	2/9	> 50%	63%	Yes	2/9
						N3 satisfaction	**4/9**

- **Step 7**. Final result on SWB for our selected place(s) and time(s). We calculate the mean value of the percentages of satisfaction for the ten needs (i.e., Subsistence, Security, Affection, Understanding, Participation, Leisure, Creation, Identity, Freedom and Spirituality/ Transcendence) as we did in the previous example for N3 (Table 1). This final value corresponds to the total satisfaction regarding SWB.

  The process from step 1 to step 7 can be completed within a matrix (see Table 2), where columns are identified in the following way:

  i. **Need**.
  ii. **Questions**, associated with each need. Each need is assessed by means of a number n of questions. Same questions can be used to assess different needs (i.e., question 2 is included to assess need A and need B).
  iii. **Question weight**, includes the partial weight w_n as % of each question, following the weighting process conducted by the group of experts and/or the community (see Section 3.3). Recall that a need is associated with a particular group of questions, and weights for these questions must add up 100%.
  iv. **Answer**, expressed in terms of the highest satisfaction percentage (i.e., associated with values 4 and 5 in the case of a 1 to 5 scale, or Yes in the binary case).
  v. **Threshold**, normally when more than 50% of the sample answers positively to a question.
  vi. **Satisfaction** associated with this threshold, identified with the binary variable b_n^S, showing whether the percentage of satisfied people is higher than the threshold (with a numerical value of 1) or not (with a numerical value of 0).
  vii. **SWB score** (S_N^S), for each need, and as the summation of the product of each question weight (column 3) by its satisfaction (column 4.c).

Table 2: SWB assessment matrix.

(i) Need	(ii) Question	(iii) Weight	(iv) Answer	(v) Threshold	(vi) Satisfaction	(vii) Score
A	1 2 … n	w_1 w_2 … w_n			b_1^S b_2^S … b_n^S	$S_A^S = \sum_n b_n^S w_n$

B	2 3 … n	w_2 w_3 … w_n			b_2^s b_3^s … b_n^s	$S_B^S = \sum_n b_n^s w_n$
…	…	…	…	…	…	…
N	i j … n	w_i w_j … w_n			b_i^s b_j^s … b_n^s	$S_N^S = \sum_n b_n^s w_n$
QoL						$\overline{\boldsymbol{S_N^s}}$

- **Step 8**. Intervention axes. In this stage the procedure is carried out per need and the focus is on their related questions that fulfil two important conditions: (i) the majority of the study group individuals has classified them into the reference need and (ii) they do not satisfy the threshold and consequently their weight has not been added to the total score column (e.g., as in the case of Q1 for N3 presented in the example of Table 1)[8]. Making a list of these questions per need and classifying them into bigger thematic classes allows a qualitative analysis on urban or social deficiencies for the selected place. These bigger classes will correspond to the axis of intervention. In order to perform the classification we represent the questions' connections with their pertaining needs graphically in a network. A network is, in its simplest form, a collection of points joined together in pairs by lines (Newman, 2010). The points are referred to as vertices or nodes and the lines are referred to as edges. In our case, the aforementioned questions and needs are represented as nodes and the connections between them as edges. The width of the edges illustrates the weight of each question inside each need, according to the classification conducted by the expert group. The node size represents the number of its connections, or its degree. Consequently, the satisfaction of questions with bigger node size (i.e., higher degree) affects more needs and it is where priority should be given. Questions are grouped in thematic classes according to their geographical proximity in the graph. These classes form the intervention axes where a community, neighbourhood or city would have to focus in order to achieve a better satisfaction result per need and, consequently, a higher SWB value.
- **Step 9.** Potential SWB calculation. The new, potential value of SWB is again calculated using the mean of the potential satisfaction per need and per place.

4. Results

The main statistics for the total of responses for Gn and Vs are shown in Table 4. To maximally avoid any exclusion, focus was put on all people using the space in question and not only on those living there, i.e., the survey was addressed to all types of citizens: people living in the place of reference and also people using the urban space for recreational, family reasons, shopping, working, etc. From those not living in Gn, a majority was living in the nearby neighbourhoods such as Sant Gervasi, Eixample, and Sagrada Família. For Vs, there

was also a 10% living in close neighbourhoods such as Camp d'en Grassot, Eixample or Vallcarca. Although we observe an over-participation of responders with degrees in higher education, it seems it is often the case in this type of surveys (see (Brenner, 2002; Wolfgang, 2002)).

Table 3: Main statistics of the samples.

	Groups	Gn %	Vs %		Groups	Gn %	Vs %
Gender	Female	50.6	58.8	**Place of origin**	Vila de Gràcia	51.6	68.6
	Male	49.4	41.2		Other neighbourhoods of Barcelona	35.6	31.4
					Metropolitan area	9.2	-
Age	14-17	0.6	0.0	**Activity**	Public sector	38.9	17.7
	18-24	10.9	5.9		Private sector	27.9	37.3
	25-30	21.3	33.3		Student	25.0	19.6
	31-44	35.6	41.2		Unemployed	3.5	3.9
	45-64	28.2	15.7		Pensioner	3.5	3.9
	65+	3.5	3.9		Self-employed	3.4	11.8
Relation with selected space	Lives there	51.6	9.8	**Education level**	Primary education	1.7	3.9
	Had lived there	1.7	2.0		Lower secondary	0.6	2.0
	Lives close	1.2	27.6		Upper secondary	2.3	17.7
	Works there (or close)	4.0	43.1		Technical studies	7.5	13.7
	Recreational reasons	29.9	13.7		Bachelor	11.5	11.8
					2nd cycle of studies	36.6	45.1
	Shopping	5.8	3.9		Master	20.7	-
	Family reasons	1.7	0.0		PhD	20.1	5.9

4.1 Survey analysis

As far as the satisfaction with different aspects of life (such as health, life in general, free time, place where they live, family life, social life and social status) is concerned (Figure 3a), the average of the answers were above 3 over 5 with the exception of money for Vs. The collective average satisfaction with life aspects was 3.8 over 5 for Gn and 3.6 for Vs. At the same time, there was a significant percentage considering their time spent at work as no creative (31.6% for Gn and 32.7% for Vs). Despite this fact, they appeared rather satisfied of their general time distribution (with an average of 3.1 over 5 for both sites).

