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Spatial Structure and Subjective Well-Being Across the South of Europe

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Summary

This research examines the relationship between urbanisation and subjective well-being in the South of Europe. Its main objective is to further the understanding on this relationship at the regional level – which has been referred to as the ideal spatial level at which to study well-being (Aslam and Corrado, 2012) – by borrowing measures of spatial structure commonly used in economic geography literature, such as polycentricity, dispersion and urban size.

The study thus seeks to answer one main research question: "how are different regional spatial structures associated with subjective well-being, in the South of Europe?". This is tested in the Southern countries of Greece, Italy, Portugal, and Spain, which put forward a particular context of consistently low-levels of individual well-being, hard hit economies due to the Great Recession, and traditionally compact and monocentric towns and cities.

In order to answer this question, two datasets were combined: the European Social Survey, which gathers data on participants' socio-demographics, and the Eurostat City Statistics database, which collects city population data at the NUTS 3 level. The former provides data on respondents' well-being, whilst the latter is used to create spatial structure indexes for polycentricity, dispersion and urban size, for a total of 48 regions. These are then tested through a multilevel modelling strategy, which assumes that regional characteristics are correlated with individual well-being levels.

The study finds that life satisfaction is positively associated with regional urban size, and negatively associated with urban residence. This means that, on average, residents in these Southern European countries tend to be happier in rural residences, within more urbanised regions. However, although these results present significant associations, the effects on life satisfaction are relatively small when compared to individual characteristics such as unemployment or bad health. No significant associations were found between the polycentricity and dispersion measures, which may be attributed to the high levels of heterogeneity between regions, or the lack of a mediating functional relationship (such as commuting patterns) between individuals' daily activities and regional structure.

Keywords

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Table of Contents

List of Figures

List of Tables

Chapter 1: Introduction

1.1 Background Information

As urban populations continue to grow worldwide, an estimated 68% of the global population is expected to live in cities by 2050 (UN, 2015), which equates to an increase from 4.2 billion in 2018, to a predicted 6.7 billion by 2050. This trend is expected to occur throughout developed as well as emerging regions, albeit at different growth rates (Burger et al., 2020). These major spatial and demographic shifts have brought the debate on the relationship between the economic performance of agglomerations, the socio-environmental pitfalls of urbanisation and the overall sustainability of diverse urban settlements back to life (Lenzi and Perucca, 2018).

A branch of this debate has focused, more particularly, on the relationship between urbanisation and subjective well-being. In fact, measuring the effects that 'where we live' have on subjective well-being has been the aim of an increasing amount of empirical research in several fields over the years (Ballas, 2013). In an attempt to move away from purely objective measures of 'quality of life' - where it was assumed that individuals were rational, had a full understanding of the market and sought to maximise utility (Dolan et al., 2008) - interest in the subjective measures of well-being has gained momentum. Indeed, it is becoming customary for social surveys to ask respondents to rate their life-as-a-whole so as to measure the 'experienced' quality of life of a population (Blanchflower and Oswald, 2011). Thus, instead of the traditional approach of 'revealed preferences' - analysed through market behaviour and easily measured indicators - subjective well-being assumes an individual's well-being to be their own overall assessment of their quality of life (Sumner, 1996). In this way, it can be used to complement other objective indicators.

According to Florida et al. (2013), the relationship between urbanisation and subjective well-being has become increasingly important as people make conscious decisions on where to live based on the amenities and services a city has to offer, its job opportunities, and the emotional ties and sense of belonging that they develop towards the place they call home. The empirical evidence on this relationship, however, is relatively mixed. Despite the fact that cities are the main producers of economic growth (Glaeser, 2011), urbanisation – which is considered a tool in the generation of such growth and the higher living standards related to it – has often been associated with lower levels of subjective well-being, especially in the more developed and affluent parts of the world (Burger et al., 2020).

The interpretation of these results points to the concept of 'urban malaise', which occurs when the negative externalities of living in large metropolises, such as the amount of pollution they generate, traffic and congestion, unaffordable living prices and a lack of green open spaces, outweigh the positive ones, such as access to jobs, retail amenities, and cultural facilities, such as theatres and museums (Fischer, 1973).

Most of the literature investigating this relationship has focused on the differences in self-reported well-being between residents of urban areas versus residents of rural areas, assuming a somewhat black-and-white relationship between the two (Lenzi and Perucca, 2020). It has failed to take into consideration the 'borrowed size' concept, put forward by Alonso (1973), which argues that city externalities are not constrained to urban boundaries, but rather, spread outwards to surrounding areas. In other words, city effects do not only impact urban residents

within a city, but also the residents of areas in close proximity to it, which are generally smaller in size and can therefore be sometimes classified as 'rural'.

The concept of 'borrowed size' adds a regional dimension to the debate – one that is not at all new to the field of economic geography. A burgeoning amount of literature can be found, investigating city and regional spatial structures, with the aim of understanding the optimal regional shape for economic productivity (Meijers, Evert J. and Burger, 2010; Wang et al., 2019; Zhang et al., 2017), environmental emissions (Burgalassi and Luzzati, 2015), or to reduce regional disparities (Meijers, Evert and Sandberg, 2006). In tandem with this, the fields of urban planning and policy-making alike have also shown interest in what pertains a 'good' regional structure, with preference, particularly in the E.U., given to 'compact' city policies and polycentric development, regardless of the lack of empirical evidence supporting them (Parr, 2004).

1.2 Problem Statement

Despite the increasing interest in regional spatial structures and the broad indications that residents of more urban areas report lower levels of subjective well-being than their rural counterparts, knowledge on how different urban forms within a given region affect subjective well-being is still restricted – particularly regarding the effects of the density and dispersion of such regions (Mouratidis, 2019). This comes as a surprise in light of the growing body of literature and data available tackling urbanisation, urban-rural differentials, and subjective well-being (Hoogerbrugge et al., 2021).

Literature on the economic performance of regions has thoroughly examined how differences in urban form – from monocentricity-polycentricity and centralisation-dispersion dimensions – can affect regional productivity (Meijers, Evert J. and Burger, 2010). Polycentricity is concerned with the size and distribution of urban centres throughout a region: the more balanced the distribution, in that there is no predominant urban centre (or city) within the region, the more polycentric it is (Kloosterman and Musterd, 2001; Parr, 2004). Such regions tend to be made up of clusters of small to medium sized cities that are spatially distinct, but that are within reasonable commuting distances from each other. The opposite would be a monocentric regional structure, where most of the urban population is concentrated in one big city (Kloosterman and Musterd, 2001). In turn, centralisation-dispersion measures are concerned with the spread of the population throughout the region – whether they are concentrated within urban centres or dispersed across the region in a sprawled out manner (Brown et al., 2016).

By looking at these urban form typologies alongside the notion of 'borrowed size', it can be suggested that in a more polycentric region the negative externalities of agglomeration economies, such as pollution and congestion, are contained within the city's boundaries, whereas the positive externalities, such as labour markets and amenities, are shared among the other urban centres in the area (Hoogerbrugge et al., 2021). It can, thus, be hypothesised that polycentricity could be positively associated with subjective well-being.

1.3 Relevance of Research Topic

This study's area of interest is the South of Europe – particularly Greece, Italy, Portugal, and Spain. As some of the first members of the European Union, and four of the hardest hit countries during the Economic Crisis of 2008 (Helliwell et al., 2014), their country-wide levels of well-being consistently lag behind those of their Northern counterparts (Pedersen and Schmidt, 2009), for reasons strongly attributed to their slower rates of economic development and lower quality governance (Arampatzi et al., 2019; Davoudi, 2003). This is in spite of their lifestyles being described as the 'dolce vita' (an Italian saying for 'a life of thoughtless pleasure and splendour' (Brulé and Veenhoven, 2012).

Their urbanisation patterns are also of interest in that the traditional qualities of a Mediterranean city tended towards monocentric urban forms characterised by compactness, density, and complex social diversity (Muñoz, 2003). However, in an attempt to compete with and retain a stable position with richer parts of Europe, traditional pro-urban typologies were abandoned in favour of low-density and diffused settlements (Muñoz, 2003; Salvati and De Rosa, 2014), some of which have been classified as sprawled out (Salvati, 2016), whereas others have been described as polycentric (Muñoz, 2003; Salvati and De Rosa, 2014). Thus, it is within this Mediterranean context that this research places itself – in an attempt to understand the role urban development plays in affecting the levels of individual well-being in these Southern countries.

1.4 Research Objective

This research builds on a previous study by Hoogerbrugge et al. (2021), which investigated the relationship between polycentricity and subjective well-being in the North-West of Europe. As Parr (2004) points out, polycentricity literature tends to focus on economic success stories such as the Randstad region in the Netherlands and the Rhine-Ruhr region in Germany – shedding a positive light on the concept. Thus, to complement the previous literature and in an attempt to explore the concept in less recognised polycentric areas, this research instead focuses on the South of Europe.

Thus, the main objective of this research is to contribute to the existing knowledge on the relationship between different spatial structures and subjective well-being, by testing the effects of polycentric regional structures and their level of centralisation- dispersion, in relation to subjective well-being.

1.5 Research Question and Sub-Questions

The main research question is as follows:

How are different regional spatial structures associated with subjective well-being, in the South of Europe?

This can be broken down into the following sub-questions:

1. How is regional urban size associated with subjective well-being in Greece, Italy, Portugal, and Spain?

2. How are regional monocentricity - polycentricity dimensions associated with subjective well-being in Greece, Italy, Portugal, and Spain?

3. How are regional centralisation - dispersion dimensions associated with subjective well-being in Greece, Italy, Portugal, and Spain?

1.6 Structure of Study

Following this introduction, Chapter Two introduces the state of the art theories on the concepts of interest: polycentricity, dispersion and their relationship with well-being. This is followed by a discussion on the countries in the South of Europe: their urbanisation patterns, their socio-economic situations, and how this is all relevant for the well-being of their residents. Chapter Three explains how the research questions will be answered, by giving an overview of the data used, the research methods adopted, and any limitations that were faced throughout the study. Chapter Four presents the research findings, and a discussion of the results, and finally, Chapter Five puts forward the conclusions of this study, and recommendations for future research, or policy.

Chapter 2: Literature Review

This chapter introduces the main theoretical concepts of the research, and the relationships between them. It first presents state of the art knowledge on subjective well-being and how it relates to spatial structure, followed by an explanation of different spatial structures. This is then contextualised in the South of Europe, with a summary of the countries' urbanisation patterns, and the subjective well-being of their populations. The chapter concludes by putting forward three relevant hypotheses, indicating the convergence of the theory.

2.1 On Subjective Well-Being

2.1.1 What is Subjective Well-Being?

According to Veenhoven (1988), happiness can be defined as "the degree to which an individual judges the overall quality of his life-as-a-whole favorably" (p.22) – an umbrella term that has been used interchangeably over the years, with words such as 'well-being', 'welfare', and 'quality of life'. Veenhoven's (2000) later work points out, however, that these terms denote different life aspects that contribute to happiness and therefore, aggregating them into one index would be akin to comparing "apples and pears" (p.2). Hence, an overall index of happiness would be inaccurate - he instead proposes measuring it through the 'four qualities of life' model.

Figure 1: The Four Qualities of Life, with some examples of attributes (Veenhoven, 2000)

	Outer qualities	Inner qualities

Life chances	**Livability of environment**
	• Ecological
	  e.g. moderate climate, clean air, spacious housing,
	• Social
	  e.g. freedom, equality and brotherhood
	• Economical
	  e.g. wealthy nation, generous social security, smooth economic development
	• Cultural
	  e.g. flourishing of arts and sciences, mass education
	• Etc…
		Life-ability of the person
		• Physical health
		  negative: free of disease
		  positive: energetic, resilient
		• Mental health
		  negative: free of mental defects
		  positive: autonomous, creative
		• Knowledge
		  e.g. literacy, schooling
		• Skills
		  e.g. intelligence, manners
		• Art of living
		  e.g. varied lifestyle, differentiated taste
		• Etc…

Life results	**Objective utility of life**
	• External utility
	  e.g. For intimates: rearing children, care for friends
	  e.g. For society: being a good citizen
	  e.g. for mankind: leaving an invention
	• Moral perfection
	  e.g. authenticity, compassion, originality
	• Etc…
		Subjective appreciation of life
		• appraisal of life-aspects
		  e.g. Satisfaction with job
		  e.g. satisfaction with variety
		• Prevailing moods
		  e.g. Depression, ennui
		  e.g. zest
		• Overall appraisals
		  Affective: general mood-level
		  Cognitive: contentment with life

The 'four qualities of life' pertain to inner and outer qualities, as well as life chances and results. Inner qualities concern the individual: *life-ability* focuses on how physically or mentally capable one is of dealing with problems or situations, whereas the *appreciation of life* denotes the subjective, self-appraisal of one's own life. Outer qualities are external to the individual but still play a big part in influencing their overall happiness: the *liveability of the environment* denotes good living conditions – environmentally, socially, and politically; and the *utility of life* measures how useful and appreciated an individual is because of what they do (Veenhoven, 2000). It is the combination of these four qualities, as seen in Figure 1, that contributes to 'the good life', and although it was concluded that they should be evaluated separately and are all of equal importance, Veenhoven (2000) also states that the most inclusive measure of happiness is through the individual's self-appraisal of his or her own life – i.e., their subjective well-being (SWB).

2.1.2   Measuring Subjective Well-Being

Humans differ from other species because they can reflect on their affective experiences using their cognition (Diener et al., 1999; Veenhoven, 2000). Therefore, when individuals 'appreciate their life, it can be in a cognitive or affective manner - the former referring to a summary appraisal of how one's life is overall, in comparison to 'how it should be', whereas the latter focuses on the moods and emotions felt as a result of an on-going experience (Veenhoven, 2000). Although moderate intercorrelation exists between the different variables, cognitive and affective evaluations are generally measured separately, as their validity as stand-alone measures is stronger than this correlation (Diener et al., 1999). Happiness literature, thus, tends to use the cognitive evaluation measured through 'life satisfaction' survey questions, where respondents are generally asked a question such as the following:

"Taken all together, how would you say things are these days -- would you say that you are very happy, pretty happy, or not too happy?" (Blanchflower and Oswald, 2011, p.34).

The multi-dimensionality of what pertains to 'the good life' brings together several life domains such as work and relationships and the complex interplay between them, covering both the objective measures of living conditions, with subjective perceptions of them (Shucksmith et al., 2009). A seminal paper by Dolan et al. (2008) broadly defines seven themes of SWB determinants and provides a comprehensive list of all its potential influences, as can be seen in Table 1.

