VILLAGES IN THE CITY – URBAN PLANNING FOR NEIGHBOURHOOD LOVE

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ABSTRACT

The city comprises of a wide variety of heterogeneous territorial units (e.g. districts or neighbourhoods). In many – especially larger – cities, social capital assets (like community bonds) are mirrored at the level of neighbourhoods which form the home for many sociocultural communities or distinct socio-economic classes. We postulate in this study that the big city is essentially an 'archipelago' made up of '*urban villages*'. We analyse the residents' perceived attractiveness regarding their daily local neighbourhood by introducing the concept of '*village love*' (or '*neighbourhood love*'), inspired by the recent literature on '*city love*' (comprising 'body', 'soul' and 'community' constituents of urban life). Based on an extensive and detailed multi-annual database for all neighbourhoods in Rotterdam, the present paper seeks to identify the background factors shaping 'village love' in the city, with particular attention to the citizens' subjective appreciation for and access to a great variety of (physical and immaterial) urban amenities shaping the place-based satisfaction of residents. The theoretical framing of our research resembles the basics of traditional central place theory here transmitted to the urban space in which local proximity to amenities plays a key role. A wide array of relevant amenities impacting on the place-specific well-being feelings ('village love') of residents in various neighbourhoods in the city of Rotterdam is distinguished using inter alia-rich multi-annual survey data. This approach is empirically tested and verified by means of LISA statistics and advanced spatial econometric dependence models ('urbanometrics'). The findings confirm the usefulness of a central place interpretation of 'urban village love' in the city.

Key words: City love; happiness; well-being; neighbourhood love; urban village; body; soul; community; spatial dependence; urbanometrics

INTRODUCTION

A city is not just a container full of people. It is a functionally and organically interconnected and organised network of residents, business and visitors brought together in a demarcated geographical territory. Cities have a unique character, with a historical culture, a social network, an economic growth potential, a place-specific architecture, a suitable technology base and a unique ambiance and identity (Licciardi and Amirthamasebi 2012). It is noteworthy that the intra-urban space does not have a uniform and homogeneous

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character; it shows a great diversity in density, architecture, morphology, demography, ethnicity, socio-economic development, environmental quality and cultural history. The intra-city heterogeneity is clearly reflected in the conventional spatial subdivision of a city into distinct administrative and sociocultural districts or neighbourhoods. Each of these urban microcosmic units has a typical set of features which altogether offer a multidimensional panorama of the city, its neighbourhoods and its communities. Chaskin (1997) describes a neighbourhood as a 'spatial construction denoting a geographical unit in which residents share proximity and the circumstances that come with it. The neighbourhood is a subunit of a larger area and is usually seen as primarily, if not exclusively, residential' (p. 522). Neighbourhoods are thus coherent spatial network areas in a city with a typical character that house distinct socio-economic and cultural communities. In a way, a neighbourhood is a '*village in the city*'. Citizens – certainly those residing in a larger urban area – are in many cases essentially villagers who are fond of their localised environment at the sub-city level of an urban agglomeration (see e.g. Chung 2010).

A modern city is essentially a multi-scalar 'archipelago' (Bettencourt 2013). The New Leipzig Charter (2020) on 'the Transformative Power of Cities for the Common Good' articulates the importance of the spatial scale for understanding human interactions in urban agglomerations. The above policy document of European ministers on urban matters posits inter alia: 'Urban challenges are often more pronounced at the *neighbourhood level*. Some neighbourhoods can reflect social tensions, poverty or environmental stress. Other neighbourhoods are arrival areas for migrants or subject to gentrification, social mobility and a shortage of affordable housing. Specific neighbourhood policies should therefore encourage local commitment for community building and inclusiveness' (p. 3). Hence, distinct neighbourhoods in large agglomerations function often as the multifunctional daily habitat for people; from a multi-scalar perspective, they act more or less like villages. Clearly, modern technology (e.g. logistics, home deliveries, e-shopping) helps in creating interconnections between distinct urban neighbourhoods, but in most cases, such villages have their own identity with specific authentic features.