Regarding aspects associated with quality of urban life in the two sites (Figure 3b) such as traffic, noise, pedestrian areas, green spaces, sanitation facilities, and air and water quality, responders seemed rather dissatisfied, with the average satisfaction reaching 2.9 units at the scale of 5 for Gn and 3.2 for Vs. The least punctuated aspect appears to be green spaces, reaching an average of 2.2 for Gn and 2.3 for Vs. There was also a low satisfaction regarding noise, traffic and air quality.

Although most respondents were renters (50.6% for Gn and 62.6% for Vs), they stated "feeling at home" when they were there (87.4% for Gn and 86.3% for Vs). The great majority also felt absolutely or rather safe around the neighbourhood and the square (79.3% for Gn and 82.4% for Vs). Notwithstanding, there was a 6.9% for Gn and a 13.7% for Vs that had experienced violence in the familiar environment, and a 12.6% and 23.5%

respectively that did not feel free as persons. Another interesting datum is that besides the actual turbulences in the economic and political spheres both in Barcelona and Spain, the great majority (74.1% for Gn and 76.5% for Vs) appeared optimistic, stating that they could make plans for the future.

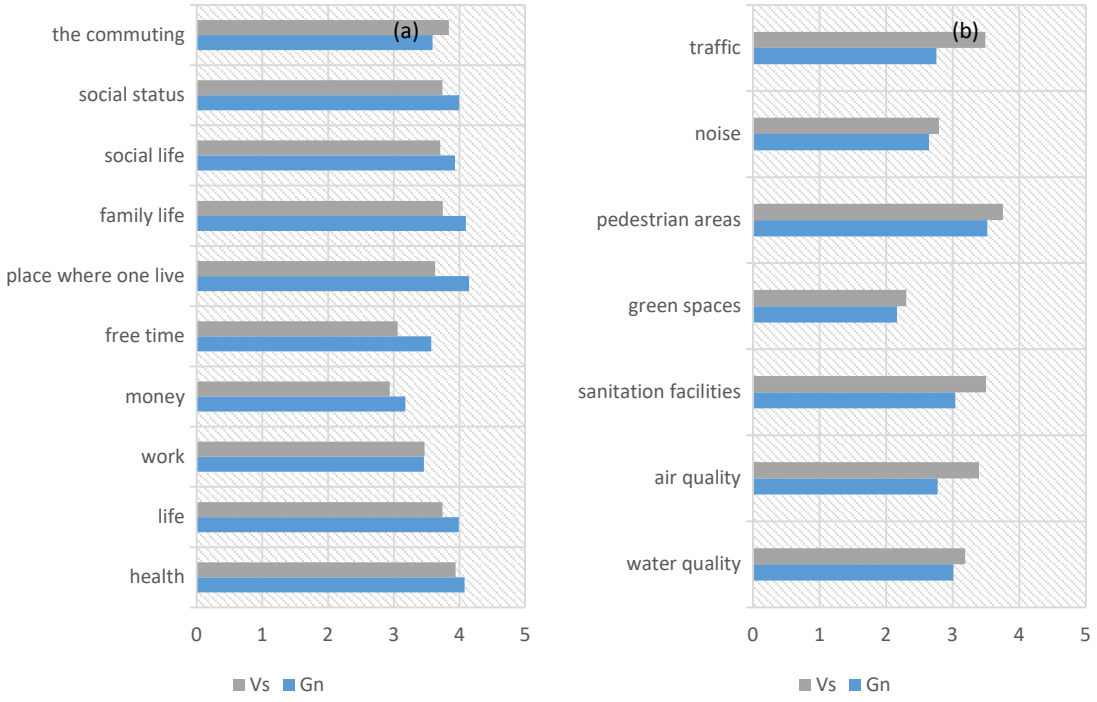


Figure 3: Averages of satisfaction with different aspects (a) of life and (b) of quality of urban life, in Gn and Vs rated from 1 (not satisfied) to 5 (completely satisfied).

As far as environmental practices are concerned, the questioned claimed they do recycle, save energy and water, with values ranging from 86% to 94% for Gn and from 78% to 86% for Vs. They also prefer walking to their destinations (86.8% for Gn and 64.7% for Vs) or using the public transport (90.2% and 82.6% respectively) though they do not show a preference for bicycle as a common means of transport (52.9% and 47.1% respectively). They neither tend to share their homes (only 31.0% and 47.1% respectively) or cars (only 23% and 43% respectively).

About the level of attachment to significant others, the Gn sample seemed emotionally dependent on other people. 46% scored their emotional dependence on their family with 4 or 5 over 5 (with an average of 3.2) and 23% scored the same dependence on their friends (with an average of 2.7). For Vs scores were lower, with 20% appearing fully or mostly dependent on their family and only 8% on their friends. Averages in this case were of 2.6 units over 5 for their family and 2.2 for their friends.

When it came to feelings, a majority stood for positive ones in both sites (see Figure 4(a)), giving them an average frequency higher than 3 over 5. A greater dispersion was observed for negative ones (see Figure 4(b)). In this latter case, worry was the most frequent feeling, reaching an average of 3.5 for Gn and 3.4 for Vs. Stress

seemed to be another concern for the responders, with average frequencies of 3.3 and 3.5 respectively. The least frequent negative feeling was anger, with average frequencies of 1.5 and 1.7 respectively.

