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Use and perception of urban green spaces in Barcelona

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Vic, gener de 2014

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Summary

Use and perception of urban green spaces in Barcelona

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Final year project, BSc Environmental Sciences. Universitat de Vic, Barcelona, 08 Jan 2014.

Abstract

Background: Although the mechanisms are not well understood yet, evidence exists of the benefits of urban green spaces for human health. As a consequence, one of the concerns of public health interventions must be to promote the use of urban green spaces within cities.

Aims: This study aims to explore the citizens' purposes of use of urban green spaces as well as the elements related to the characteristics of these places that condition their use.

Methods: In-depth interviews were conducted with non-hospitalised people living in different areas of Barcelona, with different socioeconomic status and different residential distance to urban green spaces (n = 20). Thematic content analysis of the qualitative data was performed.

Results: Physical pursuits and attention restoration were identified as prominent purposes of use of urban green spaces. The natural features of urban green spaces were identified as the most relevant determiners for the use of these places.

Conclusions: To promote the use of urban green spaces, qualitative findings from this study suggest that purpose-built places should be provided. Moreover, natural features of urban green spaces must be particularly taken into account when designing and maintaining them.

Keywords: Public health, urban green spaces, in-depth interviews, thematic content analysis.

1. Introduction

An introduction consisting of the theoretical basis and the context of this study is provided below.

1.1. Theoretical basis

1.1.1. Public health

Public health is the science and art of preventing disease, prolonging life and promoting health through the organized efforts and informed choices of society, public and private organizations, communities and individuals (Winslow, 1920). The area of application of public health concerns the whole society as well as each one of its different parts: from populations to individuals.

The focus of public health intervention is to improve health and quality of life through (i) the prevention and treatment of disease and other physical and mental health conditions, (ii) the surveillance of cases and health indicators, and (iii) the promotion of healthy behaviours. Public health is based on the respect for human rights and the research of an effective social justice as a guarantee for a better collective well-being (Hernández-Aguado, 2005).

Public health issues are those situations of sanitary emergency occurring in a population beyond the concern to an individual or group of individuals to encompass the entire society. The continuous cycle of action of public health is made up by its six main functions:

1. Evaluation and monitoring of the health status of the population and the impact of health policies and public health interventions and other measures.

2. Identifying the most effective policies that improve the health and deal with public health problems as well as the agents that can best apply them.

3. Efficient management and implementation of public health strategies: health promotion and protection.

4. Development of public health programs and services for prevention and direct action: controlling outbreaks of disease, disaster management and other public health crises.

5. Assurance of effective, accessible and high quality health services led by their health outcomes.

6. Assessment of public health policies, strategies and services.

The dimensions of health can encompass "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity", as defined by the World Health Organization (WHO, 2005). Epidemiology, as one of the tools for improving health, is broadly used for public health.

1.1.2. Epidemiology

Epidemiology is defined as "the study of the distribution and determinants of health-related states or events in specified populations, and the application of this study to control of health problems" (Last, 1995). It therefore comprises not only studies, but also assessments of how study results have been used. For epidemiology, the term 'health conditions' is not limited to the occurrence of disease and, therefore, it studies all events related directly or indirectly to health, understanding this concept broadly.

Epidemiology aims to describe and explain the dynamics of population health, identify the elements that determine its health, and understand the forces that run these elements. Its main objective is to develop actions aimed at preserving and promoting the population health. In other words, epidemiology studies the distribution, frequency and determinants of health conditions in human population as well as the different types and impact of social responses implemented to manage them (Gordis, 2004).

As epidemiology continues to develop and spread to new areas, its field of action has been considerably expanded and new disciplines focusing on specific applications of epidemiology have emerged. Thus, we can find different types of epidemiology such as social, molecular, genetic, clinical or environmental epidemiology (Hernández Ávila, 2007).

Environmental epidemiology is the branch of epidemiology that specifically deals with environmental exposures. It can be defined as "the study of the distribution of health-related states or events in specified populations in relation to determinants/factors in the living environment of these populations, and the application of this study to the control of such factors" (Baker *et al.*, 1999).

Environmental epidemiology applies the ideas and methods of many scientific disciplines, including chemistry, meteorology, microbiology, and physics (to establish human exposure levels). It also uses elements of clinical medicine, biochemistry, and physiology (to establish the health impacts). By applying statistical and mathematical methods, environmental epidemiology integrates information collected via the other sciences. The interpretation of this information for preventive action is one of the most challenging and important aspects of environmental epidemiology.

In environmental epidemiology the focus is on environmental factors as determinants. We can classify them in a number of ways depending on their character or source – biological, chemical, physical, psychological, or safety-related (Figure 1.1).
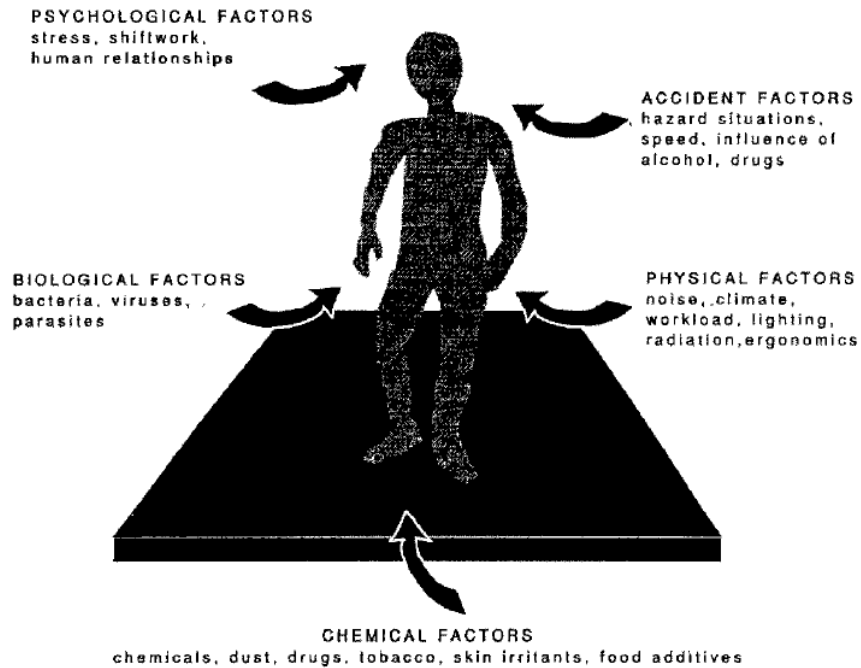

PSYCHOLOGICAL FACTORS
stress, shiftwork,
human relationships

ACCIDENT FACTORS
hazard situations,
speed, influence of
alcohol, drugs

BIOLOGICAL FACTORS
bacteria, viruses,
parasites

PHYSICAL FACTORS
noise, climate,
workload, lighting,
radiation, ergonomics

CHEMICAL FACTORS
chemicals, dust, drugs, tobacco, skin irritants, food additives

Figure 1.1. Environmental factors. Source: Baker et al., 1999.

The basic premise of any environmental epidemiology investigation is that exposure to an environmental factor or factors can lead to health effects. The two concepts of *exposure* and *effect* are therefore integral to any environmental epidemiology study. Exposure is used to signify the contact that occurs between the human body and the environmental factor of interest. Exposure can occur via: inhalation; ingestion; direct skin contact (or eye contact); transplacental blood contact (from mother to foetus), injection directly into the body (although this may not be considered an environmental exposure in a strict sense), or a combination of the previous ones. The amount of factor that enters the body is termed the *dose*. The dose may determine whether or not the individual exposed experiences an effect. Nevertheless, genetic variation in the population influences variation in internal dose and susceptibility to an effect. Other individual characteristics that could modify the susceptibility to an effect are: sex, age, nutrition, and disease or health condition.

As in all scientific methods, three stages have been established in the epidemiological method. These three stages are (i) the observation and description of the studied phenomenon, (ii) the analysis resulting in a hypothesis of causal relationships between health factors and the emergence of the effect, and (iii) the study design that enables to confirm, refine or discard the hypothesis.