The neighbourhood-oriented focus on cities calls also for a new, focused and actionable perspective on the broader concept of sustainable cities, with a particular emphasis on place-specific environmental quality assets and local behaviours (Rijnks *et al.* 2019; Roe and McCay 2021). Sustainability in urban or metropolitan areas calls for a microcosmic action perspective that finds its origin in the daily living and leisure environment of citizens and local communities, namely in their localised physical and social neighbourhood with a strong community resilience ('*urban village*'). This also means that neighbourhood quality and place-specific identity (including culture and language) are pivotal drivers of urban socio-economic and environmental sustainability (see, for an overview, Grazieschi *et al.* 2020). Sustainability starts from liveability motives and environmental awareness of heterogeneous individuals at a microcosmic level of the urban fabric. Consequently, the emotional contentment with and personal appreciation of citizens for their direct living environment is critical for an effective upscaling of the perception and realisation of environmental quality of cities. Environmental value creation by responsible citizens who care about their daily environment is, therefore, an essential anchor point for sustainable city governance at different scale levels (see e.g. Willemsen *et al.* 2023). It goes without saying that technologically advanced devices can be helpful in the creation of social value and sustainability in urban areas, but the sense of community well-being is likely not rigorously affected by modern technology.

In recent years, much research has been undertaken to assess in quantitative terms the feelings of satisfaction or contentment of liveability of residents in urban areas (see e.g. Kourtit *et al.* 2020; Östh *et al.* 2020; Wahlström *et al.* 2020). Specific research questions addressed in these studies were inter alia: what are the determinants of the citizens' appreciation or contentment for their daily living environment? If distinct neighbourhoods in the city exhibit a different socio-demographic

DNA composition, including social capital access and use of varied amenities, how does this affect the perceived contentment of residents for the city as their 'home'? The core question addressed in the present study is: Which critical amenities in an urban neighbourhood (or in adjacent neighbourhoods) shape the residents' perception of the quality and attractiveness of the urban space in terms of its 'body', 'soul' and 'community'? The answer to this core question will employ modern quantitative measurement techniques in order to estimate subjective perceptions on urban attractiveness by residents. Our empirical test case will be the city of Rotterdam in the Netherlands. We have chosen this city, since the extensive database from Rotterdam allows us to pursue a detailed and focused analysis of neighbourhood ('village') dimensions of this place.

The present paper aims to frame a novel data-driven research approach to quantify and explain the neighbourhood attachment of citizens. To that end, we employ here the concept of '*city love*', which will be decomposed into three distinct constituents, namely, '*body*', '*soul*' and '*community*', not only at the city level but also at the neighbourhood level. This analytical and methodological endeavour will be described in Section 2, against the background of a concise selective literature overview of city love concepts from several disciplines. A prominent question is of course whether the heterogeneous urban space (subdivided into e.g. distinct environments, districts, or 'urban villages') creates different well-being profiles among citizens and place-specific attractiveness feelings or neighbourhood love. This will be further examined in Section 3. Next, Section 4 will introduce our case study, namely, the city of Rotterdam, while also the methodological framing – inspired by central place theory concepts – and the multi-annual database employed in our study will be described. The empirical statistical and modelling results will be given in Section 5, while next also appropriate advanced spatial-econometric tests on neighbourhood feelings (taking account of spatial dependency) will be pursued. An interpretation of these 'urbanometric' findings is offered in Section 6. The final section (Section 6) provides retrospective and prospective observations on our study.