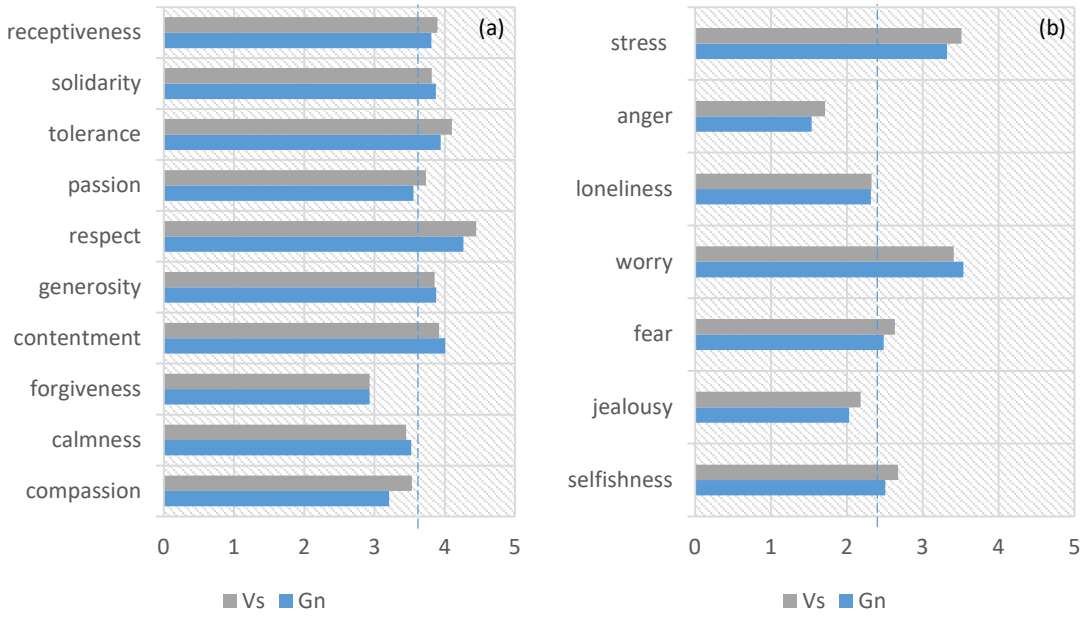


Figure 4: Average frequency of positive (a) and negative (b) feelings for Gn and Vs rated from 1 (rarely) to 5 (very often). For most positive feelings a frequency close to 4 (often) is commonly observed. Discontinuous lines indicate the average value. Frequencies for negative feelings appear to be more disperse. Most responders seem to experience worry and stress often while other feelings such as anger appear the last in the list, as rarely experienced.

Figure 5 shows connectivity graphs with feelings that, according to the questionnaires' answers, would change in a different urban environment, both for Gn (a) and Vs (b). In this representation, feelings were connected when appearing together in a response. The node size represents the frequency of appearance of every word while the thickness of the links (edges) represents the weight between each connection or the co-appearance frequency. Stress, calmness, fear and loneliness dominate both graphs, while in (a) solidarity, tolerance and respect also play an important role. At the bottom of the list appears compassion, jealousy and forgiveness for Gn, and compassion, generosity, passion, selfishness and jealousy for Vs as feelings that would be least affected by a change in urban environment.

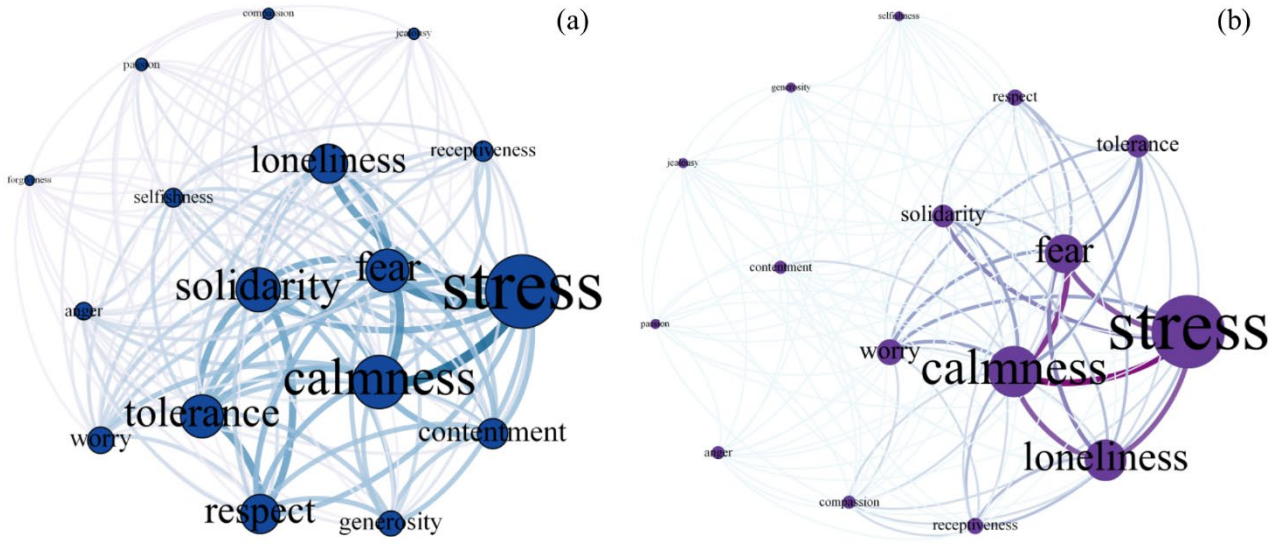


Figure 5: Feelings that would change in a different urban environment for Gn (a) and for Vs (b). Feelings were connected when they appeared together in a response. The node size represents the frequency of appearance of every word while the thickness of the strings (edges) represents the weight between each connection or the co-appearance frequency. "Stress", "calmness", "fear" and "loneliness" dominate both graphs, while in (a) "solidarity", "tolerance" and "respect" also play an important role. (Visualisation created with Gephi.)