Regarding the last one of the three stages mentioned above, *epidemiological studies* consist essentially of four phases. These four phases are (i) selection of a population, (ii) data collection, (iii) data analysis, and (iv) interpretation of results. The main purpose of these studies is to understand the relationship between exposure and effect variables. Depending on the characteristics of the exposure and outcome studied, different epidemiological studies can be conducted. Mainly, epidemiological studies can be divided into observational and experimental (Baker *et al.*, 1999):

a) *Observational studies* are those studies where researchers observe the effects without trying to influence what happens. The most usual observational studies include:

   1. *Cross-sectional studies* examine the association between exposure and a health outcome at a particular point in time or during a short period of time. Estimates of exposures and measurements of personal characteristics and biological effects are made at the same time. The benefit of a cross-sectional study is that it allows researchers to compare many different variables at the same time. However, cross-sectional studies may not provide definite information about cause-and-effect relationships because such studies offer a snapshot of a single moment in time, thus they do not consider what happens before or after the snapshot is taken.

   2. *Cohort studies* are longitudinal studies thus, contrary to cross-sectional studies, the studied population is monitored over a period of time to understand the relationship between exposure and health outcome. A cohort is any group of people with a shared characteristic. With a forward direction monitoring, the outcome is studied taking the exposure as starting point. The benefit of a longitudinal study is that researchers are able to detect developments or changes in the characteristics of the target population at both the group and the individual level. Therefore, a longitudinal study is more likely to suggest cause-and-effect relationships than a cross-sectional study by virtue of its scope.

   3. *Case-control studies* examine the association between exposure and a health outcome by comparing cases (i.e. individuals who develop the outcome) and controls (i.e. a sample of the source population from which the cases were identified). Having selected cases and controls, the researcher then determines the prior exposure status of the cases and controls by examining existing records. The distribution of exposure for the controls indicates the expected exposure distribution for the cases if no association existed between exposure and health outcome. With a backward direction monitoring, the exposure is studied taking the outcome as starting point.

4. *Ecological studies* are studies in which the investigators analyse hypothesized associations between environmental exposures and health outcomes using groups of people, rather than individuals as the unit of analysis (no information is available about the data pair exposure/effect for each individual member of the study population). Thus an ecological study compares aggregate measures of exposure, such as average exposure or proportion of population exposed, with aggregate measures of health outcome rates for the same population. Despite these studies are susceptible to the ecological fallacy (i.e. the impulse to apply group or societal level characteristics onto individuals within that group); they can be carried out easily, quickly and inexpensively using data that are generally available.

Observational studies may be the only way researchers can explore certain questions. For example, it would be unethical to design an experimental study deliberately exposing subjects to a potentially harmful situation (Bonita *et al.*, 2006).

b) *Experimental studies* are those studies where researchers introduce an intervention and study the effects. Experimental studies may include:

1. *Randomized Controlled Trial (RCT)* is a study where eligible people are randomly assigned to two or more groups. One group receives the intervention while the control group receives nothing (or an inactive placebo). The researchers then study what happens to people in each group. Any difference in outcomes can then be linked to the intervention.

2. *Controlled Clinical Trial (CCT)* is similar to an RCT, except that subjects are not randomly assigned to the treatment or control groups. This increases the chance for 'bias' – that is, that people with similar qualities ended up in each of the groups which could influence the final results.

The RCT is still considered the best source for producing reliable evidence because little is left to chance. Nevertheless, there is a growing realization that such research is not perfect, and that many questions simply cannot be studied using this approach. Such research is time-consuming and expensive – it may take years before results are available (IWH, 2005).

Even though quantitative methods, such as statistics, are the basic tools used to carry out most of the epidemiological studies, qualitative methods may also be useful for some specific purposes. Furthermore, using both methods is becoming a common practice in recent epidemiological studies related to public health issues.

1.1.3. Qualitative methods research

According to various authors, qualitative methods research is intended to deeply explore, understand and interpret social phenomena within its natural setting (Denzin and Lincoln, 2000). By using a qualitative research methodology, researchers want to collect richer information and get more detailed picture of issues, cases or events. They want to explore the *why* and *how* of a situation, not only *what*, *where*, *when.*

Contrary to quantitative methods, which are based on the positivist paradigm, commonly used in natural sciences such as physics or mathematics; qualitative methods are based on the interpretivist paradigm (also known as anti-positivist), which is commonly used in social sciences such as anthropology or psychology. This paradigm questions the positivist idea that subjects' behaviour is ruled by general/universal laws. On the contrary, interpretivists think it is based on a contextual reality made up by social, political and cultural values. Therefore, depending on the context, there exist multiple realities, multiple knowledge, etc. (Flick, 2004). Taking into account the idea that objectivity cannot be achieved, qualitative researchers are aware of their influence on research process and there is no distance between researcher and study object. Contrary to quantitative research, where knowledge is generated through a deductive and linear process, qualitative research is an inductive and circular process of knowledge emergence (Álvarez-Gayou Jurgenson, 2003).

One of the characteristics of qualitative research is the necessity to establish a theoretical framework or epistemological position that helps to determine which kind of methods or techniques will be used. Hence, a theoretical framework is a group of concepts, assumptions and models that form the base for the research process. It guides what researchers can say about the data and informs how they theorize meaning. There are several different kinds of theoretical frameworks within qualitative methods research but, in general, they can be divided into two main groups: essentialist/realist and constructionist (Braun and Clarke, 2006). Within an essentialist/realist framework, researchers can theorize motivation, experience and meaning in a straightforward way, because a simple largely unidirectional relationship is assumed between meaning and experience, and language. On the other hand, within a constructionist theoretical framework, meaning and experience are socially produced and reproduced, rather than inhering within individuals. Therefore, it cannot and does not seek to focus on motivation or individual psychologies, but instead seeks to theorize the socio-cultural contexts and structural conditions that enable the individual accounts that are provided.

Just like all methods of research, qualitative research seeks to answer questions and thus involves the collection of evidence in the form of data. There are a variety of methods of data collection in qualitative research, including observations, textual or visual analysis (e.g. from books or videos), and interviews (individual or group). However, the most common methods used, particularly in healthcare research, are interviews (Gill *et al.,* 2008).

Qualitative methods, such as interviews, are believed to provide a 'deeper' understanding of social phenomena than would be obtained from purely quantitative methods, such as questionnaires. Interviews are, therefore, most appropriate where little is already known about the study phenomenon or where detailed insights are required from individual participants. In particular, individual interviews are considered the most widely used method in qualitative research (Legard *et al.*, 2003). There are three fundamental types of individual interviews: structured, semi-structured and unstructured.

a) *Structured interviews* are, essentially, verbally administered questionnaires, in which a list of predetermined questions is asked, with little or no variation and with no scope for follow-up questions to responses. Consequently, they are relatively quick and easy to administer. However, by their very nature, they only allow for limited participant responses and are, therefore, of little use if 'depth' is required.

b) *Unstructured interviews* do not reflect any preconceived theories or ideas and are performed with little or no organisation. Such an interview may simply start with an opening question and will then progress based, primarily, upon the initial response. Unstructured interviews are usually very time-consuming and can be difficult to manage and to participate in, as the lack of predetermined interview questions provides little guidance on what to talk about. Their use is, therefore, generally only considered where significant 'depth' is required, or where virtually nothing is known about the subject area.

c) *Semi-structured interviews* consist of several key questions that help to define the areas to be explored, but also allows the interviewer or interviewee to diverge in order to pursue an idea or response in more detail. This interview format is used most frequently in health care, as it provides participants with some guidance on what to talk about, which many find helpful. The flexibility of this approach, particularly compared to structured interviews, also allows for the discovery or elaboration of information that is important to participants but may not have previously been considered as pertinent by the research team.

Once the data are collected, they must be analysed and interpreted. Since qualitative methods research generates huge amounts of data, the aim of the analysis process is to sort, organize and give meaning to all the collected data. Hence, qualitative data analysis is the range of processes and procedures whereby we move from the qualitative data that have been collected into some form of explanation, understanding or interpretation of the people and situations we are investigating.

Depending on the purpose of the research and the theoretical framework chosen, the different methods of qualitative data analysis can be divided into the following main categories (Fernández de Sanmamed *et al.*, 2010):

a) *Thematic content analysis* is the procedure for the categorization of verbal or behavioural data for the purpose of classification, summarization and tabulation. The meaning of the discourse lies in *what* is said.

b) *Structural analysis* investigates the patterns which may be found in conversations, text, activities, etc., with little or no explanation as to pattern meaning. Therefore, discourse's meaning does not fundamentally lie in *what* is said but in *how* it is said.

c) *Discourse analysis* aims to identify and understand the communication process and the social construction of the language in this process**.** The meaning of the discourse lies in the reason *why* something is said and its purpose.

Since it is the method through which our qualitative data analysis has been carried out, a more detailed description of thematic content analysis is provided below.