FOUNDATIONS OF CITY LOVE

Over the past decades, several analytical–quantitative attempts have been made to measure well-being, satisfaction, contentment, liveability or happiness of people, groups, countries or regions. A wealth of literature covering evidence-based research on well-being and happiness has come to the fore in several social science disciplines, for instance, in welfare economics (see e.g. Easterlin 2002; Blanchflower and Oswald 2011; Pellenbarg and Van Steen 2011; Oswald *et al.* 2015; Frey 2018; Blanchflower 2021) and in sociology (see Diener 2000; Veenhoven 2000). The field of urban geography – and of urban sciences in general – has rather late recognised that well-being and happiness have a place-specific background (see e.g. Ballas 2013; Delmelle and Thill 2014; Kourtit *et al.* 2020; Östh *et al.* 2020; Morrison 2021; or Wahlström *et al.* 2020; Vaz 2023). It is interesting to observe that the quantitative empirical measurement of urban or regional happiness or satisfaction on the basis of statistical and econometric techniques has gained much interest over the past years. These practical attempts have brought to light that: (i) Actual happiness of people is often showing a rather time-varying and fluctuating pattern, even on a daily basis, so that a more robust analysis of place-specific residents' perception of a city environment is needed (hence, the more structurally oriented term 'city love' used in the present study); (ii) cities offer a differentiated spatial arena of human actions and social interactions, so that well-being and city love research may have to pursued at a sublocal or neighbourhood level ('urban village'). Happiness or life satisfaction of people is usually seen as an expression for current subjective well-being or life satisfaction. It may vary over time and space (Weiner 2008); it is clearly influenced by various background factors, such as income, wealth, health, employment, freedom, governance and quality of the built environment (Kahneman and Krueger 2006; Deaton 2008; Marans and Stimson 2011).

Well-being or happiness research may take place at different geographical levels. The measurement of well-being and happiness at *national* or *macro* level has gained much popularity over the past decades, especially in the

context of comparative studies. Interesting contributions can be found in particular in the UNDP Human Development Index (HDI), the UN World Happiness Index, the World Health Organization (WHO) Quality of Life, The World Bank Human Capital Index, the OECD Better Life Index, the Eurostat Quality of Life Index or the Happy Planet Index. In recent years also several attempts have been made to estimate well-being, happiness or life satisfaction at *regional* level. Examples can be found in Andreoni and Galmarini (2015), Hall (2002) and Lenzi and Perucca (2016), while also the OECD Regional Well-Being Index is noteworthy (https://www.oecd.org/). The quantitative assessment of *urban* well-being and related concepts is – as argued above – a more recent research challenge (see e.g. Carvalho *et al.* 2018; Kourtit, 2020), while the assessment of sublocal contentment (e.g. district, neighbourhood or community) is still in its infancy (Jabbar *et al.* 2022; Pinto *et al.* 2022). Clearly, the multiscalar nature of urban well-being or contentment may range from sublocal level (street, place, neighbourhood) to regional (or sometimes national) level.

The citizens' appreciation for or contentment with their urban living space may assume different forms. In our empirical analysis of the residents' perception of attractiveness of the city and its neighbourhoods, we will resort to the above-mentioned concept of '*city love*', which refers to the measurable or visualised geographical mental map of citizens regarding their personal appreciation for – or contentment with – the living climate or ambiance in their city (Kourtit *et al.* 2020, 2022; Wahlström *et al.* 2020). City love is an aggregated concept that aims to capture the residents' appreciation for the urban living climate in terms of the sum of a variety of feelings that exist between citizens (or visitors) and the city, such as place, identity, pride, satisfaction, loyalty or contentment. This concept is also the main reason for not using one of the more established concepts, such as attachment or sense-of-place, as these often refer to one aspect of the relationship between the citizen and the city or neighbourhood. The concept of city love has a clear geographical connotation which can also be represented as a mental map in geography. A *mental map* is a notion from the social sciences, in particular social geography, that provides a subjective representation or visualisation of the cognitive image of a geographical reality as seen through the eyes of the observer. The concept became popular thanks to the work of Kevin Lynch (1960) on the image of the city, which was later on put in a dynamic spatial perspective by Lefebvre and Nicholson-Smith (1991) with their concept of 'spaces of representation'. In the present study, we assume that city love comprises three constituents of urban liveability or quality of life, named as follows:

- *body*: the physical or tangible components of the city (infrastructure, amenities, morphology, etc.).
- *soul*: the immaterial characteristics of a place that shapes its distinct identity (historical culture, urban ambiance, human spirit and experience, etc.).
- *community*: the social capital and network linkages among people in a place (ethnic-cultural cohesion, social support systems, language bonds, etc.).