4.2 SWB assessment

As stated in Section 2, SWB is associated with perceptions related to people's and collectivities' experiences and lives. For its measurement, the classification of questions per need is applied as analysed in step 3 (see Figure 1, Section 3), followed by the process explained in steps 4 and 5 (see text related to Figure 2 and Table 1). Table 5 shows an example of the process of classification and weighting of the survey questions into the corresponding needs, where Gn questions refer to the neighbourhood of Vila de Gràcia and Vs questions to Virreina square. For example, for question Gn7, associated with the satisfaction with one's health, we can see that 83% of the study group classified it in Subsistence, resulting in a weighting score of 2.75% for that need. At the same time, 67% of the experts classified it in Freedom, resulting in a weighting score of 1.72% for that need. The threshold remains the same for both needs (or study categories) representing that if more than 50% percent of the responders are satisfied (5 over 5) or rather satisfied (4 over 5), the weighting score will be added to the total of each need (last column). For this Question, and according to the "Answer" column, the score reaches 81% and the threshold is satisfied. The same happens with question Gn41, which is only related to Security need according to the experts' opinion. This is not the case, though, for question Vs75 related to stress experiencing frequency, where the threshold is not satisfied and the question weight is not added to the total score of the need. The same process is followed for the rest of the questions of both surveys in order to obtain a result for each need individually and for the SWB as a total.

Table 4: Classification and weighting example. Gn questions refer to the neighbourhood of Vila de Gràcia and Vs questions to Virreina square.

Need	ID	Question	# People	Question weight	Threshold	Answer	Threshold satisfaction	Total score
Subsistence	Gn7	How satisfied are you with your health?	83%	2.75%	4-5 > 50%	4-5: 81.03%	Yes	2.75%
Freedom	Gn7	How satisfied are you with your health?	67%	1.72%	4-5 > 50%	4-5: 81.03%	Yes	1.72%
Security	Gn41	How safe do you feel at the neighbourhood of Vila de Gràcia?	100%	3.02%	4-5 > 50%	4-5: 79.31%	Yes	3.02%
Creativity	Vs75	How often do you experience stress?	67%	3.13%%	1-2 > 50%	1-2: 17.65%	***No***	***0.00%***

Final results per need (step 6, Figure 1, Section 3) are given as a percentage and they are shown in Table 8 (initial values) and Figure 6. The most satisfied needs for Gn are Participation (67.3%) and Identity (71.6%). Leisure (50%), Creativity (51.9%) and Spirituality/ Transcendence (46.1%) are the least satisfied ones. The rest of the needs related to Subsistence, Security, Affection, Understanding and Freedom are found in between, with percentages varying from 56.9% to 59.2%. The total satisfaction corresponding to SWB (step 7) reaches only 57.7%.

For Vs, results both per need and in total are slightly higher in most categories, excluding Participation, Leisure and Creativity. The three most satisfied needs are Subsistence (73.2%), Affection (73.2%) and Security (70.7%). The least satisfied needs are Leisure (50%) and Creativity (51.6%). Needs such as Understanding, Participation, Freedom and Spirituality/ Transcendence range from 58.7% to 67.7%. Total satisfaction or SWB reaches 63.1%.

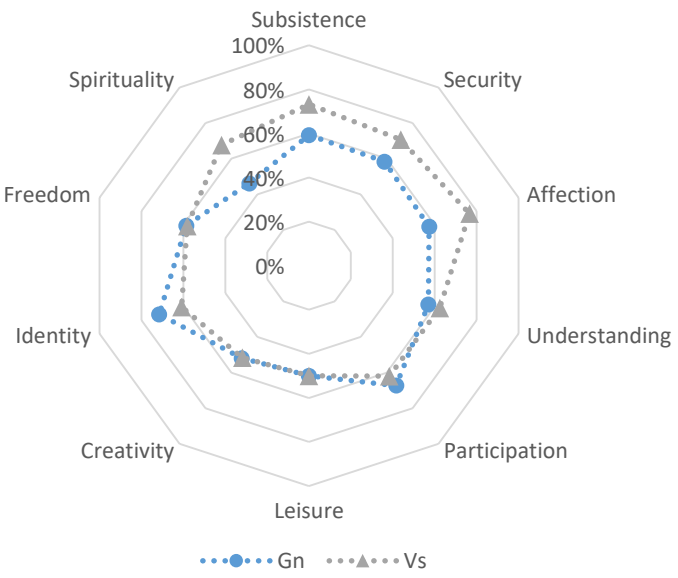


Figure 6: SWB assessment satisfaction results per need for Gn and Vs.

4.3 Intervention axes

The identification of intervention axes (step 8, Figure 1, Section 3) allows the creation of potential future scenarios for SWB improvement. To identify the axis, only highest-ranked questions whose thresholds were not satisfied are selected per need and represented in a network (see step 8, Section 2). Our two networks, regarding Gn and Vs respectively, are created in NodeXL[9] with questions and needs being represented as nodes and connections between them as edges (see Figure 7(a) for Gn and (b) for Vs). The width of the edges illustrates the weight of each question related to each need, according to the classification conducted by the experts group. Node size is equivalent to the number of its connections. Question nodes are coloured according to the number of their connections (i.e., node degree).

For both places there are highest-ranked questions connected to more than one need. Leisure, Freedom and Creativity share most of the questions in both networks, while Spirituality and Affection share many questions only in the case of Gn. Particularly, in Gn (Figure 7(a)):

- The most connected questions are Gn69, Gn86 and Gn82[10], classified and affecting four or five (in the case of Gn82) different needs. They form the first intervention priority represented with red colour.
- The second priority questions are Gn81, Gn88, Gn112 and Gn114-19; they are connected to three needs and represented with green colour.
- The third priority questions are Gn19, Gn47, Gn48, Gn59, Gn70, Gn73, Gn74, Gn76, Gn87, Gn90, and Gn128, influencing two needs and represented with dark blue colour.
- The rest of the questions, being the most peripheral in the network, form the fourth priority and are represented with light blue colour.

in Vs (Figure 7(b)):

- The most connected questions are Vs93 and Vs 94[11], forming the first priority.
- The second priority form questions Vs99, Vs114 and Vs116-20.
- In the third priority belong the following questions: Vs13, Vs20, Vs21, Vs24, Vs52-54, Vs72, Vs75, Vs88, Vs91, Vs95, Vs100, and Vs123.
- The rest of the questions form the fourth priority. Colours represent priorities and follow the same pattern as in Figure 7(a).