Thematic content analysis is a qualitative analytic method for identifying, analysing and reporting patterns within data. It can be applied across a range of theoretical and epistemological approaches and is compatible with both essentialist and constructionist frameworks. Through its theoretical freedom, it provides a flexible and useful research tool, which can potentially provide a rich and detailed, yet complex, account of data (Braun and Clarke, 2006). As thematic content analysis does not require the detailed theoretical and technological knowledge of approaches, it can offer a more accessible form of analysis, particularly for those early in a qualitative research career.

In thematic content analysis, themes or patterns within data can be identified in two primary ways:

a) Through an *inductive analysis* (or data-driven), the themes identified are strongly linked with the data themselves and may bear little relation to the specific questions that were asked to the participants. The coding process is conducted without trying to fit it into a pre-existing coding frame, or the researcher's analytic preconceptions.

b) A *deductive analysis* (or analyst-driven) tends to provide less a rich description of the data overall and more a detailed analysis of some aspect of the data than the inductive analysis. The coding process is aimed to fit into a pre-existing coding frame, or the researcher's analytic preconceptions.

Moreover, themes can be identified at different 'levels'. A thematic content analysis typically focuses exclusively or primarily on one level:

a) Through a *semantic analysis*, themes are identified within the explicit or surface meanings of the data and the analyst is not looking for anything beyond what the participant has said or what has been written. It commonly entails a progression from description, where the data have simply been organized to show patterns in semantic content and summarized; to interpretation, where there is an attempt to theorize the significance of the patterns and their broader meanings and implications, often in relation to previous literature.

b) A *latent analysis* goes beyond the semantic content of the data, and starts to identify or examine the underlying ideas, assumptions, and conceptualizations that are theorized as shaping or informing the semantic content of the data. It tends to come from a constructionist epistemology, where broader assumptions, structures and/or meanings are theorized as underpinning what is actually articulated in the data.

1.2. Context of the study

1.2.1. Green spaces and health

For people living in large and dense cities, a good quality of life depends largely on the quality of the urban environment. High volumes of traffic and noise, atmospheric pollution, and excess of built-up areas contribute to a lower quality of life as well as a gradual weakening of human health and well-being. As a result, urban living is often linked to poor respiratory health, sedentary lifestyle, increased obesity, cardiovascular disease, stress, and associated mental ill-health (WHO, 2005). High quality of urban green space is widely regarded as a neighbourhood characteristic that is important for the physical, mental and social well-being of its residents. Although the specific mechanisms at work remain somewhat unclear, there is evidence linking urban green spaces with increased physical activity, improved mental health, social well-being, and longevity (Takano *et al.*, 2002; Kuo, 2003; Cohen *et al.*, 2007; Barton and Pretty, 2010).

Numerous scientific studies have associated contact with nature to improving human health. Such contact with nature has been considered as spending time in natural surroundings, wild nature and/or contained gardens. Environments in the city like parks, gardens and other urban green spaces could reduce stress as well as present opportunities for recovery (Ulrich, 1984; Kaplan, 1989). Researchers have argued that natural settings together with plants in addition to water induce relaxed and significantly less stress filled dispositions in observers compared with city views with no plants (Ulrich, 1984; Kaplan, 1989; Chiesura, 2004). Getting in contact with nature has psychological positive aspects by minimizing stress (Ulrich, 1984; Ulrich *et al.*,

1991), restoring attention (Kaplan, 1989), improve reflection, rejuvenate the urban resident, and offer a sense of peacefulness and peace by positively affecting self-regulation and restorative healing experiences (Hartig *et al.*, 2003; Korpela and Ylén, 2007; Van den Berg *et al.*, 2007).

The hypothesis about the regenerative function of natural environments has long been examined in several scientific studies. For instance, *Ulrich* discovered that recovery takes place quicker in hospital patients who are able to view natural environment such as trees through their windows than those patients whose views are restricted (Ulrich, 1984). Studies after *Ulrich* (1984) yielded similar results validating the supposition that natural environments influence mental and psychological health positively. Further, present-day studies on the utilization of urban forests and parks strengthen notions about the stress-reduction benefits of natural environments on mental health (Kaplan, 1992; Hartig *et al.*, 1996; Hartig *et al.*, 2003).

Findings also reveal that brief nature experiences offer far better psychological gain than a similar encounter in an urban environment (Hartig *et al.*, 1996). In many studies amongst urban green space visitors, a substantial relation was observed between use of urban green spaces and perceived positive state of health: individuals who used urban green spaces often were much more likely to report good health compared to those who did not (de Vries *et al.*, 2003; Grahn and Stigsdotter, 2003). An epidemiological research by *Maas et al.* showed a strong link between health and urban green spaces between one and three kilometres from people's residences (Maas *et al.*, 2006).

So far, correlation between people's health and use of urban green spaces has been found in developed countries. Moreover, urban green spaces are recognized as restorative healing environments (Korpela *et al.*, 2008). As a consequence, lack of access to and/or use of urban green spaces becomes a public health concern for people living in urban areas.

1.2.2. PHENOTYPE project

As stated above, indications exist that close contact with nature benefits human health and well-being, but the mechanisms are not well understood. In addition, most of the research has been conducted in the Northwest of Europe and the United States of America. This leaves a need for a more robust evidence base on links between contact with nature and human health and well-being across Europe.

PHENOTYPE (Positive Health Effects of the Natural Outdoor environment in TYpical Populations of different regions in Europe) is a collaborative project to investigate the interconnections between contact with nature and improved human health and well-being (www.phenotype.eu). There are eight research institutes from six different countries involved

in the project, including the Centre for Research in Environmental Epidemiology (CREAL) in Barcelona. However, the data collection for the study is being conducted just in four of these countries. For this, volunteers from different health, cultural and social backgrounds in Stoke-on-Trent (United Kingdom), Doetinchem (Netherlands), Kaunas (Lithuania), and Barcelona (Spain) are being recruited. This data collection will help to obtain a representative sample of typical populations of different regions in Europe.

Results of the research will be analysed with input from stakeholders from different areas including urban planning, medical, academic and policy development professions. It will be translated into recommendations to the European Commission and national level organisations for integration policies directly or indirectly affecting human health.

The project is broken down in topic-specific *Work Packages* (WP) led by experts in different areas of knowledge (Figure 1.2).
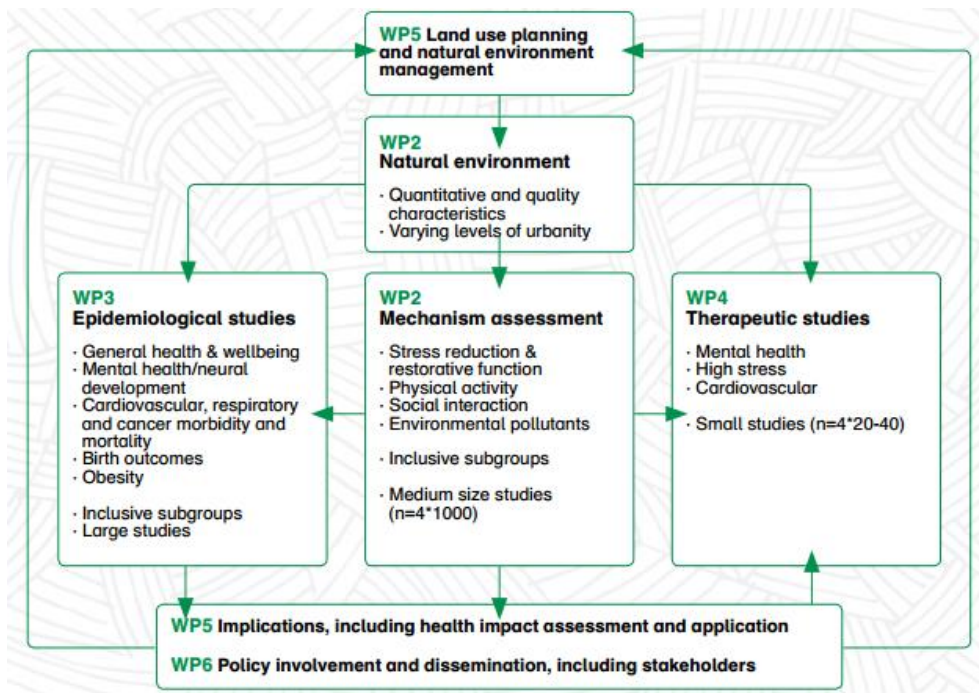
Figure 1.2. PHENOTYPE project's structure. Source: www.phenotype.eu.