On a neighbourhood or 'urban village' level, the notion of 'city love' can, as mentioned above, be decomposed in the same way into three similar components, so that the resulting 'neighbourhood love' can also be illustrated as a triangle; see Figure 1. In this figure, neighbourhood love represents the sum of the citizen's/user's place-dependent (positive) feelings for the neighbourhood of residence ('village'), in terms of its 'body', 'soul' and 'community'. These feelings may be further distinguished into notions such as satisfaction, loyalty, contentment, sense of place, pride, trust, belonging, commitment or place responsibility. Clearly, this neighbourhood love is also influenced by the general citizen's/user's individual happiness and well-being feelings.

Over the past years, various interesting empirical studies on neighbourhood quality or satisfaction have been undertaken. We refer here inter alia to past contributions provided by Chaskin (1997), Chung (2010), Hildalgo and Hernandez (2001), Hernandez *et al.* (2007), Lewicka (2010), Jorgensen and Stedman (2011), Stedman (2011), Casakin *et al.* (2015), Westin (2016), Frankling and Tait (2002), Bell and Jayne (2004) and Hin and Xin (2011). However, the systematic decomposition into body, soul and community

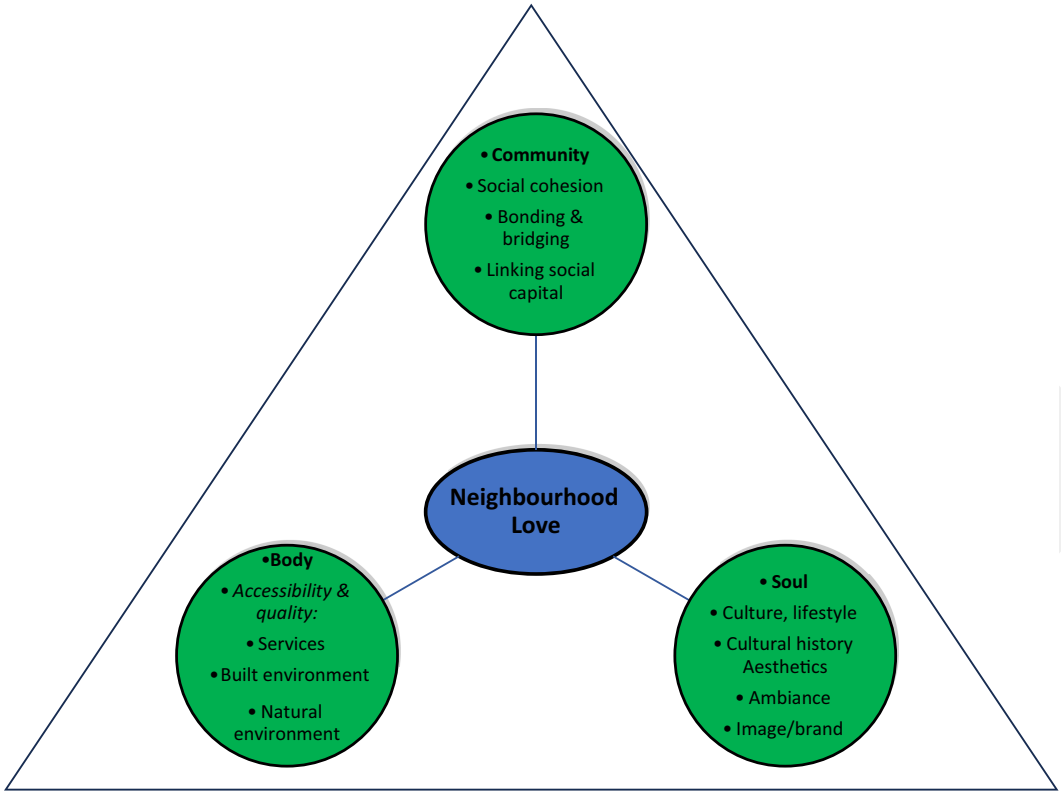

Figure 1. *The triangle of 'urban village' or 'neighbourhood love'.*

of neighbourhood love was not made in these studies.