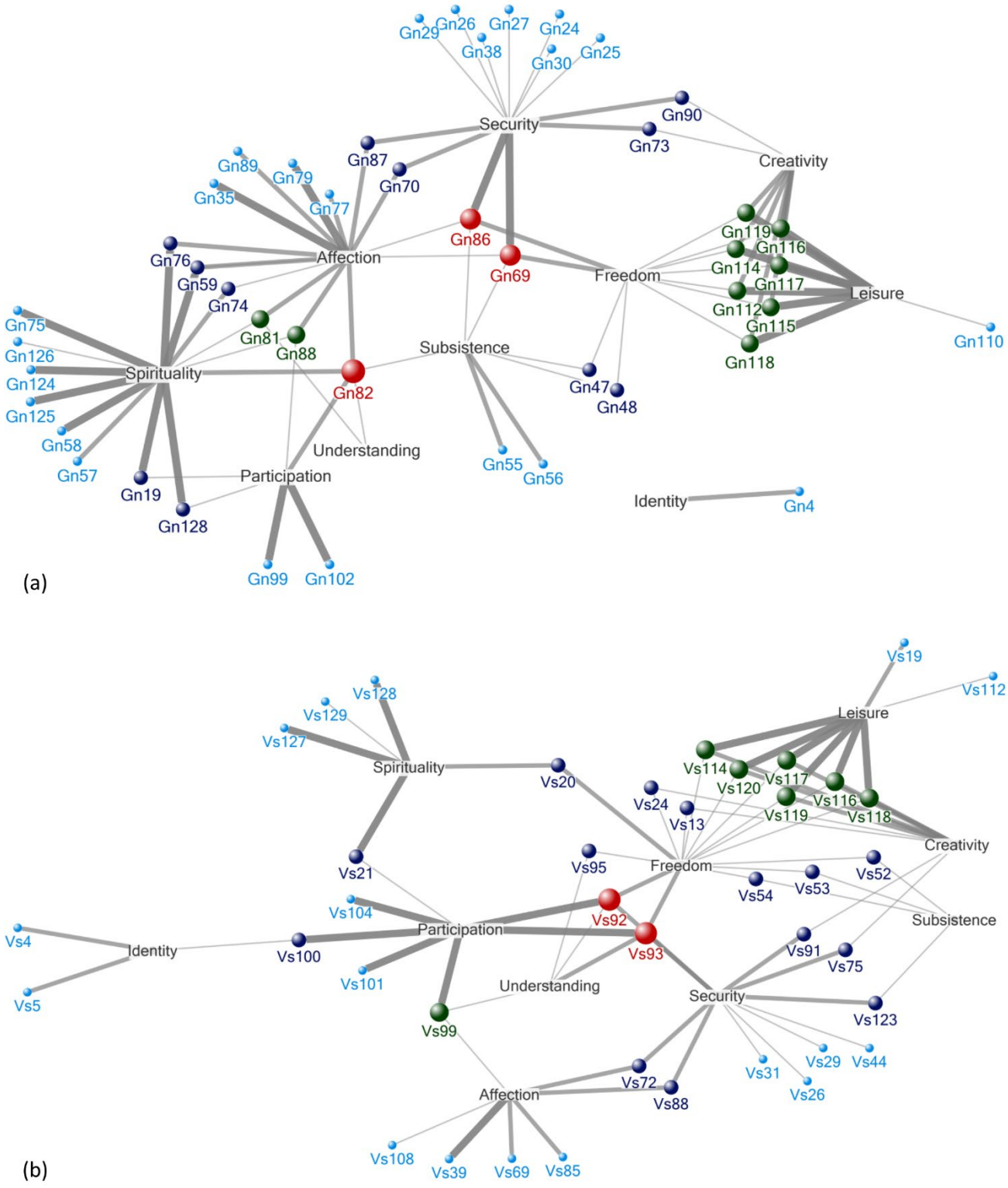


Figure 7: Connectivity map among highest-ranked questions (whose thresholds were not satisfied) and needs, for Gn (a) and Vs (b). Visualisation created with NodeXL.

Percentages of questions belonging to each priority for both Gn and Vs are shown in Figure 8. Most unsatisfied highest-ranked questions for both sites are of fourth priority. Very few questions (around 6%) are of first priority. This fact facilitates the intervention axes procedure.

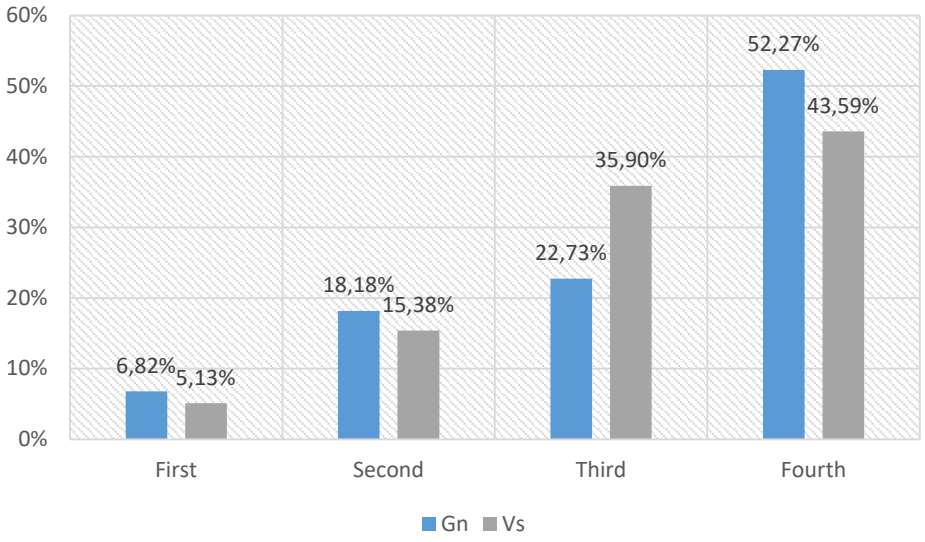


Figure 8: Percentage of highest-ranked unsatisfied questions per priority for Gn and Vs.