Since this is the part of PHENOTYPE project to which our study has been related, a more detailed description of Work Package 2 is provided below.

Work Package 2 of PHENOTYPE project is intended to explore the mechanisms underlying the relationship between the natural environment and health for different population groups and different levels of urbanity across Europe in a consistent way and fill up the knowledge gaps mentioned before.

The focus is on the day-to-day environments in which people live and spend most of the time such as neighbourhood, work and transportation environments. The natural outdoor environment is defined as green spaces (e.g. city parks, gardens), blue spaces (e.g. beaches, bonds), and greenery (e.g. sidewalk trees, hedges). However, in the present study, the term *urban green spaces* will be equally used for referring to all three kinds of natural outdoor environments defined above.

From each of the four cities where data collection is being conducted, approximately 30 neighbourhoods/censual sections are sampled, stratified by urban green space exposure (based on land use data/NDVI/GIS) and socio-economic status (based on population statistics). A random sample of one thousand non-hospitalised people aged 18-75 years old is recruited in each of the study areas to collect detailed information (making a total of 4000 subjects for the four cities). Following the selection of the study population, Work Package 2 is mainly divided into three stages:

a) Initial questionnaire survey (n = 1000): The main aim is to gain individual data on people's contact with urban green spaces, their perception and attitude towards urban green spaces, the association between mechanism endpoints (physical activity, social contacts, stress/restorative function) and urban green spaces, and self-reported health (perceived health, medicine use). In addition, contextual information is collected regarding their perception of the neighbourhood/censual section, as well as background information on socio-demographic and their home environment.

b) *Calfit*/EMA study (n = 100): A hundred volunteers are recruited from participants of the initial questionnaire survey. A Smartphone-based system called *Calfit* (Figure 1.3) is used to obtain physical activity and positioning as well as subjective mood and environmental perception data. Volunteers carry a special belt with the Smartphone-based system for seven days and receive an economic incentive at the end.

Figure 1.3. Calfit is a cell-phone body sensor developed by UC Berkeley.
Source: PHENOTYPE project.

Calfit is a cell-phone body sensor developed by UC Berkeley that runs on a Google Android 2.2 operating system that can collect data on physical activity with accelerometer, geographic location through a global positioning system (GPS), and interactive text messages capable of eliciting ecological momentary assessment (EMA). These data will be used to compare with questionnaire responses and to examine associations with urban green spaces measures.

c) In-depth interviews (n = 20): At last, from the *Calfit*/EMA participants, twenty people are selected to participate in the last stage of this part of the study. Semi-structured interviews are conducted to get more detailed information on specific topics included in the questionnaire survey and *Calfit*/EMA. The interviews are subsequently transcribed from a digital audio recording made with the participants' consent. Lastly, a qualitative analysis of the transcripts is carried out.

As far as it concerns our study, the data collected through the in-depth interviews conducted in one of the four selected cities (i.e. Barcelona) will be analysed.

2. Aims and objectives of the study

People choose to visit urban green spaces for many reasons, including both their own personal and environmental motivations (Irvine *et al*., 2013). The identification of these motivations is especially relevant for public health due to two main reasons. Firstly, it can help to understand why there is an association between use of green spaces and health benefits. Secondly, it can help urban planners to design more attractive urban green spaces, in order to promote their use and thus improve population's health.

The main aim of this qualitative study is to explore the use and perception of urban green spaces in Barcelona. The specific objectives of this study are:

1. To identify the different purposes of use of urban green spaces in Barcelona, in order to provide a general idea of what urban green spaces are used for.

2. To identify the elements that encourage or discourage the citizens to use urban green spaces, in order to examine the extent to which the different characteristics of urban green spaces determine their use.

3. Methods

3.1. Study area

Research was conducted in Barcelona, Spain, population 1.621.000 (Idescat, 2012). The different censual sections of Barcelona city were classified into (i) tertiles by socioeconomic status (based on population statistics) and (ii) quintiles by distance to urban green spaces (based on land use data/NDVI/GIS) (Figure 3.1).
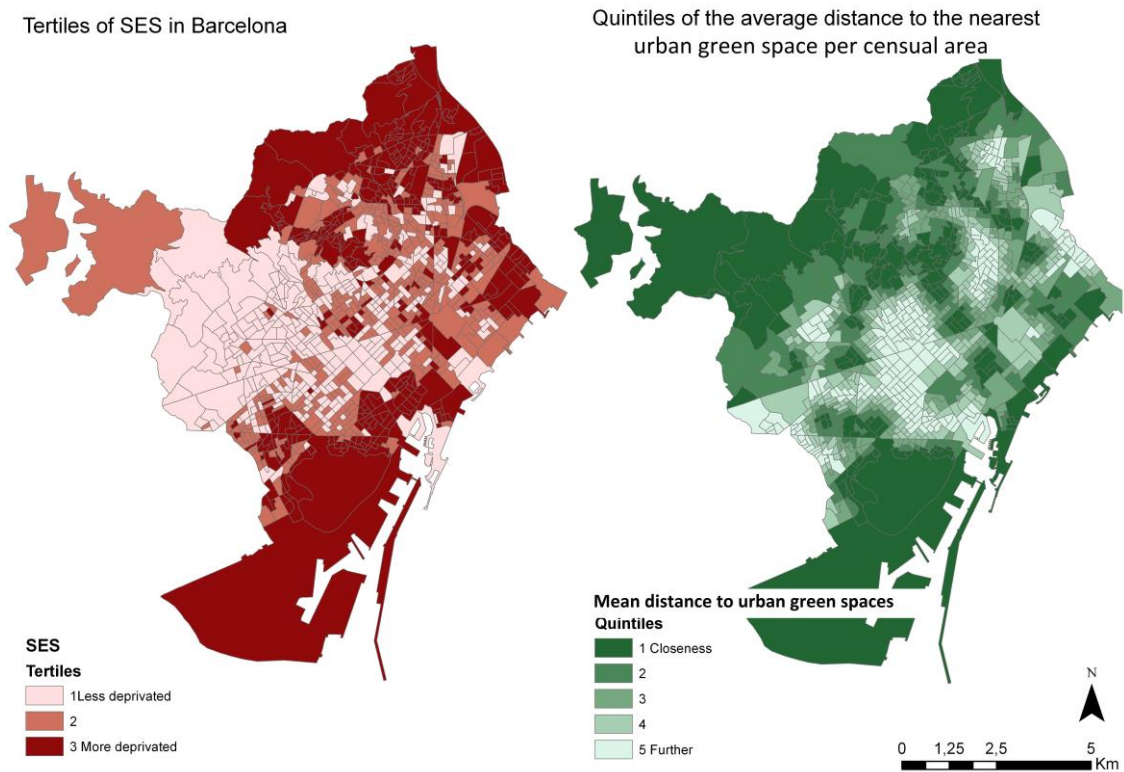
Figure 3.1. Barcelona city stratified by socioeconomic status (left) and distance to urban green spaces (right). Source: PHENOTYPE project.

This gave a total of 15 categories. According to this, a total of 30 censual sections (2 from each category) were selected as the study area (Table 3.1).

Table 3.1. Censual areas ranked into (i) tertiles by socioeconomic status (1 = less deprived, 3 = more deprived) and (ii) quintiles by distance to urban green spaces (1 = closer, 5 = further). Source: PHENOTYPE project.

Tertiles of SES	Quintiles of distance to nearest urban green space					Total
	1	2	3	4	5	
1	54	72	72	80	76	354
2	67	45	79	83	80	354
3	92	95	61	49	56	353
Total	213	212	212	212	212	1061

3.2. Recruitment

Twenty participants for the in-depth interviews were purposively sampled from the *Calfit*/EMA study (n = 100) to include men and women, different age groups, and different censual categories, thus different socioeconomic statuses and different distances to urban green spaces. Interview participants were recruited in an iterative fashion by telephone once their participation in the previous stage of the project had ended. No remunerative incentives were offered for participation in the interviews.

3.3. Participants

The sample (n = 20) was balanced between men and women (50%). The age range of the sample was from 21 to 60 and the mean age of the total sample was 43 (S.D. = 10.84). From the twenty participants who took part, there were approximately a third from each socioeconomic status and a fifth from each category of distance to urban green spaces level (Table 3.2).

Table 3.2. Total number and percentage of participants from each censual area ranked into tertiles (socioeconomic status) and quintiles (distance to urban green spaces).