Table 1: Categorisation of subjective well-being determinants (Dolan et al., 2008)

Domain	Variable
Income	Income
Personal characteristics	Age
	Gender
	Ethnicity
	Personality

| Socially developed characteristics | Education |
	Health
	Type of work
	Unemployment
How we spend our time	Hours worked
	Commuting
	Caring for others
	Community involvement / volunteering
	Exercise
	Religious activities
Attitudes and beliefs towards self / others / life	Attitudes towards our circumstances
	Trust
	Political persuasion
	Religion
Relationships	Marriage / intimate relationship
	Having children
	Seeing family & friends
Wider economic, social, and political environment (where we live)	Income inequality
	Unemployment rates
	Inflation
	Welfare system and public insurance
	Degree of democracy
	Climate and the natural environment
	Safety and deprivation of the area
	Urbanisation

2.2 Subjective Well-Being and Urbanisation

Research into the different determinants of SWB, such as income and personality traits, has long been the topic of interest of many fields. However, literature on the relationship between SWB and spatial characteristics, particularly regarding urbanisation, is relatively recent (Lenzi and Perucca, 2020). This might be due to the complexity that exists between the different characteristics of urban environments, such as the social, economic, and environmental, at different scales, through the neighbourhood, city, and region, as well as the life satisfaction of each individual that resides within them, as certain urban characteristics might contribute to stressful experiences from some inhabitants and not others (Marans and Stimson, 2011). To understand this further, Campbell et al. (1976) proposed a theoretical framework, as seen in Figure 2, specifically to encapsulate the complex relationships between urban environments at any level, and individual life satisfaction, built on four underlying assumptions:

1. People derive different experiences from interactions with their surroundings;

2. Subjective individual evaluations differ from the objective environment;

3. Individuals respond and adapt to their experiences with the environment; and,

4. That different satisfaction levels in different life domains contribute to the overall experience of life satisfaction.

Figure 2: Conceptual model showing relationship between different domain satisfactions and life satisfaction. Adapted from Campbell et al. 1976.
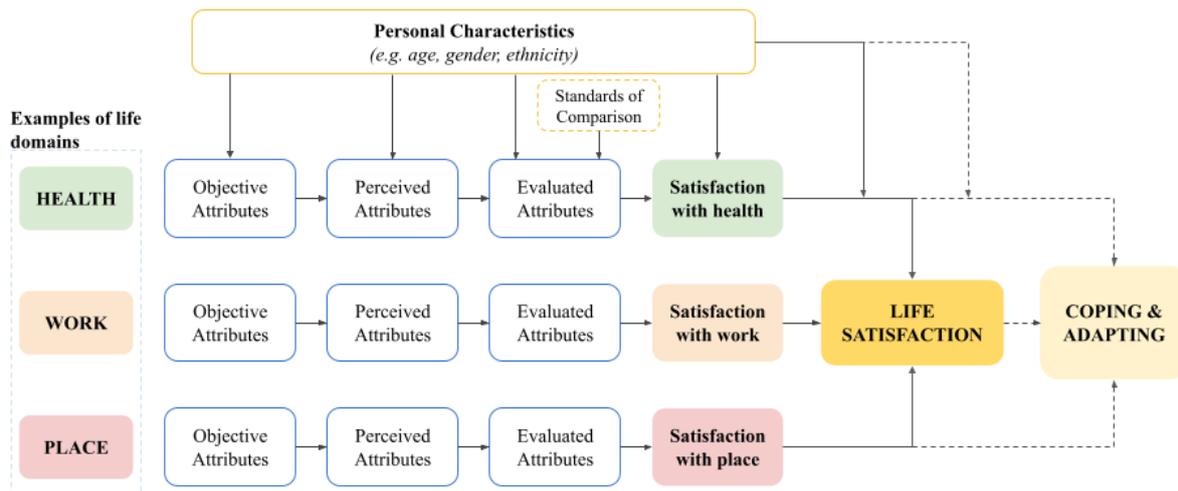
2.2.1 Subjective Well-Being and City Life

It could be said that interest in the causal relationship between urbanisation and subjective well-being was instigated by Easterlin (1973), when he identified the tensions between economic measures of well-being, and subjective measures. Labelled 'Easterlin's Paradox', he provided evidence against the assumption that income growth automatically led to an increase in well-being. By overlaying this notion in space, the idea that contemporary cities are our 'greatest invention' (Glaeser, 2011) can be questioned, since, despite the fact that cities are places of prosperity and innovation - providing higher living standards, higher wages and better access to amenities (Glaeser, 2011) - recent empirical research conducted at the global scale has proven that, on average, residents in more developed countries – such as the U.S. and the North West of Europe – show higher levels of subjective well-being in rural settings, rather than urban ones (Burger et al., 2020).

This research echoes the sentiments of previous literature, such as that of Okulicz-Kozaryn (2015), who stated that despite the job opportunities they provide, cities are innately unnatural and inhumane places, and are certainly where people should *not* go to be happy. He claims that there exists a strong urban-rural, or rather, a city-nature happiness gradient, where people are happiest in the open country (Okulicz-Kozaryn, 2015). Sørensen (2014) also supports this through his research in the E.U., where he found that rural dwellers report higher levels of life satisfaction than urban dwellers.

The most common scholarly interpretation of these results is through the concept of 'urban malaise' – a term coined by Fischer (1973). He found that in most countries around the world,

people tended to be more unhappy in rural areas, making the case of 'rural malaise' rather than urban. On the other hand, he also saw a trend in the largest urban metropolises – namely in France and the U.S. – where contrary to the rest of the world, urban dwellers were overall unhappier (Fischer, 1973).

Figure 3: The Urban Paradox (Source: Morrison, 2021)
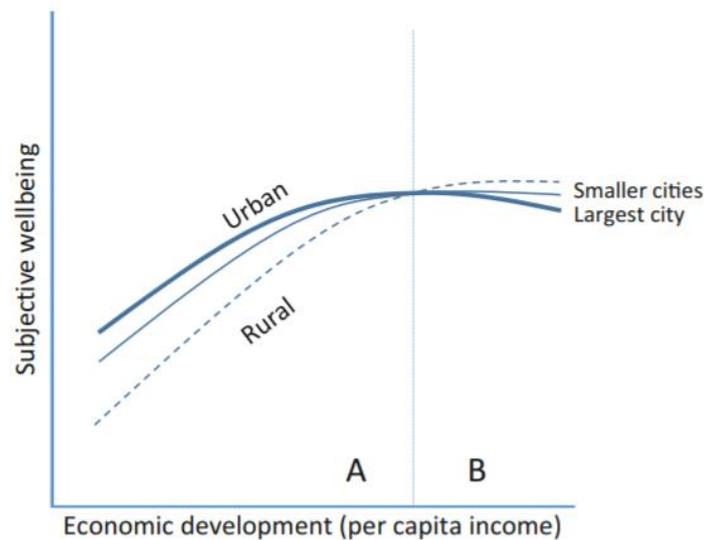
This trend did not subside and has now been renamed the 'urban paradox' (Morrison, 2021), where, although population size and density are not always associated with lower levels of well-being, the average SWB of the largest cities in most developed world economies, tends to be lower than in the rest of their respective countries. However, as can be noted in Figure 3, this is contingent on the stage of economic development the country is at, as well as an intricate balance of people-based and place-based factors, such as an individual's level of education, his income, as well as access to affordable housing and quality amenities (Burger et al., 2020).

Morrison (2021) postulates however, that the main reason behind a city transitioning into area B in Figure 3, is due to the sheer number of non-tertiary educated people, who receive lower pays, commute for longer, and hence, spend less time with close relations, driving down the average well-being levels, in spite of the positive externalities offered to the well-educated, and higher earning minority.

2.3 Spatial Structure: A Closer Look

According to Lenzi and Perucca (2020), however, the debate on subjective well-being and urbanisation has been too simplistic, so far. They argue that the categorisation of different urban forms has been somewhat black-and-white and does not harness the complex urban relationships within, and between cities (Lenzi and Perucca, 2020).

The authors provide two reasons for this statement: firstly, because cities vary greatly in the amenities they provide, their historic, economic, and demographic circumstances and their size (Lenzi and Perucca, 2020). For example, larger cities tend to enjoy a range of amenities due to economies of scale, and the agglomeration benefits of knowledge sharing, matching, and learning (Duranton and Puga, 2004). They are also considered places of consumption, in that they provide a range of high-quality services and cultural amenities (Glaeser et al., 2001). On the other hand, smaller cities, which are further down the urban hierarchy, and yet, are still perceived as 'urban', might not provide such services. In fact, Fischer's (1973) and Burger et al.'s (2020) results pointing to urban malaise were only significant when looking at the largest, and most economically developed areas in the world, where agglomeration diseconomies outweighed their positive effects.

The second point is that city externalities are not constrained to urban boundaries, but rather spread outwards towards surrounding areas, and the intensity by which these spill-over effects are felt, depends on their spatial proximity to a larger city (Van Oort, 2007, in Lenzi and Perucca, 2020). The interpretation of this relationship looks to the concept of 'borrowed size', put forward by Alonso (1973) and reignited by Burger et al. (2015),which states that smaller cities can enjoy the agglomeration benefits of larger cities, as long as they are close to them. This means that cities, towns, and villages within spatial proximity to cities higher up the urban hierarchy can reap agglomeration benefits such as amenities and access to more diverse labour markets, without the potential localised disadvantages that come with excessive urbanisation, such as crime, pollution, congestion, and high rental prices, (Lenzi and Perucca, 2020). Thus, agglomeration effects on subjective well-being can filter down the urban hierarchy, if the spatial range remains contained at the regional level (Lenzi and Perucca, 2020).

Through their research in the E.U., Lenzi and Perucca (2018; 2020) provide evidence that contradicts the conclusion that urban areas in developed regions are unhappier, finding that this is only the case when comparing the largest metropolises to remote, rural areas. Upon taking a closer look at the regional structure of cities, they found that respondents tended to be happiest in mid-sized cities, within urbanised regions – i.e. enjoying the agglomeration benefits of larger cities, without their costs (Lenzi and Perucca, 2020).

2.3.1   The Dimensions of Spatial Structure

It can, thus, be postulated that a relationship exists between subjective well-being and urban form at the regional level. Hoogebrugge et al. (2021) take this notion a step further by seeking to understand what types of regional structures might lead to higher levels of SWB. Borrowing measures used in economic geography literature, they sought to understand this relationship through polycentricity-monocentricity, and centralisation-dispersion measures.

2.3.1.1 Polycentricity – Monocentricity

Polycentricity-monocentricity measures are concerned with how urban centres are distributed throughout a region. A monocentric urban region can be classified as having a sharp divide between what is urban, suburban, and rural, and can typically be seen in traditional cities, inspired by industrial economics (Kloosterman and Musterd, 2001). A polycentric regional structure is made up of smaller urban centres, separated by open tracts of land, all within an easily commutable distance from each other (Kloosterman and Musterd, 2001).

Polycentricity describes the spatial structure of a region from two dimensions: morphological, and functional. In morphological terms, a polycentric region is one where there is no evident hierarchy between one city and the next, and where the population and size of the cities within a region is relatively balanced (Meijers, Evert J. and Burger, 2010). From a functional perspective, a region can only be considered polycentric when, over and above its morphology, there also exists a level of economic linkage, interaction, or dependence between cities (Burger and Meijers, 2010; Parr, 2004).

Little is known about the direct relationship between polycentric regional structures and subjective well-being. Hoogerbrugge et al. (2021) explored this relationship in the North-West of Europe and found that there exists a weak, positive association between the two. Aside from this, polycentricity has been empirically associated with higher labour productivity rates in the U.S. (Meijers and Burger, 2010), higher per capita income and lower poverty rates, also in the U.S. (Arribas-Bel and Sanz-Gracia, 2014) and lower income segregation in Brazil (Garcia-López and Moreno-Monroy, 2018), all of which are positively associated with subjective well-being in their own right (Hoogerbrugge et al., 2021).

On the other hand, polycentric urban structures tend to diffuse the agglomeration benefits associated with more monocentric forms, since they can lack 'economies of scale' and the critical mass needed for certain types of specialised retail functions and cultural amenities (Burger et al., 2014; Meijers, Evert, 2008). Additionally, there are no concrete results on the relationship between polycentricity and commuting, since, on the one hand, it might be possible to find a job closer to one's home, but on the other, if functions are spread across the region, this might result in more commuting, and higher levels of air pollution, which are negatively associated with well-being (Ballas, 2013; Darçın, 2017).

2.3.1.2 Centralisation – Dispersion

Another layer to the regional spatial structure debate is the centralisation-dispersion dimension, which is concerned with how spread out the population is. Centralisation denotes a concentration of the population within urban centres (or, cities), whereas the opposite would be a dispersed structure, which refers to a scenario where the population is spread out across a region in a non-concentrated manner (Meijers, Evert J. and Burger, 2010). This can be confused with 'urban sprawl', which is associated with low-density development and high car dependency. However, the dispersion dimension is not concerned with density, and simply focuses on whether a population is concentrated in urban centres, or not (Meijers, Evert J. and Burger, 2010).

In this regard, centralisation is more cost effective to provide public services (Meijers, Evert J. and Burger, 2010), whilst highly dispersed regions tend to lack 'economies of scale', meaning that it is less likely to find public services readily available such as public schools and public transport; less amenities – retail, or otherwise – and ultimately an increase in commuting since everything is so spread out (Burger et al., 2014).

When studying neighbourhoods in Oslo, Norway, Mouratidis (2019), found that compact neighbourhoods showed higher levels of subjective well-being than dispersed ones, particularly when controlling for typical urban problems such as crime, noise, and pollution. Hoogerbrugge et al. (2021) found similar results in the North-West of Europe, with dispersed regions showing lower levels of life satisfaction, however dispersed *and* polycentric regions were associated with higher levels of life satisfaction. On the other hand, when studying OECD metro areas, Brown et al. (2016) found contradictory evidence regarding these dimensions,

where land use fragmentation (associated with dispersion) was found to be negatively associated with life satisfaction, but, at the same time, so was centralization.