We classified the above questions into bigger thematic classes according to their position in the graph (see Figure 7 (a) and (b)). Their geographic distribution is a result of their connections to the ten needs. Close-appearing questions belong to the same class. These classes correspond to the intervention axes (see step 8, Figure 1, Section 3) where the community, the neighbourhood or the city would have to focus in order to achieve a better satisfaction result per need and in total (see step 9, Figure 1, Section 3). Highest-ranked unsatisfied questions for Gn (Table B1) and for Vs (Table B2) classified per Priority and Axis can be found in Appendix B. The last column of those tables corresponds to the axis priority, being it the average of the priorities of the questions classified in each Axis. Highest-ranked questions referring to Identity need (Gn4, Vs4 and Vs5) are not included in the improvement axis as they depend on the sample (i.e., age and gender) and not on improvable elements of the urban sphere. In Table 5, a summary of all axes is given, with the corresponding axis priority per each site. A new column is added with some proposed actions for mitigation.

Table 5: A summary of the Intervention Axes for Gn and Vs with their priority and some proposed actions for mitigation. We observe that most of the axes are similar for both scales. For detailed data see Appendix B.

Intervention Axes	**Axis priority**		**Actions examples**
	Gn	***Vs***	
Reduce fear	1	-	Make neighbourhood more walkable. Illuminate dark areas. Transform empty lots into public spaces.
Encourage perception of inclusiveness	-	1	Citizen involvement. Enhance participatory processes. Activate social grid. Promote social platforms.
Promote free-time activities and improve time distribution	2.25	2.6	Promote public and accessible to all expositions, projections, music festivals. Time management courses. Effective and on-time public transport.
Increase caring feelings	2.89	-	Promote voluntary programs.

			Promote social engagement.
Promote sharing/ Sustainable way of living	3	3	Car-sharing platforms. Flat-sharing platforms. Bicycle lines. Bicycle parking infrastructure.
Reduce stress	3	3	Effective circulation management. On time public transport. More green areas. More pedestrian areas.
Reduce worry	3	3	Make neighbourhood more walkable. Time management courses. Effective and on-time public transport.
Be informed	-	3	Metro news spots. Emissions regarding the commons in local channels.
Surviving	-	3	Establish minimum salary.
Facilitate connection with nature and inner self	3.75	3.6	Facilitate access to nature. Create more green space. Help in understanding the importance of spirituality.
Improve civic commitment	4	3.25	Encourage participation in community life.
Improve urban life quality	4	4	Reduce noise levels, improve water quality. Implement traffic reduction/regulation measures. Promote public transport. More green areas. Facilitate home ownership. Establish maximum rent per neighbourhood. Facilitate long-term rents.
Diminish dependence on others	4	-	University scholarships. Student help programs. Start-ups supporting. New entrepreneur programs.
Responsibilities/ Having children	4	4	Make neighbourhood more walkable and safe. Facilitate public school entrance to single parents. Establish more days of maternity and paternity leave.
Reduce selfishness	-	4	Citizen involvement. Enhance participatory processes. Activate social grid. Promote social platforms. Promote social engagement.
Enhance sociability	-	4	Create meeting points. Invest in embracing and inclusive urban furniture.

4.4 Potential SWB improvement

The implementation of actions such as those associated with each intervention axis of Table 5, allows the satisfaction of the highest-ranked unsatisfied questions found during the initial SWB assessment (see Section 4.2 and 4.3). The satisfaction of these questions allows an increase in the satisfaction of each need. In general, we can observe an increase varying between 4.3% and 38.9% for Gn and 7% and 35.9% for Vs as shown in Table 6 and Figure 9. The categories or needs that accept the least potential increase (less than 10%) are Understanding for both places and Identity for Gn. At the same time, categories that accept the highest potential increase (more than 30%) are Security, Leisure, Creativity and Spirituality/Transcendence for Gn and

Leisure and Creativity for Vs. These results show that a potential increase in the total SWB up until 22% for Gn and 18% for Vs can be reached.

Table 6: Initial and potential SWB and need fulfilment for Gn and Vs after applying actions associated with the intervention axes of Table 5.

Need	Gn SWB			Vs SWB		
	Initial %	Potential increase %	Potential %	Initial %	Potential increase %	Potential %
1. Subsistence	59.22%	16.76%	75.98%	73.20%	8.25%	81.44%
2. Security	58.29%	30.15%	88.44%	70.70%	21.86%	92.56%
3. Affection	57.31%	28.08%	85.38%	73.20%	13.49%	86.69%
4. Understanding	56.91%	4.42%	61.33%	62.37%	6.99%	69.35%
5. Participation	67.29%	13.55%	80.84%	61.99%	18.10%	80.09%
6. Leisure	50.00%	33.33%	83.33%	50.00%	31.25%	81.25%
7. Creativity	51.91%	32.82%	84.73%	51.56%	35.94%	87.50%
8. Identity	71.55%	-	71.55%	61.29%	-	61.29%
9. Freedom	58.62%	19.83%	78.45%	58.68%	26.03%	84.71%
10. Spirituality/ Transcendence	46.11%	38.86%	84.97%	67.65%	15.88%	83.53%
Total/ SWB	**57.72%**	**21.78%**	**79.50%**	**63.06%**	**17.78%**	**80.84%**