SES Distance	1		2		3		TOTAL	
	n	%	n	%	n	%	n	%
1	1	5	1	5	2	10	4	20
2	2	10	1	5	1	5	4	20
3	1	5	2	10	1	5	4	20
4	2	10	1	5	1	5	4	20
5	0	0	2	10	2	10	4	20
TOTAL	6	30	7	35	7	35	20	100

3.4. Data collection and interview procedure

The primary data were collected through in-depth semi-structured interviews which explored attitudes, use and perception of urban green spaces. The interview addressed a broad range of issues, ranging from perception of urban green spaces in the local area, reasons for using or not using urban green spaces, experiences with urban green spaces and motivation for travel routes. The use of open-ended questions facilitated capture of participants' own words and insight into what people spontaneously identify as motivations for use.

For the purpose of this study, however, the analysis is limited to the purposes of use and the motivators and deterrents for use of urban green spaces. Specifically, this study focuses on the information derived from the following three key questions of the semi-structured interview guide: "What do you think about the urban green spaces in your local area/neighbourhood?", "What elements of urban green spaces do you like/dislike?", and "Do you use the urban green spaces in your local area?" Generally, some follow-up questions were posed after each of the three main questions in order to obtain more information.

A project description and assurance of anonymity were provided in writing and verbally prior to the interview. Informed consents from the participants were obtained in all the previous stages of the study within PHENOTYPE Work Package 2. Moreover, consent to record the audio of the in-depth interview was obtained verbally. This part of the study had been approved by the Ethical Committee of *Parc de Salut Mar* (Hospital del Mar, Barcelona).

Data collection took place on weekdays (between 10 am and 8 pm), June through September 2013. The interviews were conducted one-to-one in a room of the research centre (n=13), in participants' homes or work places (n=6) and, in one case, in a local café at the participant's request (n=1). All interviews were conducted by the same interviewer (LGM) and the interview length ranged from 35 to 65 minutes (49 min average). After the interview, digital audio recordings were transcribed by a professional.

3.5. Analysis

From an essentialist/realist theoretical framework, a thematic content analysis of the data was conducted in a deductive way. Through a semantic approach, the analysis focused on the explicit or surface meanings of data (Braun and Clarke, 2006). The codification of transcripts was carried out using qualitative data analysis software (*Atlas.ti*, Version 7.0). To extract, sort, and synthesise our findings, the resulting codes were classified into different domains, some of which were divided into different themes. Thematic content analysis resulted in no double coding of responses which allowed quantification at all three levels – code, theme, domain – to provide a measure of salience (i.e. the frequency with which a given purpose of use or use conditioning element was present among participants).

For the first objective, the question that drove the analysis of data was "What do you use the urban green spaces for?" Firstly, the different purposes of use of urban green spaces were identified within data and a code was generated for each one. Code names were developed to closely reflect the particular wording used by participants. Following that, codes were clustered into themes or families of codes. Themes labels were derived from participants' language and findings from previous research. Lastly, themes were further organized into

domains, which were informed by and grounded in constructs from previous literature (Irvine *et al.*, 2013).

For the second objective, the data analysis process had two different parts. The questions that drove the analysis were "What elements of urban green spaces encourage you to use them?" for the first part, and "What elements of urban green spaces discourage you to use them?" for the second part. The rest of the process was the same for both parts. Firstly, different domains related to the main chronological stages of an urban green space's life were identified (i.e. urban design, green space design, and use of green space). Secondly, putting focus on the characteristics of the place itself, the different motivators/deterrents for use of urban green spaces were identified within data and a code was generated for each one. Lastly, the different codes were clustered into themes or families related to the different domains identified initially. Code and theme labels were based on participants' language. In this latter part of the analysis, codes mentioned only by one participant were omitted due to the large amount of codes generated.

4. Results

Results are presented for each analysis question separately: purposes of use of urban green spaces and elements that condition the use of urban green spaces.

4.1. Purposes of use

The resultant codes of the thematic content analysis were sorted into five different domains of purposes of use of urban green spaces, some of which were divided into different themes (Table 4.1).

Table 4.1. Participant purposes of use of urban green spaces (N = 73 comments). Codes, themes, and domains are identified along with the number of comments within each.

Domain	#	Theme	#	Code	#
Physical	32	Physical pursuits	22	Go for a walk	11
				Walk the dog	2
				Cycling	2
				Running	2
				Exercise	2
				Bath	1
				Passing through	1
				Ping-Pong	1
		Physical restoration	10	Sit	5
				Eat	3
				Chill out	2
Cognitive	23	Mental pursuits	8	Read	4
				Phone calling	2
				Surf the internet	1
				Crosswords and Sudoku	1
		Attention restoration	15	Relax	9
				Take a break	6
Social	8			Meet friends	5
				Chat	2
				Watch people	1
Nature	6			View	3
				Fauna	1
				Fresh air	1
				Sunshine	1
Children	4			Play	4

The five domains for purposes of use included: physical (divided into physical pursuits and physical restoration), cognitive (divided into mental pursuits and attention restoration), social, nature, and children. Participant comments are in quotation marks with the source document (P) and participant ID (R) numbers in brackets.

With almost half of the total number of comments, the *physical* domain was the most mentioned reason for using urban green spaces among all participants' responses. The purpose of use which gathered the largest number of total comments was *go for a walk*, within the physical pursuits theme, e.g., "To go for a walk, to go for a walk. To walk" [P12: R103055] and "Well, I usually go out for a long walk every day. I walk quite often around my neighbourhood and I use them (urban green spaces). Yes, I use them almost every day" [P9: R101300]. Next, another relevant code among total responses, *sit,* was the second most mentioned purpose of use within the physical restoration theme, e.g., "I like to sit on a bench in the shade of a tree in one of these small parks" [P9: R101300] and "I like to sit on a bench and enjoy that moment, you know?" [P17: R104597]. Another important purpose of use within the physical restoration theme was *eat*, e.g., "I go there almost every weekend, (…) for me, it's a privilege to have such a place and the option to go there to have a breakfast" [P20: R109846]. With lower number of comments, the next five purposes of use within the physical domain were all related to the physical pursuits theme, including *walk the dog*, e.g., "I use them (urban green spaces) mostly to walk the dogs" [P17: R104597] and "I prefer to walk the dog within a park rather than around the streets, you know? (…) it's isolated from the city and there you can walk without surrounding traffic" [P19: R104926]; *exercise*, e.g., "I use these green spaces when I want to do some quick exercise" [P1: R100032]; *cycling;* and *running;* except from *chill out* which was related to the physical restoration theme. Remaining codes related to the physical domain were *bath*, *passing through* and *Ping-Pong*; all three within the physical pursuits theme.

The *cognitive* domain of purposes of use was the second most mentioned among participants' responses. *Relax*, within the attention restoration theme, was the most frequent purpose of use related to the cognitive domain and the second most mentioned code among all domains, e.g., "To relax for a while" [P9: R101300] and "To relax a little" [P10: R101709]. Also within the attention restoration theme, *take a break* was another relevant purpose of use among total comments, e.g., "I use them (urban green spaces) mostly to take a break" [P14: R103515] and "To take a little break from the house and noise" [P10: R101709]. On the other hand, within mental pursuits theme, the most mentioned purpose of use was *read*, e.g., "To read the newspaper mainly on Sundays" [P12: R103055] and "I like to sit on a bench and read for a while" [P9: R101300]. The next most frequent purpose of use, also within the mental pursuits theme, was *phone calling*, e.g., "For example, you go there if you want to phone someone and be quiet" [P2: R100093]. Remaining codes within the cognitive domain, all related to the mental pursuits theme, were *surf the internet* and *crosswords and Sudoku*.

The third most common domain of purposes of use among participants' responses was *social*. Within this domain, *meet friends* was the most frequent purpose of use and one of the most relevant codes among total comments, e.g., "When weather is nice, I often go there to have a beer along with my friends at noon or afternoon" [P20: R109846] and "I have a friend with whom I meet once a week or fortnight, and we prefer to go to places like these (urban green spaces)" [P14: R103515]. Another relevant purpose of use within this domain was *chat*, e.g., "there are some friends and we already know each other quite well (...) we chat about everything: politics, football, women... We spend a good time" [P2: R100093]. With fewer comments, *watch people* was another purpose of use related to the social domain.

The *nature* domain for purposes of use was the fourth most common among participants' responses. *View* was the most relevant purpose of use within this domain, e.g., "Sometimes we go to the beach to watch the moon. Even when there's a storm, it's nice to go there and watch the tidal wave. There is an amazing view there" [P 7: R100581]. Remaining codes within the nature domain included *fauna*, e.g., "I like to see fauna, mostly to see fauna. I love fauna. I love ornithology, you know?" [P3: R100208], *sunshine,* and *fresh air*.