**Figure 4:** Elements of a regional spatial structure (Adapted from Meijers & Burger, 2010)
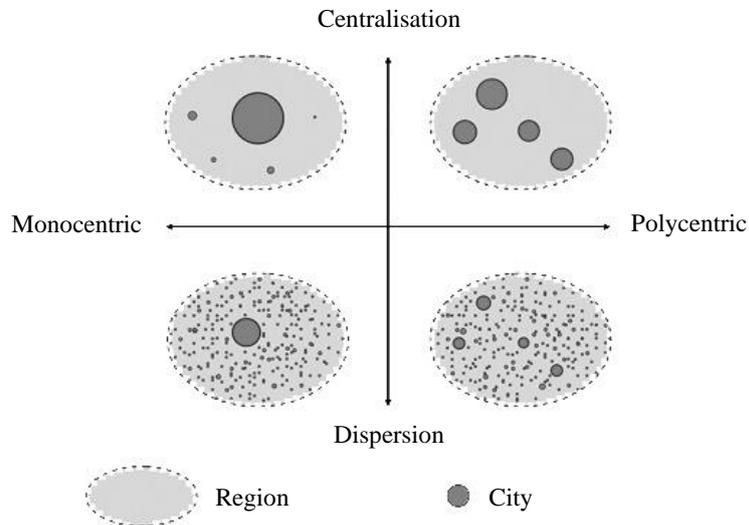
Figure 5: Conceptual Framework, elaborated on by Author (2021)
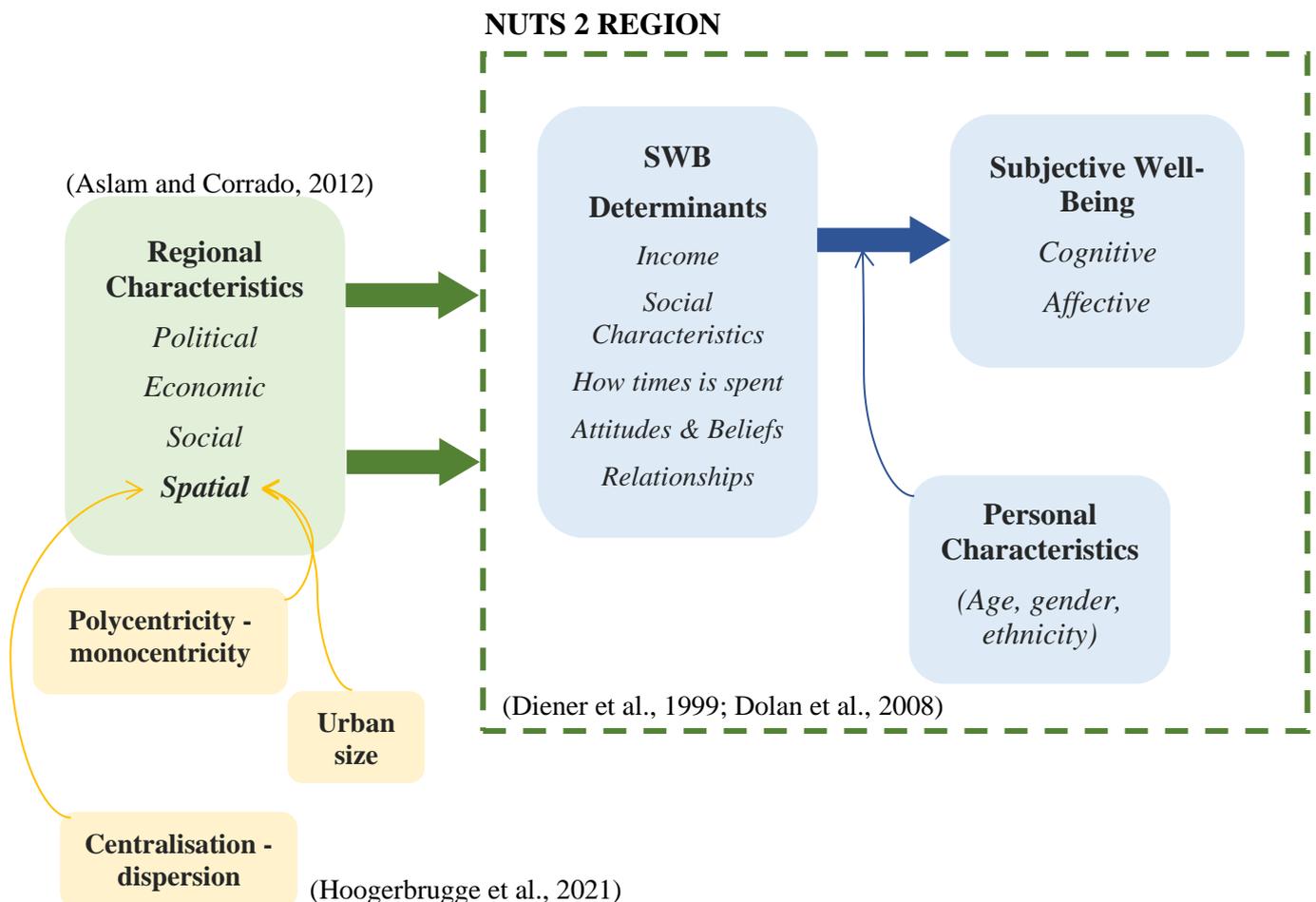
2.4 The European South

2.4.1 Urbanisation Patterns around the Mediterranean

Regions along the South of Europe are some of the most affluent in the Mediterranean Basin. With exceptionally long histories, their spatial patterns represent a mosaic of ancient civilisations, different modes of production, and social complexity (Morelli and Salvati, 2010). Although very heterogeneous in nature, until the 1990s, metropolitan regions in this area were generally characterised by functionally monocentric spatial organisations, very densely populated urban centres, and structurally centralised urban forms (Kasanko et al., 2006). They differ from Northern regions particularly regarding the location of economic activity: whereas Northern countries tend to have specialised economic zones, following a land-rent gradient, Southern cities are represented by a more disordered urban tissue, where "retail and artisan establishments, kiosks and workshops of the informal economy are scattered in small local centres, along roads and in residential areas" (Morelli and Salvati, 2010, p. 69).

In recent years, however, it has been argued that 'exurban development' has become the overarching mode of development characterising the South (Muñoz, 2003) – i.e., towards more suburban, and polycentric forms of development (Salvati, 2013). Driven by a number of factors such as changes in production structures, a weakening agricultural sector, a strong second-home real estate market and social polarisation (Leontidou et al., 2007), development moved further and further away from the urban fringe, towards the edges of motorways and ring roads, similar to the American suburban landscape (Muñoz, 2003).

Measuring morphological polycentricity at the country level, Nikolopous et al. (2018), found that Spanish cities are relatively territorially balanced, and is a 'sufficiently polycentric' country; Italy, despite being quite regionally polycentric, is very territorially imbalanced, following its typical North-South divide (Musolino, 2018); Portugal is dominated in the North by Porto, and in the South by Lisbon, and was described as 'oligocentric'; and finally, Greece was categorised as 'potentially polycentric', since its territories are relatively balanced at the country level.

Nowadays, at a smaller scale, Mediterranean cities have diverged in character, firstly because their urban forms are strongly based on what was previously there, but also because they have been influenced by different master plans and policies (Salvati, 2013). Conducting a comparative analysis for Barcelona, Athens, and Rome, Salvati and De Rosa (2014) found that Barcelona tended towards a moderately polycentric form of development; Rome developed in a compact manner, with several morphological subcentres on its fringes, but remained, functionally monocentric; and Athens remained completely monocentric, albeit more dispersed.

At the regional level, Salvati et al. (2013) confirm that there exists quite a lot of variability between regions, traditionally following compact growth typologies, urban settlements have expanded outwards in different ways, some following dispersed patterns, whilst others more polycentric. Thus, it is expected that measuring regional polycentricity and dispersion nowadays should lead to quite a large amount of variation between regions, due to this divergence in urban development post-1990s.

2.4.2 Subjective Well-Being in the Southern Countries

To contextualise the well-being discussion in the South of Europe, one must first point out that there is a strong North-South divide in overall life satisfaction within the E.U., where Southern European countries - namely, Italy, Greece, Portugal, and Spain - report the lowest average life satisfaction values, as can be seen in Figure 5 (Pedersen and Schmidt, 2009). This difference can be explained due to developmental disparities on the European level, where the peripheral and somewhat geographically remote Southern countries lag behind the economic powerhouses at the 'core' (Davoudi, 2003). In fact, individuals from Southern countries experience a higher jump in subjective well-being levels with an increase in income relative to average income, compared to Northern or Central regions (Pedersen and Schmidt, 2009; Pittau et al., 2010).

Figure 6: Average life satisfaction values for European countries in 2000. Source: Pederson & Schmidt (2009).
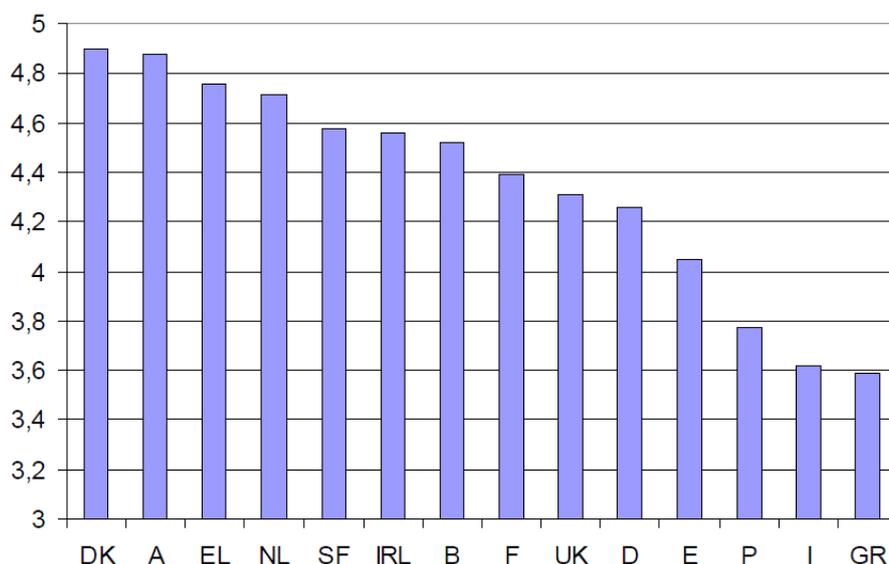
Note: E - Spain, P - Portugal, I - Italy, GR - Greece.

Thus, it comes as no surprise that these countries experienced substantial declines in SWB levels during the Great Recession (2008 – 2013). Arampatzi et al. (2019) discuss that whereas in Athens, 63% of the adult population in 2005 thought themselves fairly / very satisfied, by 2014, this dropped to 43%, which was an increase from the low of 34% in 2012. The authors further discuss that although this decline in SWB was mostly attributed to the country's economic failings, they found that high quality regional governance served as a buffer, with a positive association with life satisfaction levels, resulting in some regions faring better than others (Arampatzi et al., 2019). Helliwell et al. (2014) further suggest that average happiness drops in these countries, during this period of economic crisis, were also a result of damaged social ties, and less trust in institutions.

Brulé and Veenhoven (2012) postulate that another explanation for this dissatisfaction – outside of personal economic factors – is also due to cultural differences in development histories. They note that Southern European countries developed in a more socially hierarchical manner, where societies vary in their degrees of freedom due to social expectations, which can

be influenced by family ties, religiousness, morality, and the quality of government, and which, in turn, are negatively associated with subjective well-being (Brulé and Veenhoven, 2012).

2.4.3 Subjective Well-Being and Urbanisation in the South

Contradictory evidence exists regarding levels of urbanisation and well-being in Southern European countries. Burger et al. (2020) found that in the South, urban populations are significantly happier than their rural counterparts – by 0.46 points on the Cantril Ladder (an 11-point scale in which the bottom step of the ladder (0) is the worst possible life one can imagine, and the top step (10), the best possible life). However, on the other hand, De Neve and Krekel (2020) indicate that Lisbon and Athens are two of the least satisfied European Capitals, before controlling for individual characteristics.

Piper (2015), who studied the relationship between European capital cities (generally the most metropolitan regions) and life satisfaction found that on average, Lisbon and Athens were less happy than the rest of their respective countries, whilst Madrid reported no significant differences. After controlling for individual aspects and place-based variables such as 'fear of crime' he still found lower well-being levels in Lisbon, whereas in Athens, these controls removed any regional differences (Piper, 2015). Loschiavo (2019) further supports this negative thesis by indicating that across Italy, city size is negatively associated with happiness. He attributes this to long commuting times, where city residents do not have enough time to focus on 'happiness-generating activities' such as socialising, exercising and other activities that are generally positively associated with well-being (Loschiavo, 2019).

Thus, given the above discussion, the first hypothesis regarding the first research question is:

H₁: Regional urban size is negatively associated with subjective well-being in the South of Europe.

Adding another layer of complexity to the relationship, Lenzi and Perucca (2018, 2020) found that Europeans are less satisfied in more urbanised regions and are more satisfied in mid-urbanised regions. Being more specific, this mid-urbanisation relationship is mostly found in Western regions (a grouping which also included Southern countries), who have enjoyed superior economic performance, especially when compared to Eastern countries (Lenzi and Perucca, 2018). Aside from this, there is not much concrete evidence that would indicate that regional polycentric regions should be positively associated with SWB in Southern countries, however taking into consideration the discussion on its negative association with urban size, this study hypothesises a positive association, or no association at all due to the spatial heterogeneity that exists between regions (Salvati and De Rosa, 2014).

H₂: Regional polycentricity is positively associated with subjective well-being in the South of Europe.

Finally, it can also be hypothesized that a higher degree of dispersion could be negatively associated with subjective well-being, since such spatial and land-use fragmentation could

decrease face-to-face interactions which, in turn, is associated with lower levels of subjective well-being (Hoogerbrugge et al., 2021).

H₃: Regional dispersion is negatively associated with subjective well-being in the South of Europe.

Chapter 3: Research Design and Methods

The aim of this chapter is to discuss how the research questions posed in Chapter One will be answered. It first discusses the research strategy and data sources, followed by a translation of the theoretical concepts of subjective well-being, urban size, polycentricity and dispersion into measurable indicators. It shall conclude with an explanation on how the variables were calculated, and the data analysis method to be used.

3.1 Research Strategy and Data Sources

In order to answer the research questions, this study follows the research strategy adopted by Hoogerbrugge et al. (2021), who investigated the same relationship between SWB and spatial structure in the North-West of Europe. They employed quantitative desk research, in which two datasets were combined: the European Social Survey (ESS) and the Eurostat Cities Statistics Database (Urban Audit) at the Local Administrative Level (LAU).

3.1.1   Spatial Units: NUTS 2 Regions

The Nomenclature of Territorial Units for Statistics (NUTS) is the standard territorial statistical system for the European Union (Aslam and Corrado, 2012). It is a hierarchical classification system through which the EU divides up its economic territories. The second level of this system – the NUTS 2 level – has a population threshold of between 800,000 and 3,000,000 inhabitants and comprises the basic regional level at which regional policies can be applied (EC, 2021).

Aslam and Corrado (2012) emphasise the importance of using regions – as opposed to countries – as the macro-level in well-being research due to the fact that people within the same region share socio-cultural, political, and economic situations which may vary between regions, within the same country. The benefit of the NUTS system, therefore, is that it is defined by sub-national institutions, which, although vary in power, are still present to manage their regions and municipalities (Aslam and Corrado, 2012). This is an important aspect as the proper functioning of institutions is strongly correlated with subjective well-being (Arampatzi et al., 2019; Veenhoven, 2009).