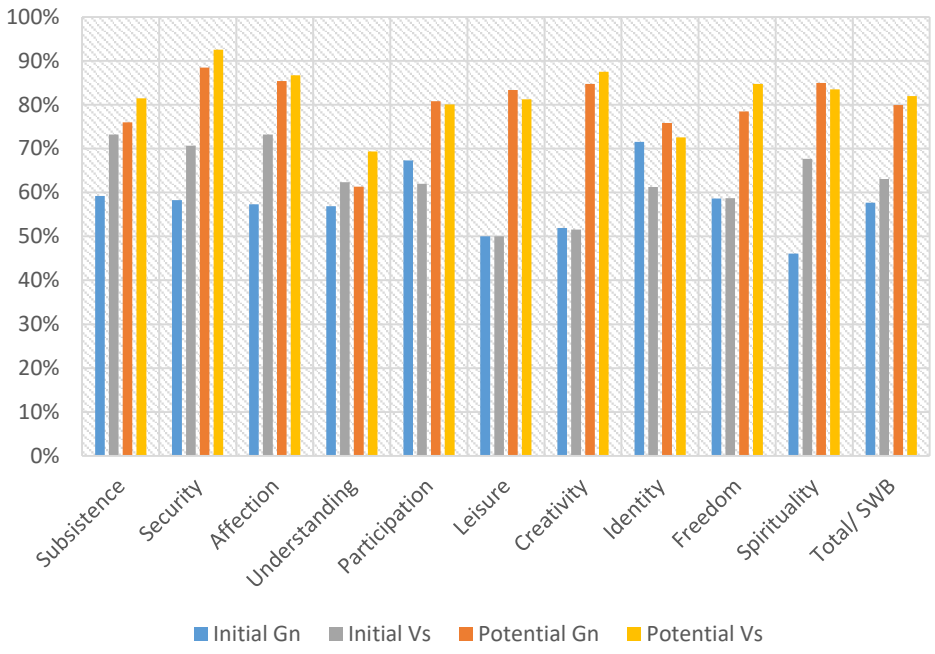


Figure 9: Initial and potential need fulfilment and SWB for Gn and Vs.

5. Discussion and conclusions

The methodology presented in this paper challenges the established orthodoxy – inherent in urban studies practices – by focusing on a 'bottom up' approach to the perception of social space. This community-led

perspective allows a critical examination of the many facets of the social, physical, cultural, economic and environmental space that have a central role in our planning system. Human attention to the whole system of life is generally considered indirect, with a main direct interest for one's own safety and happiness and, at times, development (Doxiadis, 1974). While equilibrium, on the basis of human satisfaction, is one's ultimate goal when dealing with his system of life, urban spaces shape and condition how individuals and groups think and conceive of themselves, cultivate and develop personal and collective identities, and contest, as well as reinforce, prevailing meanings of race, class, gender, sexual orientation, and other social inequalities (Gotham and Brumley, 2002). As shown here, dwellers believe some of their feelings would change in different types of urban environment, with stress and calmness leading the list, followed by fear and loneliness. This is also validated in previous research that showed both that local attachment may result from a positive perception of the place in question and that perceptions of the local environment have a direct and independent effect on place attachment (Mesch and Manor, 1998), contributing to individual's well-being (Scannell and Gifford, 2017). A city, a neighbourhood, a community and parts of them such as a street or a public space can be seen as systems that produce complexity (Batty, 2009). Those types of systems consist of diverse rule-following entities with interdependent behaviours (Page, 2011). The entities interact over a contact structure or network and they often adapt. Humans or dwellers are seen in this study as entities directly associated and constantly interacting with the urban system. Consequently, the methodology applied takes into consideration the collectivities' aggregated diversity, coming from each individual participant. It can be catalogued as a user-centred approach – particularly one where users and uses involved determine what happens to the natural or social space, and that its effects on them are brought about by social agents and their actions, as in (Gans, 2002) – with a focus on collectivities rather than on an individual-based well-being.

SWB is here thus interpreted and understood as something complex and multidimensional: it depends on the chosen spatial and temporal scales, the methodology applied, the target group of the surveys, the study group selected for the classification of questions into needs, etc. Therefore, an effort to incorporate all different options and aspects that may affect someone's well-being, and the fulfilment of her needs is considered as mandatory. A good interpretation of the accumulated data may lead to the creation of a visual representative image of the sample for the selected time and foresee in it what is missing, what goes wrong and what is affecting personal happiness (Papachristou and Rosas-Casals, 2015). The use of human needs as study categories aims at understanding the category in which a problem may be concentrated (Papachristou and Rosas-Casals, 2019b). As mentioned previously, needs indicate deprivations and at the same time individual and collective human potential (Max-Neef et al., 1991). Starting off this fact and adding that such subjective measurements are useful for social policy (Veenhoven, 2002), this methodology may also be appropriate when having to decide the focus of a decision making process, concerning future policies, plans and measures of improvement. At the same time – and keeping in mind that the fulfilment of all needs is considered as equally

important since any unsatisfied or not adequately satisfied human need reveals a form of human poverty (Max-Neef, 1992) –, the methodology can be considered a useful tool both to evaluate and promote feasible solutions regarding the selected space with the aim to achieve a better one, concentrating the efforts on the SWB of the dwellers.

As with all subjective measurement tools, we may also encounter some drawbacks. Perception does not depend just on physical space components, elements and features but also on the values, past experience and socio-cultural conditioning of the observer (Brabyn, 1996). Consequently, elements such as cultural norms, mental illness and absence of information may affect individual responses (Moro et al., 2008). In addition, most show a happy face to the world (Kirita and Endo, 1995; Rhodes et al., 2003) and typically deduce their happiness level by comparing it with their fellow groups'. Nonetheless, subjective responses should not be overlooked or misinterpreted (Costanza et al., 2007). Self-reported well-being sets a satisfactory empirical proxy for individual happiness (Di Tella and MacCulloch, 2006; Diener et al., 1999; Moro et al., 2008), revealing adequate validity, reliability, factor invariance, and sensitivity to change (Diener, 1994).