Lastly, *children* domain of purposes of use was the fifth most mentioned among participants' responses. Although it was the least mentioned domain, its only code *play* emerged as an important purpose of use among total comments, e.g., "I use them (urban green spaces) mostly for the children, to go to play there" [P10: R101709] and "I have a son who lives abroad but when he comes here I also go with him to these squares and we play football or something there" [P20: R109846].

4.2. Use conditioning elements

The resultant codes of the thematic content analysis were sorted into three different domains of elements that condition the use of urban green spaces. Each domain was divided into two different themes. The three domains for use conditioning elements were related to the main chronological stages of an urban green space's life: urban design (divided into location and size/quantity), green space design (divided into natural features and facilities/amenities), and use of green space (divided into social factors and maintenance). Participant comments are in quotation marks with the source document (P) and participant ID (R) numbers in brackets.

Results are presented for use encouraging and discouraging elements separately (Tables 4.2 and 4.3) followed by a comparative review (Figure 4.1).

4.2.1. Encouraging elements

Table 4.2. Encouraging elements for use of urban green spaces (N = 140 comments). Codes, themes and domains are identified along with the number of comments within each.

Domain	#	Theme	#	Code	#
Urban design	28	Location	17	Proximity	11
				Isolation from urban environment	6
		Size/Quantity	11	Large size	11
Green space design	89	Natural features	68	Large amount of greenery	12
				Grass	11
				Large amount of trees	9
				Variety of trees	7
				Wildlife	5
				Rurality	5
				Shade trees	4
				Trails	4
				Promenades	4
				Sidewalk greenery	3
				Flowers	2
				Running/cycling paths	2
		Facilities/amenities	21	Bodies of water	8
				Off-leash dog area	4
				Fountains	3
				Playgrounds	2
				Exercise facilities	2
				Sculptures	2
Use of green space	23	Social factors	18	Social contact	10
				Cultural activities	4
				Safety	2
				Free of charge	2
		Maintenance	5	Cleanliness	3
				New facilities	2

The *green space design* domain included by far the most common theme among use encouraging elements: natural features. The most frequent of these motivators were those related with vegetation, including *large amount of greenery*, *grass*, *large amount of trees* and *variety of trees*. The most mentioned one, *large amount of greenery*, does not refer to any specific kind of vegetation, e.g., "But yes, I like greenery. I like the presence of greenery" [P9: R101300] and "It must have trees and greenery, greenery, I mean green areas. It must have

greenery (speaking about how a good urban green space should be)" [P10: R101709]. Another important use encouraging element was *rurality*, e.g., "What I don't like is a park which looks built-up (…) I prefer those in which it seems that you are in the mountain, you know? I really appreciate that" [P5: R100283], as well as *wildlife*, e.g., "You can go there and disconnect. You can hear the birds and nature" [P14: R103515]. The rest of the motivators within the natural features theme were related to more practical issues in order to carry out a specific activity such as *trails*, *promenades*, *shade trees* or *running/cycling paths*; as well as other kinds of vegetation less present as motivators such as *sidewalk greenery* and *flowers*. Within the other theme of this domain, facilities/amenities, *bodies of water* was the most mentioned encouraging element, e.g., "More water because it is quite important for me. It must have a fountain or something where you can get wet and cool off. If it could have a little pond, then it would be great" [P9: R101300] and "When they built this small square *Folch i Torres* over here, it had a kind of waterfall which was really beautiful, it was very relaxing" [P11: R102875]. The remaining codes emphasized those facilities destined to carry out different activities such as *off-leash dog areas* to walk the dog, e.g., "there's a nice off-leash dog area which is very large. It's important to have a place like that for people who have dogs like us, you know? They can freely run there and we have the feeling of being in an open space" [P17: R104597]; or *fountains* and *exercise facilities*. Remaining codes were related to *playgrounds* for the children and pieces of art within urban green spaces such as *sculptures*.

The *urban design* domain consisted of use conditioning elements related to the stage previous to the construction of urban green spaces. *Proximity*, which was the most frequent encouraging element within the location theme, was one of the most relevant motivators for use among participants' responses, e.g., "We use the beach very often, both in summer and winter. It's different if you live here near the beach, cause that's when you make the most of it. Otherwise, if you live in a place far from the beach, you won't come to the beach in a Thursday or Friday night" [P7: R100581]. *Isolation from urban environment* was also a quite frequent use encouraging element, e.g., "It's the feeling you have of being in a different environment, more relaxed, without circulation. There are people running by, cycling, the families with their kids, you know? In the *Ciutadella Park* it's common to see people having lunch on the grass, juggling, doing magic tricks, yoga or meditation. I mean, this is the nice thing within a green space, isn't it? People go there and it's like a little island isolated from the city. That's beautiful" [P12: R103055]. Within the size/quantity theme, *large size* of urban green space was one of the most mentioned motivators for use, e.g., "It would be better if they were bigger with less streets passing through them, like the one in *Bac de Roda* or *Sant Martí*" [P1: R100032] and "I think so, a bigger space is necessary because there are several small green corners, but there aren't real 'lungs' and I think they are necessary" [P6: R100491].

The *use of green space* domain included those elements unrelated neither to the design nor the structure of urban green spaces. Even though this domain was less present as a motivator,

social factors were an important theme within use encouraging elements. This theme included *social contact*, which was one of the most mentioned motivators among total responses, e.g., "I often go there to have a beer along with my friends at noon or afternoon" [P20: R109846] and "there are some friends and we already know each other quite well (…) we spend a good time" [P2: R100093]. Remaining encouraging elements related to social factors were *cultural activities*, *safety* and *free of charge*. Elements related to maintenance of green spaces, which included *cleanliness* and *new facilities*, were also present as motivators for use.

4.2.2. Discouraging elements

Table 4.3. Discouraging elements for use of urban green spaces (N = 139 comments). Codes, themes and domains are identified along with the number of comments within each.

Domain	#	Theme	#	Code	#
Urban design	36	Location	18	Surrounding traffic	7
				Far off	6
				Discontinuity	3
				Lack of access points	2
		Size/Quantity	18	Small amount of GS	9
				Small size	9
Green space design	51	Natural features	38	Concrete/pavement	12
				Small amount of greenery	10
				Small amount of trees	6
				Sandy soil	5
				Poor variety of trees	3
				Pollen	2
		Facilities/amenities	13	Small amount of fountains	7
				Small amount of benches	2
				Small amount of exercise facilities	2
				Lack of toilets	2
Use of green space	52	Social factors	36	Antisocial behaviour	9
				Use overlap	8
				Littering	7
				Dog mess	6
				Tensions/Ownership	3
				Insecurity	3
		Maintenance	16	Dirtiness	6
				Poor maintenance of greenery	4
				Poor maintenance of facilities	4
				Out of order fountains	2

The *use of green space* domain gathered the most common deterrents for use of urban green spaces among participants' responses. The most frequent theme within this domain, social factors, was one of the most common themes among all domains. One of the key dissuasive elements for use of green spaces was *antisocial behaviour*, e.g., "Since it's a small and more or less hidden place, they take advantage to drink beer or something and you find there the typical drunk. So instead of enjoying this place, you try to avoid going there" [P6: R100491] and "I had some negative experiences because some people bring their dogs to the park and train them to fight at night" [P14: R103515]. Another important use discouraging element related to social factors was *use overlap*, e.g., "They are somewhat saturated because there are a lot of people, you know? I mean, there are lots of people who use these places so they usually are a little bit crowded" [P8: R100860], which was often associated with themes from the urban design domain such as *small size* or *small amount of green spaces*, e.g., "If it's a small place, old men will say that children bother them, while the children's parents will ask the man with the dog to go elsewhere and the man with the dog will say 'I can't go nowhere'. So there will always be conflicts. On the other hand, if it's a big place where everybody fits within, everybody can find its own place. Everybody can enjoy it" [P6: R100491]. Other frequent deterrents for use within this theme included *littering*, e.g., "The place is cleaned up every day but it's still always dirty. Even on holiday it's cleaned up, you know? So I'd blame on the people who live there rather than the public services who are in charge of its maintenance" [P8: R100860], and *dog mess*, e.g., "dogs are animals so they make it where they want to. The problem comes when their owners don't pick up the excrement" [P5: R100283]. The rest of the use discouraging elements related to social factors were *tensions/ownership* and *insecurity*. Regarding the other theme of deterrents within the use of green space domain, maintenance, most of the comments were related to *dirtiness*, e.g., "There's a kind of lake, you know? (…) it's always been very dirty (…) Of course, I'd like that it were clean. But it isn't, so I don't like it" [P17: R104597] and "They leave much to be desired (...) they aren't taken care of properly and are very dirty" [P9: R101300]; as well as *poor maintenance of greenery, poor maintenance of facilities* in general, and specifically *out of order fountains*.