3.1.2   Data Source: The European Social Survey

The European Social Survey (ESS) is a survey conducted in participating countries every two years, where face-to-face interviews are held with individuals so as to gather data on people's behaviour patterns, cultures, and beliefs (ESS, 2018). A random sample is taken from each participating country and is representative of its population – anyone aged 15 and upwards can be interviewed regardless of their nationality, citizenship, or preferred language. The survey gathers a sample of 1,500 respondents for all countries, unless their population is less than 2 million, in which case, a sample of 800 respondents is collected. This research shall combine

data from five rounds of the survey, collected between 2010 and 2020, so as to form a panel dataset.

The benefit of using this survey is that each observation is documented per its regional location, at the NUTS 2 level which can then be merged with regional data from Eurostat, at the same NUTS 2 level or otherwise.

3.1.3 Data Source: Eurostat LAU Data: Cities (Urban Audit)

City-level data was required to create the spatial structure variables for city size, polycentricity, and dispersion. This was extracted from the Eurostat City Statistics (Urban Audit) database, which annually collects comparable data on European Cities. The population data is collected at the LAU2 level, or municipality-level, of each country: 'Comuni' in Italy; 'Municipios' in Spain and Portugal; and 'Dimoi' in Greece. Where applicable, a LAU code links the city to its corresponding NUTS 3 region, which in turn can be linked back to a NUTS 2 region – our unit of interest. This enables the researcher to calculate both polycentricity and dispersion indexes, along with regional urban populations and city population sizes. These indexes can then be tested against the NUTS 2 level data on subjective well-being, extracted from the ESS, so as to answer the research questions.

3.2 Operationalisation

3.2.1 Dependent Variable: Subjective Well-Being

Data on subjective well-being – defined as an individual's self-appraisal of his or her life (Veenhoven, 2000) – is gathered through survey data from the ESS, which asks respondents the following question: "how satisfied are you with your life as a whole nowadays?" whereby respondents can rate their lives from 0 (extremely dissatisfied) to 10 (extremely satisfied) (ESS, 2018). Accordingly, the survey also gathers data on the socio-demographics of its respondents, ranging from their age and gender, to their employment status and regional location. The most relevant indicators – the control variables – for which data pertaining to the subjective well-being determinants was available, are noted down in Table 2 below. Most variables are nominal in nature, and 'age' has also been transformed to its quadratic form, as its relationship with subjective well-being has been confirmed as U-shaped, by Blanchflower and Oswald (2008).

3.2.2 Independent Variable: Polycentricity

To calculate polycentricity, the Herfindahl-Hirschmann Index is used. This index is typically used as a measure of competition for the implementation of antitrust laws so as to avoid the rise of monopolies through unbalanced market shares (Meijers, Evert et al., 2018). In its essence, it measures 'primacy', which when applied to spatial organisation, parallels the lack of 'primacy' that is at the core of polycentricity (Meijers, Evert et al., 2018). It can be considered a more inclusive measure of polycentricity than the usual rank-size distribution (which, so far, has been the prevailing method for calculating polycentricity) as it considers all

cities within a region, unlike the rank-size distribution which only considers the first four ranking cities (Meijers, Evert et al., 2018). In this context, the index measures the population share of a city in the total regional population – the shares are squared and summed together as can be seen in Equation (1).

$$\text{(1)} \quad H = \sum_{i=1}^{N} S_i^2$$

Where S_i is the population share of city i, in the total population of all cities within the region and N is the number of cities in the region (Meijers, Evert et al., 2018). Following Hoogerbrugge et al. (2021), this is taken a step further by inversing the sum (subtracting it from 1), so that a larger positive value indicates a higher degree of polycentricity. Previous studies measuring polycentricity confirm that it is an appropriate alternative to the rank-size distribution (Meijers, Evert et al., 2018; Zhang et al., 2019).

3.2.3 Independent Variable: Dispersion

In addition to testing the distribution of cities within regions, another important dimension is to understand whether inhabitants reside within the boundaries of a city or not. Although previous studies (e.g., Meijers and Burger, 2010) treat the centralisation-dispersion measure as supplementary to the polycentricity measure, due to the urbanisation patterns in the South of Europe, this research shall treat it as an equally important measure for testing SWB. Following previous studies (Arribas-Bel et al., 2011; Brown et al., 2016; Hoogerbrugge et al., 2021) dispersion is measured by dividing the total regional population not living within cities, by the total regional population, and subsequently log-transforming it.

3.2.4 Independent Variables: Urban Residence and Regional Urban Population

Complimenting the above measures, are two other spatial dimensions to be used to test the relationship between SWB and regional structure. Urban residence is a binary variable created through the 'domicile' question in the ESS survey, which asks respondents to rate where they live: whether in a big city, the outskirts of a big city, a town or small city, a country village or on a farm / country house. In this case, urban (1) refers to the first three options, and rural (0), the last two. This variable offers a subjective measure of where respondents live, so as to test whether they are happier in urban environments or not.

The regional urban population (urban size) – measured as the log transformed sum of all city populations within a region – shall be used to understand the level of urbanisation within the NUTS 2 regions, with higher urban population signifying a more urbanised region. Building on Lenzi and Perucca (2018), Hoogerbrugge et al. (2021) test interaction terms using the regional urban population and the spatial structure dimensions of polycentricity and dispersion – a process which this research shall also follow.

Table 2: Operationalisation Table.

Concept	Definition	Indicator	Data Source
Dependent Variable			
Subjective Well-Being	How people think and feel about their lives and what constitutes the 'good life'	Survey Question: All things considered, how satisfied are you with your life as a whole nowadays? Rating 1 - 10	European Social Survey (2010 - 2020)
Independent Variables			
Regional Polycentricity	Distribution of urban population: the lesser the city hierarchy, the more polycentric.	Herfindahl-Hischmann Index	Eurostat Cities Statistics (Urban Audit) (2010 / 2017)
Regional Dispersion	Distribution of population throughout region: less concentration within cities = more dispersed.	Dispersion Index (Regional population not living in cities / total regional population)	
Regional Urban Population (ln)	Level of urbanisation of a region.	Urban Population (Sum of all city populations within region)	
City Size	Number of people living in a city.	City Population	
Urban Residence	Self-reported place of residence.	Dummy variable: 1 = Urban, 0 = Rural. From survey question: how would you describe where you live?	European Social Survey (2010 - 2020)
Control Variables			
Subjective Well-Being Determinants	Life domains that influence an individual's level of SWB.	Perceived Income (how do you feel about your household's income nowadays)	European Social Survey (2010 - 2020)
		Employment status	
		Level of Education	
		Age	
		Age^2	
		Gender	
		Relationship Status (Marital Status)	
		Has Children	
		Perceived Health Problems	

		Social Meetings (How often do you socially meet with friends, relatives, or colleagues)	
		Religiousness (How religious are you)	
		Trust most people	
		Trust legal system	

3.3 Data Preparation

To calculate all the spatial structure variables, city-level population data was downloaded from the Eurostat City Statistics database and manually matched to its respective NUTS 2 regions, for which data was available. The most recent population data for Greek cities was from 2011, whereas city data from 2017 was used for Italy, Portugal, and Spain. Since the focus of this research is on morphological polycentricity, only data for clear-cut city cores was used, not FUAs or greater cities, which are provided for in the raw dataset. This was done since greater cities might encompass more than one urban core, and the location data from the ESS is not detailed enough to be able to calculate for this.

Previous studies such as Hoogerbrugge et al. (2021) and Meijers et al. (2018) then proceeded to drop all cities from the dataset with a population of less than 40,000 or 50,000 inhabitants. This was based upon the EU definition of a city, which assumes a minimum threshold of 50,000 inhabitants (EC, 2021). However, in this study, this step was skipped given the small population sizes of cities in the South of Europe, as can be seen in Table 3.

Following the calculations of polycentricity, the dispersion index and regional urban populations, 8 regions were dropped[1] due to city data limitations, bringing the total number of regions down to 48.

Table 3: City population data per country.

Country	NUTS 2 Regions	Total Obs.	No. of Cities	Average City Pop.	Minimum City Pop.	Maximum City Pop.
Greece	13	2,274	9	367,000	59,000	664,000
Italy	20	3,553	87	331,000	51,000	2,873,000
Portugal	5	7,380	23	164,000	61,000	505,000
Spain	19	9,304	131	136,000	30,000	3,183,000
Total	**56**	**22,511**	**250**	**199,000**		

Note: Average, min., max. rounded to the nearest 1000.

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[1] *These were Alentejo in Portugal; Melilla in Spain; Central Greece, Ionian Islands, North Aegean, South Aegean, and Western Macedonia in Greece; and Valle d'Aosta in Italy.*

3.4 Data Analysis

Generally, the starting point in happiness literature is that within a human being there is some kind of happiness utility function that follows this form:

Happiness = f(age, gender, income, education, marital status, diet, other personal characteristics, region characteristics, country characteristics)

Researchers, such as Oswald and Wu (2009), and Okulicz-Kozaryn (2011) use quantitative methods, and employ multiple-regression techniques, where the dependent variable is a form of happiness, or well-being measure (gathered through survey data), and the size of the coefficients is calculated through 'happiness equations' such as the one above (Blancheflower and Oswald, 2011). Hoogerbrugge et al. (2021) adopt the same equation format:

$$SWB_{ir} = S_r + \text{ß}IND_{ir} + YEAR_t + COUNTRY_r + \varepsilon_{it}$$

Where, SWB (subjective well-being), is the dependent variable, denoted by the measure of an individual's life satisfaction; i represents the individual who lives in region r; S_r stands for the spatial structure variables, which describe region r – i.e., the polycentricity and dispersion indexes, amongst others; IND_{ir} denotes all the individual level control variables, such as age, income, employment and so on – for individual i in region r; $COUNTRY_r$ represents the country groups – in this case Italy, Greece, Portugal and Spain – $YEAR_t$ denotes the time effect dummy variables; and ε_{it} is the error term of individual i during time period t (Hoogerbrugge et al., 2021). The year dummy variables were included since the panel dataset is unbalanced, with data from Greece being collected only two years after the 2008 financial crisis, which may have a significant impact on the respondents' subjective well-being.

3.4.1 Multilevel Modelling

Another factor to note, as presented in Ballas and Tranmer (2012), is that there exists an element of nesting at different scales due to the nature of well-being data: individuals live in houses, which are found within neighbourhoods, that are located in cities that exist within regions and countries. Thus, socioeconomic variables of happiness may be influenced by grouping at different levels – i.e. it might be more difficult to be happy in a miserable neighbourhood, regardless of the individual's situation (Ballas and Tranmer, 2012). Several studies solve this by adopting a multilevel modelling strategy, which represents the hierarchical nature of the data, and which, unlike standard OLS regressions, assumes that lower level predictors are, in fact, correlated with the error term (Aslam and Corrado, 2012; Ballas and Tranmer, 2012; Hoogerbrugge et al., 2021; Pittau et al., 2010). Thus, following Aslam and Corrado (2012) and Hoogerbrugge et al., (2021), error terms shall be clustered at the regional level since individuals from the same region tend to share a similar socio-demographic, cultural and political situation.

More specifically, the modelling approach adopted is of a hybrid form, where both fixed and random effects are employed in calculating the effects that variable functions at different levels might have on SWB (Morrison, 2021). This is done because fixed effects alone cannot compare between-cluster variation, whilst on the other hand, a random effects model assumes that the unobserved heterogeneity is uncorrelated to the covariates – an assumption that would be violated based on the hierarchical nature of the data (Aslam and Corrado, 2012). To solve this problem of endogeneity, therefore, a Mundlak (1978) correction is applied to the estimation

where the group level means of the explanatory variables are included in the model (Aslam and Corrado, 2012).

3.5 Challenges and Limitations

As discussed in Chapter Two, polycentricity can be analysed from two perspectives: morphological and functional (Burger and Meijers, 2012). Due to data availability, time and methodological constraints, this research only tackles the morphological aspect, as functional polycentricity requires more complex forms of analysis.

Another limitation is the use of local administrative boundaries as the local unit of choice, rather than regions' Functional Urban Areas (FUA). This is due to the fact that the ESS subjective well-being data is measured at the NUTS 2 level, which does not provide enough individual level geographical detail to use FUAs as a measurement. The use of FUAs would be more appropriate in understanding the impact of space on people's everyday lives as it captures a city's commuting zone.

On another note, although making use of the NUTS 2 regions as a spatial unit is sufficient to guarantee a level of comparability between regions, regional areas vary to quite an extent between countries – whereas a typical Spanish region is over 80,000 km^2 in area, an Italian one would be closer to the 20,000 km^2 mark. In addition to this, due to the level at which the SWB data is reported, geographic aspects which could affect SWB, such as proximity to the coast (Brereton et al., 2008), could not be included.

The last limitation regards the generalisability of the results. As Kloosterman and Musterd (2001) point out cities are "rich, multifaceted and historically contextualised spatial phenomena" (p.623), and thus it may be difficult to generalise the results found in the South of Europe, in a different context.

Chapter Three has given an overview of the methodology through which this study shall answer the research questions. Chapter 4 puts forward a description of the data, including patterns and trends, followed by a report of the empirical findings and a discussion.

Chapter 4: Data, Variables and Empirical Results

This chapter presents the findings of the research. It begins with a description of the important trends, statistics, and patterns within the data – from the dependent variable to the independent variables, followed by an analysis of the regression results, and a discussion on how they answer the research questions posed in Chapter One.

4.1 Description of Data

Table 4 gives an overview of the descriptive statistics for each variable used in this research. It indicates the dependent variable – Life Satisfaction – followed by the independent variables: regional polycentricity, regional dispersion, regional urban population, and urban residence. These are followed by the control variables, in line with Dolan et al.'s (2008) recommendations. As can be noted from the minimum and maximum values, most of the control variables were transformed into dummy variables, and log-transformed variables are indicated as such with an (ln).