The methodology highlights some key problems and potential solutions faced by space users of two places in Barcelona. In spite of our samples being small and having an over-participation of responders with degrees in higher education, the aim to check the functionality of the proposed methodology through the two study cases is accomplished successfully. Specifically, results show that the lowest satisfaction on needs corresponds to Leisure, Creativity and Spirituality/Transcendence. Leisure and Creativity are considered as highly interrelated in modern societies. In fact, Max-Neef et al. (1991) state that "Idleness" (Leisure in our case) "and Creation" (Creativity in our case) "seem to be inseparable if the former is understood as the state of mind and spirit that is inviting to the muses" as in Bertrand Russell's "In Praise of Idleness" (Russell, 1932). It seems that our present-day extremely (pre)occupied and stressed way of life clearly affects the perceived satisfaction of these needs. Hours spent on television, on the Internet, using smart phones, video games and the low participation in productive processes might be the possible answer to the obtained low creativity score. In the actual economic model, human creativity – i.e, thinking of novel and productive ways to do things – is generally declining and being replaced by high-tech apparels and gadgets (Csikszentmihalyi, 1996; Johnson, 2010). In the case of Spirituality/Transcendence, highest-ranked unsatisfied questions are associated with the frequency of attainment to spiritual celebrations, time spent in spiritual activities, frequency of meditation/pray, how spiritual one feels, access to nature and frequency of positive feelings such as calmness, forgiveness and compassion. An explanation would be that people tend to connect this category only with religion and not with nature or well-being, as suggested in (Kamitsis and Francis, 2013). Although in this case we would expect a similar result for Vs.

In general, a lower satisfaction is detected in all Gn needs while comparing them with the Vs ones but for Participation and Identity. This result is quite interesting when connected with the period of time of the realisation of both surveys. Indeed, three characteristic events associated with social, economic and political instability occurred in the studied area during the period that also justify the high levels of worry and stress in the population. Firstly, the severe economic and social crisis in which Spain entered since 2008. Secondly, not long after the opening of the Gn survey a great demonstration was organised in Barcelona, on May 12th, as a reminder of the one year since the first demonstration of 15M movement (Buesa et al., 2010), probably affecting the perception of the questioned. Thirdly, the Vs survey concurred with the petition for a referendum from the part of Catalan people to the Spanish government, directly related to their sense of Participation and Identity. Indeed, there were two responses in the survey indicating that their well-being is also affected by "pressure coming from government and financial institutions" and the "present political situation associated with the referendum". Nevertheless, there are some concrete survey results that contradict the expected perceptions on the subject. For example, the percentage of dwellers sharing their home with other people is low despite the significant growth in housing prices that has been observed during these past decades (Altuzarra and Esteban, 2011; De Weerdt and Garcia, 2016). Also, regardless of the pressure of fiscal austerity, the reduction and privatisation of public services such as social and health assistance, education and community amenities (Garcia and Haddock, 2016), most do feel safe living in this, middle-income neighbourhood and appear optimistic, stating that they can make plans for the future. Finally, dwellers appear to complain for the low levels of citizen participation but, at the same time, they do not work as volunteers, participate to any association, have any control of the communitarian, political or social life or even participate in neighbourhood assemblies. A possible solution for further enhancement of these two needs would be to focus on the creation of contact zones and spaces of interaction (Askins and Pain, 2011). Identity, besides, is a primary motivator of ones behaviour, i.e., it comprises a set of meanings defining who she is and how she ought to behave (Kyle et al., 2014).

The intervention axes allow detecting where the focus should be in order to achieve a better satisfaction result per need and in total. Most axes are similar for both sites permitting an integral policy or strategy implementation for the whole neighbourhood, according to their priority (see Table 5). Starting from supressing fear for Gn and encouraging perception of inclusiveness for Vs, actions are proposed for all axes. Furthermore, Leisure, Freedom and Creativity seem to share most highest-ranked, not satisfied questions which means that a first focus on the satisfaction of these needs for both sites would have a direct multiplier effect on the total result. The same serves for Spirituality/ Transcendence and Affection although for Gn case only. We also show that taking into consideration only the most highest-ranked questions of each need and promoting solutions to improve perception on the items associated with them may lead to an average increase of 20% on the current SWB levels. Another important general conclusion is that the least satisfied needs are

those with the highest potential increase once intervention axes are taken into account, while the most satisfied ones are those with the least possibilities to increase their satisfaction. The low (or zero) potential increase in Understanding and Identity is due to the lack of highest-ranked unsatisfied questions. That means that even if there exist unsatisfied questions, they are low-ranked according to the expert's classification.

As a summary, this paper proposes a methodology that communities can use to set guidelines for future social and spatial sustainable development. Its outcome can be used by researchers and planners to test the usefulness of planning actions in different contexts, and it can help scholars, decision makers, planners and citizens to create and modify neighbourhoods in order to improve resident satisfaction and to make better places for people, maximising the degree of user choice and giving emphasis on the correlation between designed space, activities and use.

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Endnotes

[1] http://lameva.barcelona.cat/gracia/ca/home/el-barri-de-la-vila-de-gracia

[2] Ajuntament de Barcelona. (2014). Departament d'Estadística. Retrieved October 15, 2015, from http://www.bcn.cat/estadistica/angles/index.htm

[3] http://graciapedia.gracianet.cat

[4] For other possibilities of classification of variables into categories see (Papachristou and Rosas-Casals, 2016).

[5] Although based on (Max-Neef et al., 1991), from the initial list of needs, Protection was changed to Security as suggested by (Costanza et al., 2007) and Subsistence was considered within Reproduction, being the latter understood as a part of the former. Spirituality or Transcendence was also included as it was considered because of its importance in the assessment as a need.

[6] http://summlab.upc.edu/en

[7] https://is.upc.edu/?set_language=en

[8] From now on those questions will be referred to as highest-ranked questions.

[9] https://nodexl.codeplex.com/

[10] For the question decoding see Appendix B, Table B1.

[11] For the question decoding see Appendix B, Table B2.