With similar number of comments as the use of green space domain, the *green space design* domain of deterrents for use was the second most mentioned among participants' responses. The most frequent of these deterrents were related to a lack of vegetation, especially those related to a lack of vegetation specifically in the ground such as *concrete/pavement*, e.g., "Each time there is more concrete. I mean, it has been changing, since I arrived here until now there's much more concrete. This places are losing the greenery which had been the real beauty of *Gràcia*'s squares" [P14: R103515] and "I'd like that there were less concrete, (…) everything's hard here, there isn't a warm place to sit or walk around. There's a lack of grass. There isn't grass here, and it'd be very necessary" [P20: R109846]; or *sandy soil*, e.g., "The parks that were made ten years ago, they were made of sand or concrete (…) I wonder, was

this necessary?" [P10: R101709]. Within the natural features theme, some of the most frequent deterrents for use were related to a general lack of vegetation such as *small amount of greenery*, e.g., "I'd like there were more plants. In some way, I'd like that the density were larger, basically. Maybe also some more variety... Yes, more variety" [P15: R104067], *small amount of trees*, *poor variety of trees*, and *pollen*. Regarding the other theme within the green space design domain, facilities/amenities, *small amount of fountains* emerged as the most frequent use discouraging element, e.g., "They don't usually work and, if they do, there's just one single fountain within the whole *España Industrial Park*. I think there are very few, and the place is quite big. So I think they are scarce" [P9: R101300]. The remaining deterrents within this theme were related to a lack of different facilities/amenities such as *lack of toilets*, *small amount of benches*, and *small amount of exercise facilities*.

Regarding the *urban design* domain, both use discouraging elements within the size/quantity theme (i.e. *small size* and *small amount of green spaces*) emerged as relevant deterrents for use among participants' responses, e.g., "They are small places surrounded by cars and pollution. You can't entirely enjoy them" [P1: R100032], "If I'd wanted to go for a run I couldn't. These parks are small and with pavement. They do not encourage you to do it" [P 4: R100223], "They are scarce, there almost aren't any. There are very few and they aren't green" [P4: R100223], and "Here, in *Eixample* you walk upwards and it's a challenge if you want to find another small square" [P16: R104409]. Finally, within the use discouraging elements related to the location theme, *surrounding traffic* was the most frequent comment, e.g., "In *Ronda Litoral*, the cars pass underneath and there are some nice parks above (…) But, of course, I don't like to be in a park and see the cars passing by and all this pollution" [P7: R100581] and "I don't like being in the middle of a park made of concrete and seeing the cars crossing through at ten metres from me... You can't disconnect, it's totally worthless" [P4: R100223]; followed by *far off*, e.g., "You have to go to *Guinardó* or to the *Ciutadella Park*… So you think it twice before doing it, you know? You have to make a plan to go there someday" [P19: R104926], and "*Montjuïch* is better (...) it has mountain and it's larger (...) but it isn't in my neighbourhood" [P1: R100032]. The remaining codes related to location, which were also present as deterrents, included *discontinuity* and *lack of access points*.

4.2.3. Comparative Review

A comparison between the identified domains and themes within both encouraging and discouraging elements provided insight into the breadth and salience of the elements that condition the use of urban green spaces in general terms (Figure 4.1). Through the results from the thematic content analysis of data, we identified a high degree of consistency between participants' responses when pointing the elements related to the green space design as the most important theme that conditions the use of urban green spaces.

Figure 4.1. Relative endorsement of elements that condition the use of urban green spaces, including both motivators and deterrents. Domains (left) and themes (right) are depicted along with the percentage of comments associated with each.

If we dig a little deeper into the results and focus on the themes' percentages, we can see that almost 40% of all use conditioning elements were related to the natural features of urban green spaces (n = 106). Thus, we could say that the predominance of the green space design domain among the participants' responses was mainly due to the characteristics of the natural elements of urban green spaces. In this regard, our results provided a very clear vision of what the two key elements within this theme were. It can be easily observed the relation existing between the most frequent code among motivators for use, which was related to an abundance of vegetation (Large amount of greenery, n = 12), and the second most frequent code among the deterrents for use, which was related to an absence of vegetation (Small amount of greenery, n = 10). On the other hand, one of the four most frequent codes among the motivators for use was related to above-ground grass (Grass, n = 11), while the most frequent code among the deterrents for use was related to concrete or paved ground (Concrete/pavement, n = 12).

In general terms, the use of green space domain was not an especially relevant domain, with 27% of total comments. Nevertheless, despite being far from the natural features theme, the elements related to social factors stood out from the other themes, with 19% of total comments. Therefore, social factors were quite relevant among both motivators and deterrents for use of urban green spaces. Regarding the specific use conditioning elements belonging to this domain, we can see that one of the most frequent codes among the motivators for use was related to the chance to interact with other people within urban green spaces (Social contact, n = 10), while one of the most frequent codes among the deterrents for use was related to different kinds of antisocial behaviour within urban green spaces (Antisocial behaviour, n = 9). In addition, another relevant code among use discouraging elements was related to the impossibility to carry out two or more activities at the same time and in the same place within urban green spaces (Use overlap, n = 8).

Although the urban design domain had fewer comments, its themes were especially relevant among the participants' responses. Hence, despite being the domain in which a lowest number

of codes were generated, these codes were some of the most mentioned use conditioning elements. The results from our study, showed clearly what the two key elements within this domain were. It can be plainly observed the relation existing between the code related to a large area of urban green spaces, which was one of the most relevant codes among the motivators for use (Large size, n = 11), and the code related to a small area of urban green spaces, which was one of the most relevant codes among the deterrents for use (Small size, n = 9). On the other hand, one of the most frequent codes among the motivators for use was related to the availability of urban green spaces within the local area (Proximity, n = 11), while one of the most frequent codes among the deterrents for use was related to a lack of urban green spaces within the participants' local area (Small amount of GS, n = 9).

5. Discussion

The focus of this study was to explore the use and perceptions of urban green spaces in order to provide a general idea of what urban green spaces are used for and to identify the elements related to the characteristics of urban green spaces that encourage or discourage people to use these places.

Participants' responses showed several different ways in which urban green spaces are used. Statements about purposes of use were divided into five domains ordered by frequency of endorsement: physical, cognitive, social, nature, and children. Prominent purposes of use in each domain included go for a walk, sit, eat, relax, take a break, read, meet friends, nature view, and take children to play.

Comments from the participants illustrated the salience of the characteristics of urban green spaces that may condition their use. Statements about use encouraging and discouraging elements were divided into three domains ordered by frequency of endorsement: green space design, use of green space, and urban design. Prominent use conditioning elements in each domain included abundance and variety of vegetation, size and proximity of urban green spaces, and different social factors such as social contact or antisocial behaviour.

5.1. Purposes of use

The purposes of use of urban green spaces provided by participants in this study broadly mirror findings from previous research into the use of urban green spaces worldwide: United Kingdom (Seaman *et al*., 2010; Irvine *et al*., 2013), Netherlands (Chiesura, 2004), Denmark (Schipperijn *et al*., 2009), Iran (Abkar *et al*., 2010). In keeping with our study, going for a walk, exercise, taking a break, meeting friends, taking children to play, nature view, and fresh air are all reasons that thread through these studies as purposes of use of urban green spaces. The methodological differences across studies, however, make it difficult to measure the weight and depth of individual reasons. In that sense, differences may exist due to divergences in the focus of questions posed, the wording of reasons provided in checklists and the data collection methods.

In previous qualitative studies attention restoration pursuits such as relaxation were rarely identified as a purpose of use of urban green spaces (Irvine *et al*., 2013); whereas, in keeping with our results, relaxation was one of the most mentioned reasons in the study carried out by *Chiesura* (Chiesura, 2004). On the other hand, some of our findings strongly agree with previous research such as the study conducted by *Dunnett et al*., where social interaction was identified through focus group-based methods as a relevant purpose of use (Dunnett *et al*., 2002). Furthermore, the desire of taking a break identified among our participants, concurs

with other studies of use of urban green spaces that have used closed-ended checklists in which the opportunity to "escape the city" or "get away from stressful environments" were identified as a common theme (Chiesura, 2004; Abkar *et al*., 2010). Lastly, the purposes of use of urban green spaces related to physical pursuits – most of which centred on walking – were extensively present and dominated the participants' responses among the results from most of previous research (Dunnett *et al*., 2002; Roovers *et al*., 2002; Irvine *et al*., 2013).