Table 4: Summary statistics

	Average	Std. Dev.	Minimum	Maximum
Life satisfaction	6.56	2.27	0.00	10.00
Regional polycentricity	0.65	0.30	0.00	0.92
Regional dispersion (ln)	-0.60	0.40	-1.73	-0.06
Regional urban population (ln)	13.94	1.08	10.98	15.49
Urban residence	0.62	0.49	0.00	1.00
Personal Characteristics				
Age	49.65	18.84	15.00	103.00
Male	0.46	0.50	0.00	1.00
In a relationship	0.55	0.50	0.00	1.00
Children living at home	0.39	0.49	0.00	1.00
Religiousness	5.12	2.93	0.00	10.00
Trust most people	4.44	2.36	0.00	10.00
Trust in legal system	4.01	2.63	0.00	10.00
Education				
Primary education	0.32	0.47	0.00	1.00
Secondary education	0.48	0.50	0.00	1.00
Tertiary education	0.20	0.40	0.00	1.00
Employment				
Employed	0.45	0.50	0.00	1.00
Unemployed	0.11	0.31	0.00	1.00
Student	0.08	0.28	0.00	1.00
Retired	0.24	0.42	0.00	1.00
Housework	0.11	0.31	0.00	1.00

Other employment	0.02	0.14	0.00	1.00
Perceived Income				
Living comfortably	0.20	0.40	0.00	1.00
Coping	0.45	0.50	0.00	1.00
Difficult to cope	0.25	0.43	0.00	1.00
Very difficult to cope	0.11	0.31	0.00	1.00
Perceived Day-To-Day Health				
Very hampered	0.04	0.20	0.00	1.00
Somewhat hampered	0.13	0.34	0.00	1.00
Not hampered	0.83	0.38	0.00	1.00
Social Meetings				
Once a month or less	0.16	0.37	0.00	1.00
Few times a month	0.16	0.37	0.00	1.00
Once a week	0.15	0.36	0.00	1.00
Few times a week	0.26	0.44	0.00	1.00
Everyday	0.27	0.44	0.00	1.00
Regions	56			
Observations	23,498			

4.1.1 Dependent Variable: Life Satisfaction

The dependent variable is Life Satisfaction – henceforth, LS – which represents respondents' cognitive evaluation of their lives. The survey responses available for the countries concerned range between the years 2010 and 2020, however the most recent data for Greece is from 2011.

With an average LS of 6.56, the countries in the South of Europe score almost 1 point lower than those in the North-West – where the average LS reported by Hoogerbrugge et al. (2021) was 7.50. This is in-line with expectations, given the dating of the panel data, which collected responses whilst most of these Southern countries were still deep in the Great Recession, which lasted from 2008 to 2013 (Arampatzi et al., 2019). That said, Figure 7 indicates that throughout the decade, average values of LS gradually increased in almost all countries.

The between country variation in mean self-reported life satisfaction is also worth noting, as can be seen more clearly in Figure 8. On average, Spain (ES) reports the highest life satisfaction, followed by Italy (IT), Portugal (PT), and Greece (GR). This between-country variation can be explained by differences in economic affluence, with Spain and Italy being relatively better off in comparison to Greece and Portugal, despite the fact that the four countries suffered significantly due to the economic crisis (Lagas et al., 2015).

Figure 7: Mean self-reported life satisfaction responses for all countries throughout the 2010 – 2020 period.

Source: Author, 2021 using ESS survey data.
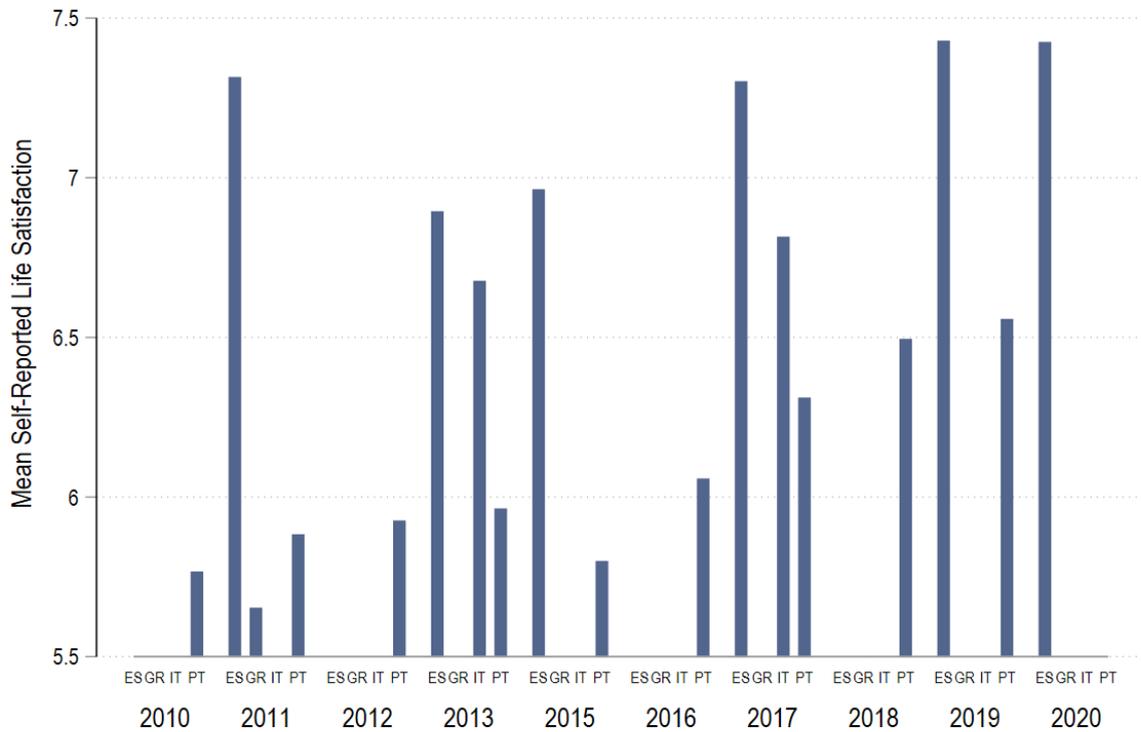
Figure 8: Between country means of self-reported life satisfaction.

Source: Author, (2021) using ESS survey data.
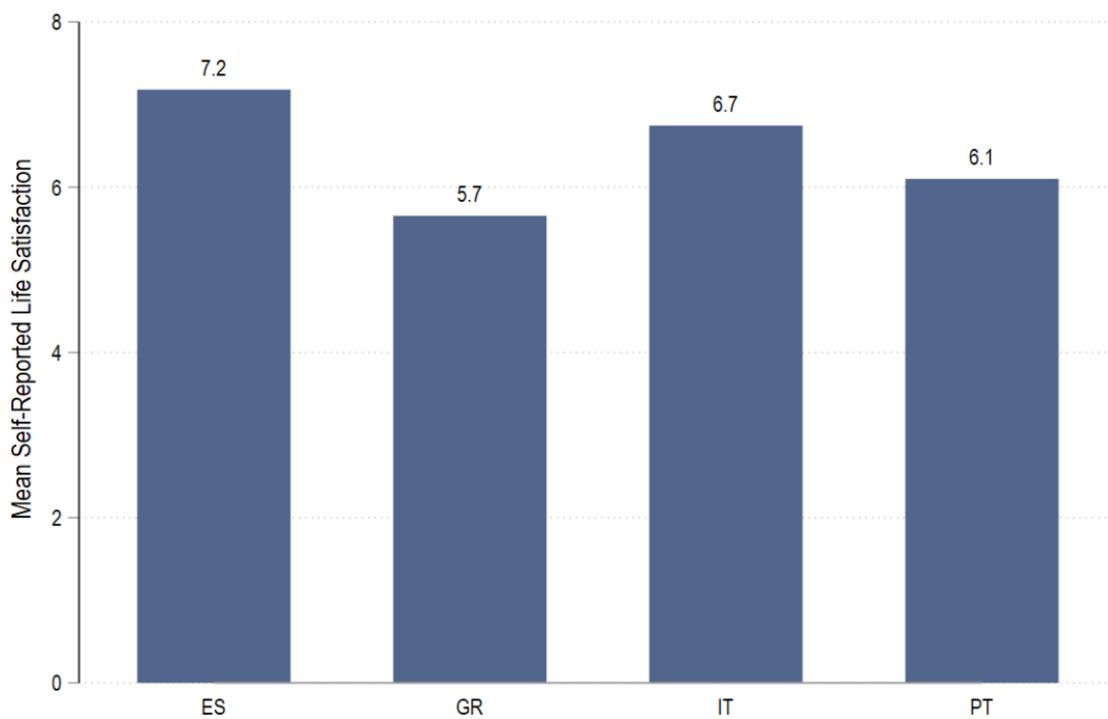
Figure 9: Within country means of self-reported life satisfaction in Southern Europe.

Source: Author, (2021) using ESS survey data.
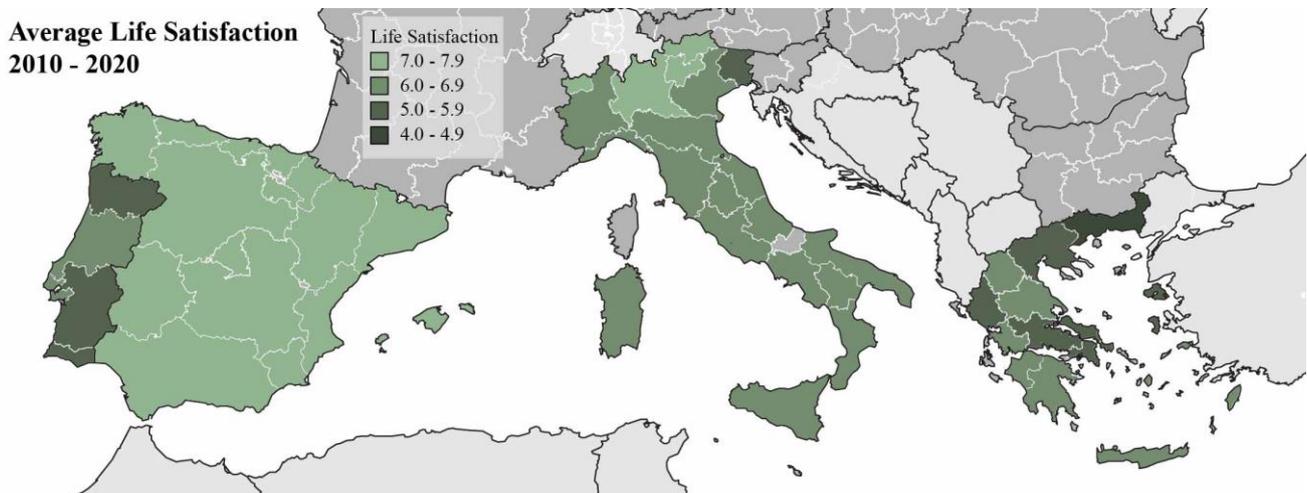
Self-reported life satisfaction also varies within countries, as can be noted in Figure 9. Using Italy as an example, there is a 1.8 point difference between the most satisfied regions and the least satisfied regions. Interestingly, the most satisfied regions – Lombardia, Trentino-Alto, and Valle d'Aosta – are found in the North, but so is the least satisfied region – Fruili-Venezia Giulia. The rest of the country does not show significant variation between regions. Italy generally shows a strong North-South divide in terms of its socio-economic geography, where the North is more economically developed than the more remote South (Musolino, 2018), however this is not so evident here in LS terms. There is hardly any regional variation in Spain, where average LS values ranged between 7.0 and 7.6, and Portugal and Greece indicate lower average LS values, which vary between 4.3 and 6.9.

Taking a closer look at places of residence, Figure 10, below, presents the mean self-reported life satisfaction across different types of domiciles. As noted in Chapter Three, the ESS asks respondents to report where they feel best describes their place of residence. Although the means do not vary significantly between the different types of domiciles – only 0.4 between the highest and lowest scoring – it is interesting to note that for the South of Europe, the 'country village' indicates the highest value of self-reported LS, followed by a 'town or small city' and 'big city', with 'suburbs or outskirts of big city' indicating the lowest average value of LS. At face value, this suggests higher LS scorings in more rural residences.

Figure 10: Self-reported residence means of self-reported life satisfaction.

Source: Author, (2021) using ESS survey data.
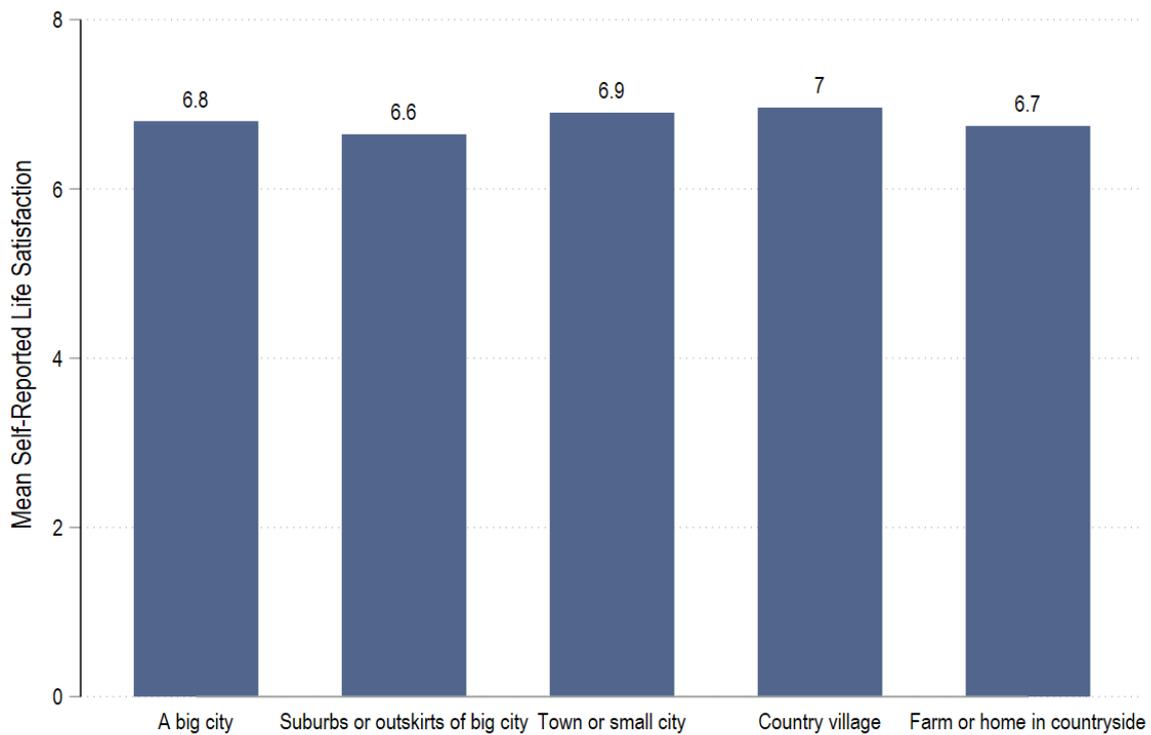
4.1.2 Independent Variables: Polycentricity, Dispersion and Regional Urban Populations

Referring back to Table 4, one can note that the mean regional polycentricity is 0.65, a lower mean than that reported by Hoogerbrugge et al. (2021) – which was 0.78 – indicating that on average, Southern European countries are less polycentric than those in the North/North-West. Figure 11, below, maps out the regional variation in polycentricity for this study, where the lighter colours indicate higher levels of polycentricity.