5.2. Use conditioning elements

The characteristics of the place itself, the majority of which are related to its natural features, are clearly the most important reason for use of urban green spaces among participants in this study. Being consistent with other studies (Giles-Corti *et al*., 2005; Strath *et al*., 2007), we identified several nature-related motivators such as trees, water features, or wildlife; as well as more practical elements such as cycling lanes or trails. Specific facilities, such as off-leash dog areas, playgrounds or shade providing elements, are also important drivers for use, providing support for the emerging literature on the relationship between the characteristics of urban green spaces and their use (Tucker *et al*., 2007; Cutt *et al*., 2008).

We also note that in some of the previous qualitative research, social contact has not been perceived as an important motivator for use of urban green spaces (Chiesura, 2004; Irvine *et al*., 2013), whereas in our study it was identified as a central driver for use of urban green spaces. Nevertheless, it is consistent with some other qualitative studies which identified interaction with other people as a motivator for use. For example, *Strath et al.* found that urban green spaces such as parks were also socially significant as gathering places: "Organized activity in parks was seen as a way of including more individuals in both social and physical activity" (Strath *et al*., 2007, p. 5). Our findings indicate support for previous work suggesting use overlap as a deterrent for urban green space users. For example, *Cutt et al.* found that the separation of dogs from other park users by off-leash dog areas were considered important for encouraging park use among both dog owners and non-owners (Cutt *et al*., 2008). In keeping with other studies, our results reveal antisocial behaviour as an important deterrent for use of urban green spaces. Bullies, gangs and vandalism were all mentioned as reasons why participants did not use parks in the qualitative research carried out in Wisconsin, U.S., by *Adams et al*. (Adams *et al*., 2008). Most antisocial behaviour concerns mentioned in our study are associated with the presence of undesirable users of urban green spaces (e.g. drug users).

There also exists quantitative evidence that distance from urban green spaces is inversely associated with use and physical activity behaviour (Kaczynski and Henderson, 2007); the closer a green space is to each individual home, the more it is used (Grahn and Stigsdotter, 2003). In keeping with these studies, our qualitative data analysis reveals proximity as one of

the most important motivators for use. These findings might suggest that creating more neighbourhood urban green spaces within walking distance to most residents could encourage the use. Nevertheless, the quality of urban green spaces must also be taken into account. Our qualitative study add to those quantitative findings further understanding by showing that people may choose not to use their local urban green spaces because they do not meet people's needs or are considered low-quality places. The other element related to urban design identified in this study was the size of urban green spaces. It is also consistent with previous studies which found that having good access to larger urban green spaces is associated with higher levels of use for some specific activities such as walking. Furthermore, larger urban green spaces generally have more attributes that make them more attractive to users (Giles-Corti *et al.*, 2005).

5.3. Strengths and limitations of the study

The strengths of this study lie in the qualitative methods of inquiry which have provided us with a large amount of information, though having been collected from a relatively small amount of sources. The qualitative interview data help to explain some of the previous quantitative findings, add depth to our understanding of how urban green spaces are perceived by users, and contribute concrete illustrations of the purposes of use of urban green spaces as well as of the use conditioning elements.

One of the strong points of our study is the data collection method. The audio recording of the in-depth interviews helped to preserve the richness of the participants' language. Other strength of our study is the novel way to classify some of the results, through which the identified use conditioning elements were divided into different domains related to the main stages of an urban green space's life. It differs with the taxonomy used for previous research where attributes of urban green spaces tend to be classified into six categories: features, condition, access, aesthetics, safety, and policies (Bedimo-Rung *et al.*, 2005). As acknowledged by the authors, the categories in this latter taxonomy overlap in practice (e.g., incivilities such as broken bottles and graffiti may be associated with perceptions of park safety, condition and aesthetics). Apart from avoiding the overlap of categories, our classification aims to provide a clear and straightforward view of the use of urban green spaces which may help to identify *when* and *who* could appropriately modify the characteristics of these places in order to eventually promote their use (e.g. urban planners are responsible for use conditioning elements such as proximity or size).

The limitations of this study mainly stem from issues related to sampling. The main limitation of the study lies in the fact that the sample size was pre-established (n = 20) in all the four cities where PHENOTYPE in-depth interviews are conducted. Thus, we cannot verify if the

theoretical saturation has been reached. In other words, we do not know if some new relevant information for the study would have emerged if we had interviewed more people. Another concern regarding the sample of the study is the failure to recruit participants aged below 20s. In this sense, our study does not take into account the experiences related to use of urban green spaces at all levels of population in terms of age. On the other hand, the heterogeneous sample of the population that was recruited – in terms of socioeconomic status and distance to urban green spaces – would allow investigation of socio-demographic differences in use of urban green spaces. However, this investigation was not purposively carried out due to a lack of time and human resources. Despite these limitations, however, we did elicit a wide range of views that appeared to mirror the different kinds of urban green space users that can be found in Barcelona city. To that extent, we believe that we have achieved the objective of reflecting the diversity within a given population.

Lastly, regarding the data analysis, a weakness related to the interpretation of the qualitative data derives from the fact that the analysis was not conducted through an iterative process by several different researchers, thus increasing the subjectivity of the study results.

For further research, modifications in the sampling process such as not pre-establishing the number of interview participants as well as recruiting a wider range of age sample would minimise the limitations of future studies. In addition, a data analysis conducted through an iterative process by different researchers would strengthen the findings from future research.

6. Conclusions

This study belongs to a series of efforts to promote health and plan healthier urban environments. Although we recognize that further research in this field is necessary, the findings of this study unassumingly offer some new insight concerning this matter. Results reported here indicate that people choose to use urban green spaces for many reasons, including both their own personal motivators and ones related to the place itself.

First of all, the identified **purposes of use** of urban green spaces may be distributed into two main groups of purposes which could be accomplished within two different kinds of urban green spaces. On one hand, the most common purposes of use are those related to *physical pursuits*. In that sense, it would be necessary to provide urban green spaces which include the proper characteristics to allow the users to carry out physical activity there. Thus, this first kind of urban green spaces may be designed in order to provide a place where large amounts of physical activity and movement happen. The purpose of taking children to *play* could also be accomplished in this kind of urban green spaces.

On the other hand, purposes of use such as *attention and physical restoration, mental pursuits, nature, and social pursuits* may be all grouped as a series of purposes which could be accomplished within another kind of urban green spaces. In that case, this second kind of urban green spaces may be designed in order to provide a quieter place where smaller amounts of physical activity happen. To sum up, it would be necessary to provide urban green spaces which meet all kinds of citizens' needs. In other words, the use of urban green spaces may be promoted by providing different purpose-built places instead of just large amounts of general-purpose ones.

Regarding the **use conditioning elements** related to the characteristics of urban green spaces, different types were identified. Firstly, the dominant use conditioning element identified is related to the *natural features* of urban green spaces. In order to promote the use of urban green spaces, these natural features must be taken into account not just when designing these spaces within the city, but also when maintaining them. Both designers of urban green spaces and public services that provide maintenance are responsible of keeping these places appealing to the citizens. In this sense, efforts must be made to deeply investigate the specific kinds of vegetation that encourage people to visit green spaces as well as to optimize the management of these public places by local administration.

Secondly, *social factors* were also identified as an important driver for use of urban green spaces. In that case, both local administration and community itself are responsible for promoting the use of these places. The former may increase the security and surveillance to reduce antisocial behaviour within urban green spaces, thus supporting the feeling of safety of users. Whereas the latter is responsible not just for using these spaces in an appropriate way

(i.e. avoiding antisocial behaviour), but also for promoting and participating in different social or cultural events which take place in urban green spaces and make them an appealing place to visit.

Lastly, urban design has been identified as a determiner of the use of urban green spaces mainly due to their *location* and *size*. In this sense, urban planners must take into account the different needs for urban green space among the citizens when designing land use policies as well as city planning. Nevertheless, they are responsible not just for providing citizens with a quantity of urban green spaces, but also for providing them with high-quality places. Hence, as stated above, further research is necessary in order to find out how high-quality urban green spaces must be.

7. References

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