On average, Spanish regions appear to be the most polycentric, aside from the Aragon-Navarre-La Rioja regions in the North, indicated in a dark blue colour in Figure 11. As an example, the Aragon region is dominated by Zaragoza, which is one of the largest cities in Spain, making it a completely monocentric region (Brezzi and Veneri, 2015). On the other hand, Andalusia houses Sevilla, Malaga, Granada, and Cordoba which are more balanced in population size, and hence, result in a more polycentric region.

Greek regions are predominantly monocentric in nature, and Italian regions vary the most, in-line with Burgalassi et al. (2019), with the Northern regions, such as Lombardia and Emilia-Romagna being predominantly polycentric, whereas the Central and Southern regions become more monocentric in nature. Portuguese regions measured as quite polycentric, particularly the Norte region.

Figure 11: Regional polycentricity mapped out across the South of Europe.

Source: Author, (2021) using Urban Audit data.
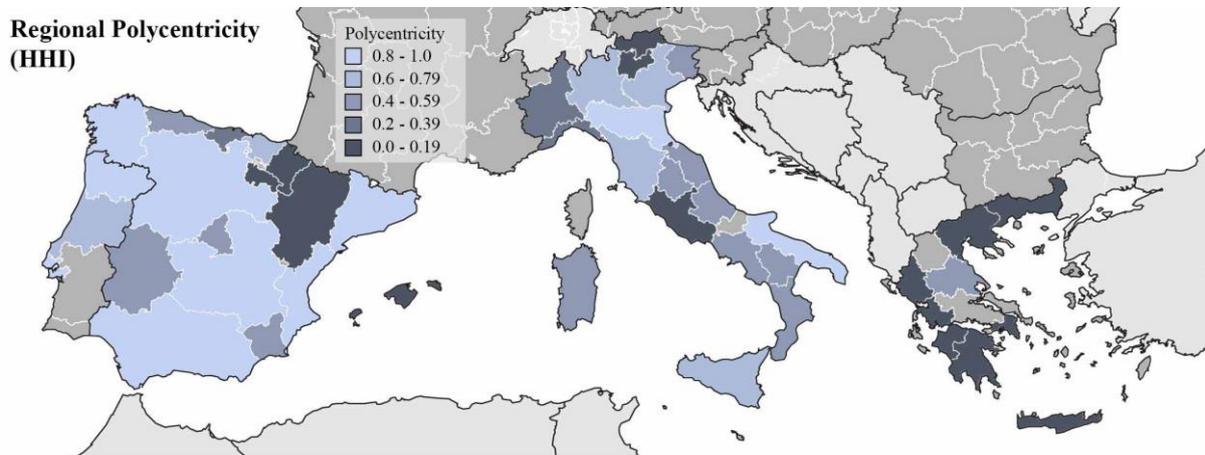
Figure 12 maps out the level of dispersion across Southern European regions, where a large negative value represents a compact or centralised region, and a smaller negative value represents a more dispersed region. As expected, the map shows that Southern European regions are predominantly dispersed in nature, with only the Madrid and Lisbon regions indicating otherwise. This is in-line with the expectations put forward in Chapter Two, where the Mediterranean City was described as featuring "density and decentralization, a small amount of open space, but a high degree of mix of uses, and a mixed pattern of scattering." (Arribas-Bel et al., 2011, p.270).

Figure 12: Regional dispersion mapped out across the South of Europe.

Source: Author, (2021) using Urban Audit data.
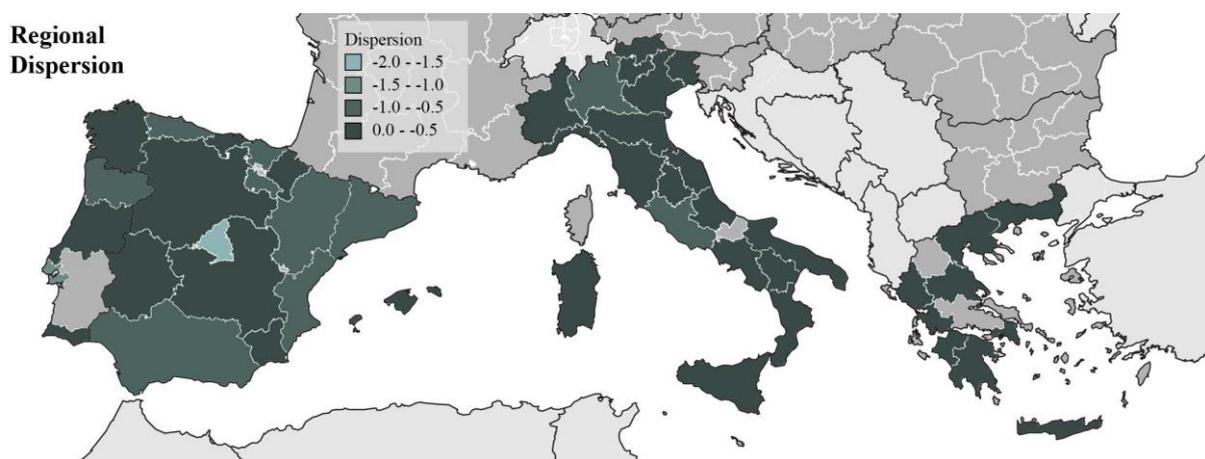
Finally, Figure 13 maps out the regional urban populations of the Southern European countries, where the lighter the shade, the larger the regional urban populations. Most regions do not have high values for urban populations, outside of the regions housing their capital cities. On average Greek regions have the lowest urban populations, followed by Portuguese regions. Highly populated Italian regions can be found in the North; the Lombardia – Piemonte – Emilia-Romagna regions, and along the coast in the Central-Southern regions such as Lazio, which houses Rome, and Campania, home to Naples. In Spain, Madrid, Catalonia, and Andalusia indicate the highest regional populations in the whole dataset.

Figure 13: Regional urban populations mapped out across the South of Europe.

Source: Author, (2021) using Urban Audit data.
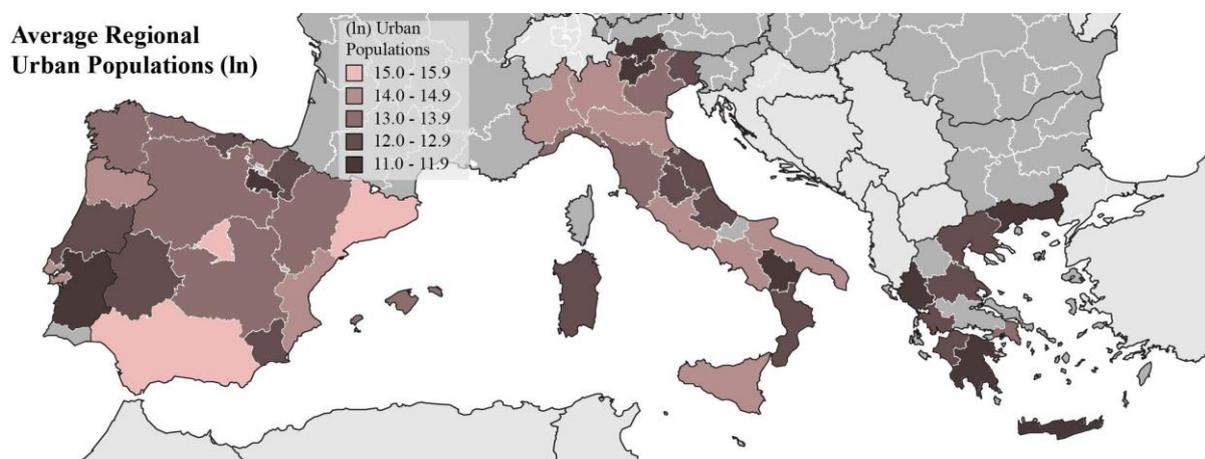
4.2 Empirical Results: Baseline Estimates

4.2.1 The Regression Models

As can be seen in Table 5 below, five regression models were tested in order to answer the research questions. Model 1 tests the relationship between life satisfaction and respondents' self-reported residence. This variable remains present in all the subsequent models. Model 2 then tests the regional urban population variable individually, followed by Model 3 which tests regional polycentricity, individually, and Model 4 that tests dispersion, again, individually. The last model then combines all the independent variables together. The models were constructed in this way so as to understand if there was any multicollinearity between variables.

Table 5: Multilevel regression analysis on the effects of different spatial structures on life satisfaction.

	Model 1	Model 2	Model 3	Model 4	Model 5
Regional polycentricity			0.32		-0.14
			(-0.2)		(-0.26)
Regional dispersion				0.02	0.19
				(-0.15)	(-0.16)
Regional urban population (ln)		0.09**			0.11**
		(0.04)			(-0.05)
Urban residence	-0.08***	-0.09***	-0.09***	-0.09***	-0.09***
	(-0.03)	(-0.03)	(-0.03)	(-0.03)	(-0.03)
Personal Characteristics					
Age	-0.06***	-0.06***	-0.06***	-0.06***	-0.06***
	(-0.01)	(-0.01)	(-0.01)	(-0.01)	(-0.01)
Age^2	0.00***	0.00***	0.00***	0.00***	0.00***
	(0)	(0)	(0)	(0)	(0)
Male	0.01	0.01	0.01	0.01	0.01
	(-0.03)	(-0.03)	(-0.03)	(-0.03)	(-0.03)
Partner	0.45***	0.47***	0.47***	0.47***	0.47***
	(-0.03)	(-0.04)	(-0.04)	(-0.04)	(-0.04)
Child	0.05	0.05	0.05	0.05	0.05
	(-0.03)	(-0.03)	(-0.03)	(-0.03)	(-0.03)
How religious	0.06***	0.06***	0.06***	0.06***	0.06***
	(-0.01)	(-0.01)	(-0.01)	(-0.01)	(-0.01)
Trust most people	0.11***	0.10***	0.10***	0.10***	0.10***
	(-0.01)	(-0.01)	(-0.01)	(-0.01)	(-0.01)
Trust in legal system	0.07***	0.07***	0.07***	0.07***	0.07***
	(-0.01)	(-0.01)	(-0.01)	(-0.01)	(-0.01)
Education (base category: primary education)					
Secondary education	0.07*	0.06	0.06	0.06	0.06
	(-0.04)	(-0.04)	(-0.04)	(-0.04)	(-0.04)
Tertiary education	0.05	0.03	0.03	0.03	0.03
	(-0.05)	(-0.05)	(-0.05)	(-0.05)	(-0.05)
Employment (base category: employed)					
Unemployed	-0.49***	-0.50***	-0.50***	-0.50***	-0.50***
	(-0.05)	(-0.05)	(-0.05)	(-0.05)	(-0.05)
Student	-0.08	-0.08	-0.08	-0.08	-0.08
	(-0.07)	(-0.07)	(-0.07)	(-0.07)	(-0.07)
Retired	-0.11**	-0.12**	-0.12**	-0.12**	-0.12**
	(-0.06)	(-0.06)	(-0.06)	(-0.06)	(-0.06)
Housework	-0.01	-0.03	-0.03	-0.03	-0.03
	(-0.05)	(-0.06)	(-0.06)	(-0.06)	(-0.06)

Other employment	-0.05	-0.03	-0.03	-0.03	-0.03
	(-0.11)	(-0.12)	(-0.12)	(-0.12)	(-0.12)

Perceived Income (base category: very difficult to cope)

Living comfortably	1.84***	1.82***	1.82***	1.82***	1.82***
	(-0.06)	(-0.06)	(-0.06)	(-0.06)	(-0.06)
Coping	1.38***	1.37***	1.37***	1.37***	1.37***
	(-0.05)	(-0.05)	(-0.05)	(-0.05)	(-0.05)
Difficult to cope	0.71***	0.69***	0.69***	0.69***	0.69***
	(-0.05)	(-0.05)	(-0.05)	(-0.05)	(-0.05)

Perceived Day-To-Day Health (base category: very hampered)

Somewhat hampered	0.73***	0.77***	0.77***	0.77***	0.77***
	(-0.08)	(-0.08)	(-0.08)	(-0.08)	(-0.08)
Not hampered	1.07***	1.10***	1.10***	1.10***	1.10***
	(-0.08)	(-0.08)	(-0.08)	(-0.08)	(-0.08)

Social Meetings (base category: once a month or less)

Several times a month	0.26***	0.27***	0.27***	0.27***	0.27***
	(-0.05)	(-0.05)	(-0.05)	(-0.05)	(-0.05)
Once a week	0.33***	0.33***	0.33***	0.33***	0.33***
	(-0.05)	(-0.05)	(-0.05)	(-0.05)	(-0.05)
Several times a week	0.45***	0.46***	0.46***	0.46***	0.46***
	(-0.05)	(-0.05)	(-0.05)	(-0.05)	(-0.05)
Every day	0.73***	0.74***	0.74***	0.74***	0.74***
	(-0.05)	(-0.05)	(-0.05)	(-0.05)	(-0.05)

Observations	19,528	18,763	18,763	18,752	18,752
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Regions	48	49	48	48	48

*Standard errors in parentheses. * p<0.1, ** p<0.05, *** p<0.01*

4.2.2 Interpretation: Independent Variables

The first two independent variables – regional polycentricity and regional dispersion – report insignificant results, both in their individual models, and when tested together (Model 3, 4, 5). The regional urban size coefficient is significant in both models (Model 2, 5), at the 5% level, and indicates a positive association with life satisfaction. This means that inhabitants living in more urbanised regions are likely to score slightly higher than those in less populated regions. For example, a 15% increase in urban population would result in an average increase of 0.01 of a point in LS, holding everything else constant.

The most consistent independent variable is that of self-reported place of residence – where 0 represents inhabitants living in rural locations and 1 represents urban locations. The coefficients indicate that, on average, people living in urban locations are less satisfied with life, holding everything else constant and significant at the 1% level. The effect of this is not very large however, as an individual's LS scoring would change by an average of less than 0.1 of a point.

4.2.3 Interpretation: Control Variables

Most of the control variables are significant at the 1% level and show the expected signs, as explained by Dolan et al. (2008). Age and Age^2 indicate that the relationship between LS and age is U-shaped as they are both significant at the 1% level. This corresponds to Blancheflower and Oswald's (2021) findings which state that on average, individuals are more satisfied when they are young, become progressively less satisfied, until a certain age – generally 40 to 50 years of age – following which they get progressively happier, holding everything else constant.

Gender does not seem to affect LS levels since, in all models, the coefficient is consistently very close to 0 and not significant, whilst having a partner is strongly, positively associated with LS, significant at the 1% level. This indicates that, on average, having a partner – as opposed to being separated, divorced, or widowed – could increase an individual's life satisfaction scoring by almost half a point, holding everything else constant. Living with a child at home is not significant.

In terms of values and beliefs: being religious, trusting one's community and trusting one's legal institutions are all positively associated with LS – significant at the 1% level. Their effect on LS is to varying degrees, where, out of the three variables, trusting one's community has the biggest effect on an individual's LS, holding everything else constant, increasing it by 0.1 of a point, on average.

Being better educated does not seem to play a role in improving well-being levels, as most models indicate insignificant coefficients. Interestingly, though, the size and signs of the coefficients suggest that having a secondary education would result in slightly higher LS levels than having a tertiary education.

Out of all the employment related dummy variables, being unemployed and being retired consistently showed a negative association with LS – significant at the 5% and 1% levels. Unemployment has a stronger negative effect than being retired, with the coefficient indicating that, on average, being unemployed decreases life satisfaction levels by about 0.5 of a point, holding everything else constant.

Similarly, perceived level of income consistently marked a very strong positive association with LS. Out of all the control variables, 'living comfortably' has the largest positive effect on an individual's level of well-being, which could potentially increase it by an average of 1.82 points holding everything else constant, when compared to someone who finds it very difficult to cope financially. This result is in-line with expectations: Pittau (2010) had pointed out that income is a very strong predictor of LS, particularly in poorer regions.

The perceived level of day-to-day health is also consistently significant in all models, at the 1% level. This has quite a large coefficient suggesting that, holding everything constant, being very hampered on a daily basis could reduce an individual's LS scoring by 1.1 points, on average, when compared to someone who is not hampered at all.

Finally, all the social meetings variables showed significant results, all at the 1% level. The size of the coefficients suggests that, holding everything else constant, more social interaction

with family, friends or colleagues results in increased levels of LS, proportional to the amount of social interaction – the highest LS level is from those who socialise every day.

4.3 Empirical Results: Interaction Terms

In addition to testing the aforementioned relationships, and following Hoogerbrugge et al. (2021), several interaction terms were also tested against life satisfaction. This was done in order to further understand the make-up of regions and their relationship with LS. In all, six interaction variables were tested, related to regional spatial structure: *polycentricity X dispersion*, i.e. a region whose urban cores are balanced, yet where the population is very spread out across the region; *polycentricity X urban population (ln)*, where the region is polycentric and more populated; *dispersion X urban population (ln)*, where the region is more urbanised and spread out; *polycentricity X urban residence*, a region with balanced urban cores, and where the respondent lives in an urban location; *dispersion X urban residence*, where the respondent lives in an urban area within a dispersed region; and finally, *urban population (ln) X urban residence,* where the respondent lives in an urbanised region, and in an urban residence within it. Table 6 below reports the results.

Table 6: Multilevel regression analysis on the effects of different spatial structures on life satisfaction – interaction terms between spatial structure measures.

	Model 1: Poly. x Disp.	Model 2: Poly. x Urban Pop.	Model 3: Disp. x Urban Pop.	Model 4: Poly. x Urban Res.	Model 5: Disp. x Urban Res.	Model 6: Urban Pop. x Urban Res.
Polycentricity x dispersion	1.48					
	(-1.3)					
Polycentricity x (ln) Urban population		-0.19				
		(-0.26)				
Dispersion x (ln) Urban population			-0.11			
			(-0.29)			
Polycentricity x Urban residence				0.24**		
				(-0.11)		
Dispersion x Urban Residence					-0.09	
					(-0.09)	
Urban population x Urban residence						-0.42

						(-0.39)
Regional polycentricity	0.84	2.5	-0.13	2.05**	0.17	-0.4
	(-0.9)	(-3.73)	(-0.27)	(-0.82)	(-0.29)	(-0.29)
Regional dispersion	-0.53	0.18	1.74	-0.15	3.06***	0.06
	(-0.65)	(-0.16)	(-4.23)	(-0.2)	(-1.07)	(-0.17)
Regional urban population (ln)	0.08	0.2	0.08	-0.03	0.20***	0.43***
	(-0.06)	(-0.14)	(-0.11)	(-0.07)	(-0.06)	(-0.14)
Urban residence	-0.09***	-0.09***	-0.09***	-0.25***	-0.14**	0.02
	(-0.03)	(-0.03)	(-0.03)	(-0.08)	(-0.06)	(-0.03)
Control Vars.	Yes	Yes	Yes	Yes	Yes	Yes
Year Effects	Yes	Yes	Yes	Yes	Yes	Yes
Country Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	18,752	18,752	18,752	18,752	18,752	18,752
Regions	48	48	48	48	48	48

*Standard errors in parentheses. * p<0.1, ** p<0.05, *** p<0.01*

The regressions show that most of the interaction terms do not report significant results, apart from the interaction between polycentricity and urban residence in Model 4. Out of the initial independent variables, once again only urban residence consistently marked a significant association with LS at the 1% and 5% levels and in Models 5 and 6, the regional urban population variable reported significance at the 1% level, suggesting a positive association with LS.

Taking a closer look at Model 4, where the interaction term is significant at the 5% level, one can note that on average, residents from a more polycentric region who live in an urban location within said region, score an average of 0.24 more points in LS than residents who do not, holding everything else constant. Additionally, the regional polycentricity variable also becomes significant at the 5% level, with quite a large coefficient.

Model 5 also seems to suggest that regional dispersion is positively associated with LS, where, with the inclusion of the interaction term between dispersion and urban residence, the regional dispersion variable gained significance at the 1% level, also with a very large coefficient.

Thus, the outcomes of the above regression models suggest that:

a) Living in an urban location – be it a big city, the suburbs of a big city, or a small city / town – is negatively associated with life satisfaction in the South of Europe, with a relatively weak effect.

b) Regional urban size – measured as the sum of the urban populations per region, for cities with more than 30,000 inhabitants – is positively associated with life satisfaction in the South of Europe.

c) Regional polycentricity and regional dispersion are not associated with life satisfaction in the South of Europe. The coefficients in almost all the models yielded insignificant results, aside from those in Models 4 and 5 in Table 6. In these models, the association is positive for both indicators, suggesting a positive relationship with LS, however, the evidence from this study is not enough to substantiate this claim any further.

4.4 Discussion

Following the above conclusions, this section shall discuss the initial research questions and hypotheses in light of the reported findings. Firstly, the relationship between LS and urban size / urban residence shall be discussed, followed by that of LS and regional polycentricity, and finally, LS and regional dispersion.

1. How is urban size associated with subjective well-being in Greece, Italy, Portugal, and Spain?

The findings of this study suggest that in Southern European countries, regional urban size is positively associated with subjective well-being, however self-reported urban residence is negatively associated with it. This can be interpreted as: although residents in Southern European countries prefer residing in more rural settings, at the same time they are also happier in urbanised regions – i.e., in rural locations within urban regions. Urbanised, but not *too* urbanised.

This finding is in-line with Lenzi and Perucca's (2018) conclusions, where they suggest that living in such locations means benefitting from the positive externalities of cities, such as job opportunities, services, and amenities, without the pollution, crime, or congestion so negatively associated with them. It also provides some evidence that city externalities extend beyond the boundaries of the strictly urban core, impacting life satisfaction levels outside of the city (Lenzi and Perucca, 2018).

This relationship is further iterated by the significant interaction between regional polycentricity and urban residence, which resulted in a positive relationship at the 5% level. Polycentric regions are associated with somewhat smaller, regionally balanced, city cores (Kloosterman and Musterd, 2001) – a definition which corresponds quite well with the above results.

Comparing this to Hoogerbrugge et al.'s (2021) results, there are some similarities, and some divergences between residents of Southern Europe and North-Western countries. In both studies, city size (urban residence) was negatively associated with SWB, and in both cases it appears residents are happier in mid-urbanised regions. The difference lies in the relationship with urban population, where Southerners are more satisfied in urbanised regions, whereas North-Westerners are less so. This could be explained by a multitude of factors, namely the different urban development trajectories followed by the two regions, "where a prosperous, economically dynamic core zone stands in contrast to an underdeveloped, geographically remote periphery" (Davoudi, 2003, p.989). Although this might be an over-simplification of the relationship nowadays, the sentiment still holds in that rural locations may be more

accessible and diversified in regions where transport and digital infrastructure are advanced (Burger et al., 2020), a characteristic associated with more developed regions such as those in the North-West of Europe (Lagas et al., 2015).

Despite these significant associations, however, it is worth pointing out that the size of the spatial effects, relative to the individual characteristics' effects, is very small. This means that individual indicators play the biggest role in impacting individual well-being levels – at least, compared to spatial indicators – particularly if one had to compare a comfortable income (1.82), or being in good health (1.1), with living in an urban residence (-0.09), for example.

2. How are regional monocentricity - polycentricity dimensions associated with subjective well-being in Greece, Italy, Portugal, and Spain?

Based on the results of this study, polycentricity-monocentricity dimensions are not associated with subjective well-being in the South of Europe.

The results in Table 5 reported no significant coefficients for the regional polycentricity variable. Table 6 – which reported the results of the interaction terms – only found one significant relationship with the interaction term of *polycentricity X urban residence*, and the same model found a significant, positive relationship between regional polycentricity and LS (Model 4).

Since the values of the regional polycentricity variables matched those by Hoogerbrugge et al. (2021), it can be assumed that the calculations were not erroneous. Before attempting multilevel modelling, basic cluster robust OLS regressions, and country fixed effects models were run, for more robustness in the study (the results of which can be found in Annexes 2 and 3). In most previous models, polycentricity was positively and significantly associated with life satisfaction. This means that, after applying the Mundlak (1978) correction, the effects previously assigned to the polycentricity variable were absorbed by the contextual characteristics of the NUTS 2 regions.

There are two potential explanations for this: firstly, it is possible that the number of regions was still too small to perform such cluster-robust calculations through multilevel modelling. Aslam and Corrado (2012) recommended using more than 30 or 50 clusters for the proper calculation of the between-group effects, so it is possible that a larger data sample for regions was required.

The second plausible explanation is that, due to the significant heterogeneity with the regions, the lack of the 'functional' element of polycentricity rendered the calculations moot. For example, according to the HHI calculations, Andalusia was one of the most polycentric regions in the dataset, which morphologically is an accurate calculation given that the population sizes of Seville (689,000), Malaga (569,000), Murcia (443,000) and Cordoba (326,000), amongst others, are relatively balanced. However, commuting times between each city are around 2 hours, which might be where the calculation in this research fell short, since, as Parr (2004) explains, for a region to be polycentric, the upper limit on commuting time between cities should be, at maximum, around an hour.

Meijers et al. (2018) restricted their regional sizes based on commuting times, by setting their limit to a maximum of 1 hour between core cities and 45 minutes between at least two of them, to create Polycentric Urban Regions (PURs), regardless of administrative boundaries.

Unfortunately, since the ESS data was collected at the NUTS 2 level, it was not possible for this study to take these commuter based measurements into consideration, for a more realistic calculation of polycentricity, and one that captured the day-to-day relationship between individuals and their region. This might have not been as much of an issue in Hoogerbrugge et al.'s (2021) study since the North-West of Europe is traditionally more morphologically polycentric than the South (Davoudi, 2003).

3. How are regional centralisation - dispersion dimensions associated with subjective well-being in Greece, Italy, Portugal, and Spain?

The results of this research indicate that centralisation-dispersion dimensions are also not associated with SWB in the European South, thus rejecting the hypothesis that expected a negative relationship between the measures and SWB.

The results put forward in Table 5 led to two insignificant coefficients for the dispersion variable, whilst the results in Table 6 only featured one significant value for regional dispersion – with a very large coefficient (Model 5).

Once again, the regional values for the dispersion index matched those reported in Hoogerbrugge et al., (2021) and according to Figure 12 it appears that most Southern regions are, indeed, dispersed in nature – keeping in-line with previous literature (Arribas-Bel et al., 2011; Salvati, 2013). Simpler estimation models also reported significant results for the relationship between regional dispersion and SWB, however once the errors were clustered to the NUTS 2 region, the effect disappeared, once again, rendering the relationship insignificant.

The sign of the coefficient suggests that dispersion could be positively associated with SWB. Brown et al. (2016) had found similar results – albeit at the city level, not regional – where they found that centralisation was negatively associated with life satisfaction for people living both within the urban core and outside it. In part, they attributed this result to the trade-off residents make between house size and distance from the urban core, although at the same time they also found a significant negative relationship between land fragmentation and well-being.

A plausible explanation for these insignificant relationships is that polycentricity / dispersion may indeed not be appropriate measures for spatial structure in the South of Europe – at least when it comes to its relationship with subjective well-being. Slavati et al., (2013) even went as far to say that the divergences at the regional level make it difficult to assess and compare Mediterranean regions as a whole, homogeneous case study, and emphasised instead the "usefulness of in-depth case studies focusing on the socioeconomic and territorial factors that drive urbanization, suburbanization and, possibly, re-urbanization in southern Europe" (p.391).

Chapter 5: Conclusion

The way in which we produce our urban environments, and how it affects different socio-economic and environmental aspects of our daily lives is becoming increasingly important. Such rapid urbanisation can lead to numerous challenges, ranging from high pollution levels and a lack of public transport to unaffordable housing and high energy consumption (De Neve and Krekel, 2020). At the heart of all this, however, is society, and the well-being of humanity – an area of concern which is picking up in urban and regional policy debates, both academically and politically (Ballas and Tranmer, 2012).

The aim of this research was to further the knowledge on the relationship between subjective well-being and urbanisation – more particularly, to understand this relationship at the regional level, which has been described in literature as the most significant spatial level at which to study well-being (Aslam and Corrado, 2012). It sought to do this through polycentricity-monocentricity, and centralisation-dispersion dimensions, which have been used time and time again to measure different spatial structures in economic geography literature (Meijers and Burger, 2010; Burgalassi and Luzzati, 2015).

The South of Europe – namely, Greece, Italy, Portugal, and Spain – was chosen as a case study as it presented an interesting context, both in terms of urbanisation patterns, and well-being levels. With their typical urban structures developed haphazardly over millennia-worth of civilizations (Salvati and De Rosa, 2014), and their residents are constantly associated with 'living the good life' (Brulé and Veenhoven, 2012), yet their levels of well-being constantly lag behind those of their Northern counterparts (Pederson and Schmidt, 2009).

Thus, the research aimed at answering one main question: "how are different regional spatial structures associated with subjective well-being, in the South of Europe?", whereby the relationships to be tested were between regional urban size, polycentricity, dispersion, and subjective well-being. The study followed previous research by Hoogerbrugge et al. (2021), who analysed these same relationships in the North-West of Europe.

Following a review of relevant literature, three hypotheses were tested: whether urban size was negatively associated with SWB, whether polycentricity was positively associated with it, and whether dispersion was negatively associated with SWB. In-line with previous studies (Aslam and Corrado, 2012; Hoogerbrugge et al, 2021), well-being data from the European Social Survey was utilised in combination with Eurostat's City Statistics database, which collects city-level data that could be used to construct the polycentricity / dispersion indexes.

The results led to two main conclusions. The first is that, on average, residents of Southern European regions are most satisfied when they live in rural locations within urbanised regions. This result was teased out through the combination of two variables and one interaction term in the two sets of estimation models, where urban residence consistently marked a negative association with life satisfaction whereas regional urban size indicated a positive relationship. This was then further iterated when the interaction term of *polycentricity X urban residence* indicated a significant positive relationship with life satisfaction.

The second conclusion was that regional polycentricity / dispersion indexes led to inconclusive results regarding the relationship between these specific measures of spatial structure and subjective well-being. This could be for two plausible reasons – firstly, leaving out a measure for functional polycentricity – i.e. commuting patterns – resulted in an unrealistic measure of polycentricity. Although this was theoretically sound, in practice, another measure in tandem with the regional polycentricity index was needed to capture the balanced relationship between

urban centres more accurately, thus encapsulating the relationship between residents and regional-level spatial structures.

The second explanation is that there exists too much heterogeneity in regional and country-wide spatial structures that it is impossible to adopt one index to encapsulate all Mediterranean regions. Salvati et al. (2013) suggested this notion, when they noted divergences in regional urban growth trajectories in the South, moving away from their commonalities. The insignificance of these indexes seem to suggest this too, at least regarding their relationship with subjective well-being, and seem particularly plausible considering the social, and urban, complexity these millenary structures contain (Salvati and De Rosa, 2014).

Given the main findings of this study, and the preceding discussion, a relevant way forward would be to understand, in more depth, more appropriate measures for the different regional spatial structures in Southern European countries. Testing out different measures on a case-by-case basis, through both qualitative and quantitative research might be one direction for further research to take on.

Additionally, as already noted in Hoogerbrugge et al. (2021), using well-being data with more specific geo-locations would be ideal to further understand how people relate to their neighbourhoods, cities, and regions. In this regard, individual characteristics have so far been the best performing indicators for individuals' level of SWB – future research could look further into this, and how people's daily activities and interactions with their space relate to the way they evaluate their lives.

On a last note, the only policy recommendation that can be put forward based on the findings of this research is that – individual characteristics aside – urban environments do indeed have an effect on society's level of well-being, however small it may be. Although the why's and how's were beyond the scope of this study, previous literature does suggest that solving lower-level urban nuisances, such as crime (Piper, 2015) and commuting times (Loschiavo, 2019), can ultimately have a positive effect on individuals' levels of well-being, and should thus be pursued through policy, and otherwise.

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Annex 1: Description of Control Variables

Name	Description
Life Satisfaction	All things considered, how satisfied are you with your life as a whole nowadays? 0 = extremely dissatisfied, 10 = extremely satisfied.
Age	Age of respondent. Quadratic effect included to test for a non-linear relationship.
Domicile	What best describes the area where you live? 1 = urban (big city / outskirts of big city / small city or town) 0 = rural (country village / farm or countryside home).
Gender	Gender of respondent. (male = 1).
Relationship status	What best describes your legal marital status now? (having a partner = 1).
Child	Are there children living at home or not? (lives with child = 1).
Religiousness	How religious are you?
Trust most people	Would you say that most people can be trusted?
Trust legal system	On a score from 0-10 how much do you personally trust the legal system in your country?
Education	Dummy variables for 'Primary Education' (includes no education), 'Secondary Education', 'Tertiary Education'.
Employment	Dummy variables for 'Employed', 'Unemployed', 'Student', 'Retired', 'Housework', 'Other employment'.
Perceived Income	Dummy variables or 'Living comfortably', 'Coping', 'Difficult to cope', 'Very difficult to cope'.
Perceived Health	Dummy variables for 'Very hampered', 'Somewhat hampered', 'Not hampered'.
Social Meetings	Dummy variables for 'Once a month or less', 'Few times a month', 'Once a week', 'Few times a week', 'Everyday'.

Annex 2: Basic OLS Regression

Table 7: Cluster-Robust OLS Model. Dependent Variable: Life Satisfaction.

	Model 1	Model 2	Model 3	Model 4	Model 5
Regional polycentricity			0.35		0.08
			(0.27)		(0.27)
Regional dispersion				-0.31**	-0.11
				(0.13)	(0.16)
Regional urban population (ln)		0.14**			0.10
		(0.06)			(0.09)
Urban residence	-0.22***	-0.26***	-0.22***	-0.28***	-0.26***
	(0.06)	(0.06)	(0.05)	(0.06)	(0.05)
Personal Characteristics					
Age	-0.07***	-0.07***	-0.07***	-0.07***	-0.07***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Age^2	0.00***	0.00***	0.00***	0.00***	0.00***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Male	0.04	0.04	0.05	0.04	0.05
	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
Partner	0.39***	0.41***	0.40***	0.41***	0.41***
	(0.04)	(0.05)	(0.05)	(0.05)	(0.05)
Child	0.12***	0.11***	0.12***	0.12***	0.11***
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
How religious	0.03***	0.04***	0.03***	0.04***	0.04***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Trust most people	0.13***	0.13***	0.13***	0.13***	0.13***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Trust in legal system	0.07***	0.08***	0.08***	0.08***	0.08***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Education (base category: primary education)					
Secondary education	0.20**	0.20*	0.22**	0.21**	0.21**
	(0.09)	(0.10)	(0.09)	(0.10)	(0.10)
Tertiary education	0.16*	0.15	0.18*	0.15	0.16*
	(0.09)	(0.10)	(0.09)	(0.10)	(0.09)
Employment (base category: employed)					
Unemployed	-0.41***	-0.44***	-0.44***	-0.43***	-0.44***
	(0.06)	(0.07)	(0.07)	(0.07)	(0.07)
Student	0.04	0.02	0.02	0.02	0.02
	(0.07)	(0.08)	(0.08)	(0.07)	(0.08)
Retired	-0.21**	-0.20**	-0.20**	-0.20**	-0.20**

	(0.08)	(0.09)	(0.09)	(0.09)	(0.09)
Housework	0.06	0.05	0.07	0.05	0.06
	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)
Other employment	0.08	0.06	0.08	0.08	0.06
	(0.12)	(0.12)	(0.13)	(0.12)	(0.12)

Perceived Income (base category: very difficult to cope)

Living comfortably	2.09***	2.00***	2.02***	2.03***	1.99***
	(0.09)	(0.09)	(0.09)	(0.09)	(0.09)
Coping	1.47***	1.41***	1.41***	1.44***	1.41***
	(0.09)	(0.10)	(0.09)	(0.10)	(0.09)
Difficult to cope	0.74***	0.69***	0.69***	0.70***	0.69***
	(0.09)	(0.09)	(0.09)	(0.09)	(0.09)

Perceived Day-To-Day Health (base category: very hampered)

Somewhat hampered	0.66***	0.71***	0.69***	0.70***	0.71***
	(0.12)	(0.11)	(0.11)	(0.11)	(0.11)
Not hampered	0.98***	1.02***	1.01***	1.02***	1.02***
	(0.12)	(0.12)	(0.12)	(0.12)	(0.12)

Social Meetings (base category: once a month or less)

Several times a month	0.28***	0.27***	0.26***	0.28***	0.27***
	(0.09)	(0.09)	(0.08)	(0.09)	(0.08)
Once a week	0.44***	0.42***	0.41***	0.43***	0.41***
	(0.07)	(0.06)	(0.06)	(0.06)	(0.06)
Several times a week	0.49***	0.48***	0.46***	0.50***	0.47***
	(0.10)	(0.10)	(0.08)	(0.10)	(0.08)
Every day	0.64***	0.65***	0.60***	0.65***	0.63***
	(0.10)	(0.09)	(0.07)	(0.09)	(0.07)

Constant	4.31***	2.44***	4.12***	4.12***	2.90***
	(0.23)	(0.79)	(0.23)	(0.24)	(1.06)

Observations	19,528	18,763	18,763	18,752	18,752
R^2	0.214	0.218	0.216	0.216	0.218
Adj. R^2	0.213	0.217	0.215	0.215	0.217

*Standard errors in parentheses. * $p<0.1$, ** $p<0.05$, *** $p<0.01$.*

Annex 3: Country Fixed Effects Regression

Table 8: Country Fixed Effects Model. Dependent Variable: Life Satisfaction

	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 5**
Regional polycentricity			0.21***		0.33***
			(-0.06)		(-0.08)
Regional dispersion				-0.12***	-0.20***
				(-0.04)	(-0.06)
Regional urban population (ln)		0.02			-0.07***
		(-0.02)			(-0.03)
Urban residence	-0.09***	-0.10***	-0.09***	-0.11***	-0.10***
	(-0.03)	(-0.03)	(-0.03)	(-0.03)	(-0.03)
Personal Characteristics					
Age	-0.07***	-0.06***	-0.06***	-0.06***	-0.06***
	(-0.01)	(-0.01)	(-0.01)	(-0.01)	(-0.01)
Age^2	0.00***	0.00***	0.00***	0.00***	0.00***
	(0)	(0)	(0)	(0)	(0)
Male	0.01	0.01	0.01	0.01	0.01
	(-0.03)	(-0.03)	(-0.03)	(-0.03)	(-0.03)
Partner	0.45***	0.46***	0.46***	0.46***	0.46***
	(-0.04)	(-0.04)	(-0.04)	(-0.04)	(-0.04)
Child	0.05	0.05	0.05	0.05	0.05
	(-0.03)	(-0.03)	(-0.03)	(-0.03)	(-0.03)
How religious	0.06***	0.05***	0.05***	0.05***	0.05***
	(-0.01)	(-0.01)	(-0.01)	(-0.01)	(-0.01)
Trust most people	0.11***	0.11***	0.11***	0.11***	0.11***
	(-0.01)	(-0.01)	(-0.01)	(-0.01)	(-0.01)
Trust in legal system	0.07***	0.07***	0.07***	0.07***	0.07***
	(-0.01)	(-0.01)	(-0.01)	(-0.01)	(-0.01)
Education (base category: primary education)					
Secondary education	0.11**	0.10**	0.10**	0.10**	0.10**
	(-0.04)	(-0.04)	(-0.04)	(-0.04)	(-0.04)
Tertiary education	0.08	0.06	0.06	0.05	0.05
	(-0.05)	(-0.05)	(-0.05)	(-0.05)	(-0.05)
Employment (base category: employed)					
Unemployed	-0.50***	-0.52***	-0.52***	-0.51***	-0.51***
	(-0.06)	(-0.06)	(-0.06)	(-0.06)	(-0.06)
Student	-0.06	-0.07	-0.07	-0.07	-0.07
	(-0.06)	(-0.06)	(-0.06)	(-0.06)	(-0.06)
Retired	-0.10*	-0.11*	-0.11*	-0.11*	-0.11*
	(-0.06)	(-0.06)	(-0.06)	(-0.06)	(-0.06)

Housework	-0.01	-0.03	-0.03	-0.03	-0.03
	(-0.06)	(-0.06)	(-0.06)	(-0.06)	(-0.06)
Other employment	-0.05	-0.04	-0.04	-0.03	-0.03
	(-0.13)	(-0.13)	(-0.13)	(-0.14)	(-0.14)

Perceived Income (base category: very difficult to cope)

Living comfortably	1.77***	1.76***	1.76***	1.76***	1.76***
	(-0.07)	(-0.07)	(-0.07)	(-0.07)	(-0.07)
Coping	1.33***	1.32***	1.32***	1.32***	1.33***
	(-0.06)	(-0.07)	(-0.07)	(-0.07)	(-0.07)
Difficult to cope	0.67***	0.65***	0.65***	0.65***	0.65***
	(-0.06)	(-0.07)	(-0.07)	(-0.07)	(-0.07)

Perceived Day-To-Day Health (base category: very hampered)

Somewhat hampered	0.72***	0.75***	0.75***	0.75***	0.75***
	(-0.1)	(-0.1)	(-0.1)	(-0.1)	(-0.1)
Not hampered	1.06***	1.08***	1.08***	1.08***	1.08***
	(-0.1)	(-0.1)	(-0.1)	(-0.1)	(-0.1)

Social Meetings (base category: once a month or less)

Several times a month	0.25***	0.27***	0.26***	0.27***	0.26***
	(-0.05)	(-0.05)	(-0.05)	(-0.05)	(-0.05)
Once a week	0.32***	0.34***	0.34***	0.34***	0.33***
	(-0.05)	(-0.05)	(-0.05)	(-0.05)	(-0.05)
Several times a week	0.44***	0.46***	0.46***	0.47***	0.46***
	(-0.05)	(-0.05)	(-0.05)	(-0.05)	(-0.05)
Every day	0.72***	0.74***	0.74***	0.75***	0.75***
	(-0.05)	(-0.05)	(-0.05)	(-0.05)	(-0.05)

Year Dummies (base year: 2010)

2011	0.2	0.2	0.2	0.22	0.22
	(0.16)	(-0.17)	(-0.17)	(-0.17)	(-0.17)
2012	0.32*	0.39*	0.39**	0.40**	0.42**
	(-0.19)	(-0.2)	(-0.2)	(-0.2)	(-0.2)
2013	0.21	0.23	0.22	0.24	0.24
	(-0.16)	(-0.18)	(-0.17)	(-0.17)	(-0.17)
2015	0.07	0.09	0.09	0.11	0.12
	(-0.16)	(-0.18)	(-0.18)	(-0.18)	(-0.18)
2016	0.22	0.21	0.2	0.22	0.21
	(-0.24)	(-0.25)	(-0.25)	(-0.25)	(-0.25)
2017	0.43***	0.46***	0.45**	0.47***	0.48***
	(-0.16)	(-0.18)	(-0.18)	(-0.18)	(-0.18)
2018	1.51	1.49	1.49	1.46	1.45
	(-2.76)	(-2.77)	(-2.77)	(-2.78)	(-2.77)
2019	0.36**	0.38**	0.38**	0.40**	0.40**
	(-0.17)	(-0.19)	(-0.19)	(-0.19)	(-0.19)
2020	0.47**	0.49**	0.49**	0.51**	0.50**

	(-0.21)	(-0.22)	(-0.22)	(-0.22)	(-0.22)
Constant	4.21***	3.87***	4.02***	4.08***	4.72***
	(-0.24)	(-0.33)	(-0.25)	(-0.25)	(-0.39)
Observations	19,528	18,763	18,763	18,752	18,752
R^2	0.24	0.241	0.241	0.241	0.241
Adj. R^2	0.239	0.239	0.239	0.239	0.24
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes

*Standard errors in parentheses. * p<0.1, ** p<0.05, *** p<0.01.*

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