In our empirical analysis of city love at neighbourhood level, we will quantify the three dimensions 'body', 'soul' and 'community', so as to measure and explain neighbourhood love of residents. Our methodology will be tested for the city of Rotterdam (The Netherlands); this choice is motivated by the great heterogeneity among neighbourhoods in this city as well as by the presence of extensive databases in this city. Before presenting our data and methodological base for the city of Rotterdam, and its neighbourhoods ('urban villages'), we will first provide a concise description of the notion of the city as a system of villages.

THE CITIZEN AS A VILLAGER

Cities are – from a macroscopic perspective – often seen as large-scale agglomerations shaped by the economic driving force of ongoing positive agglomeration advantages (see e.g. Geyer 2002; Henderson 2003, 2005; Acs 2016; Kourtit 2019; Glaeser *et al.* 2021). Their morphology may relate to territories ranging from urban cores to suburbs or satellite areas. It is noteworthy, however, that another strand of literature argues that cities originate from the human small-scale motivation to create a localised settlement system that through bonding and bridging networks creates new opportunities, social trust, economic efficiency, protection and cultural identity (see e.g. Ceci *et al.* 2020; Belanche *et al.* 2021). Citizen engagement and auto-identity are then a critical vehicle for building up a living space where well-being, affectivity and social respect can flourish. Consequently, social capital is a critical condition for localised satisfaction or happiness of citizens, in particular in regard to distinct

urban neighbourhoods (or even street-level communities). This interpretation of city of love and life is essentially based on a microcosmic and deconcentrated view on urban agglomerations.

Cities are adaptive and resilient organisms, which form a complex evolutionary system, with many actors and multilevel network connections. From a microcosmic perspective, the focus is on the functioning and governance of the modern self-organising urban fabric characterised by multiple layers of rich architectural design and historical heritage, a multidimensional pattern of many individual and collective interests and behaviours, a dynamic interaction between economic, technological, knowledge and business stakeholders and a great variety of internal and external network linkage patterns (see e.g. Neal 2012; Neal and Rosenblat 2021). To understand the functioning and mechanism of a modern city, a systemic decomposition paradigm is needed, starting from a micro-based analytical perspective on urban space use towards a macro-oriented integrative view on the essence of the city and its (public and private) space (see Kourtit 2021). This novel methodological approach ties in with recent behavioural and experimental approaches in cognitive urban sciences and human geography, as mirrored inter alia in micro-economics (well-being research), attitudinal psychology (happiness research) or behavioural sociology (quality-of-life research) (see e.g. Frey and Stutzer 2002; Musa *et al.* 2018). Examples of multiscalar approaches in economic and social geography can be found inter alia in affective (emotional) geographies (see e.g. Thien 2017), in archipelagos cities (see e.g. Schrijver 2006) or in fractal urban geometry (Batty 2017).

A microcosmic perspective on urban life places much emphasis on typical constituents of a place characterised by historical image or cultural prestige (Knez 2005; Marcouyeux and Fleury-Bahi 2011). Citizens build-up – after some time – a perceived image of a place which strengthens place-based identity and place attachment (see Kyle *et al.* 2005). Most of these spatial affinity processes take place at the micro level of the daily living environment. This human-scale environment has normally only a limited action radius (shopping, walking, school, neighbours) and shapes the conditions for a daily activity spectrum that resembles like a village in a city. From this perspective, a city is essentially a fractal system comprising an interconnected set of villages. Clearly, not all such urban villages are identical. They are different in terms of population, economic activity, amenities, geographical location and access to central urban functions. Consequently, urban districts or neighbourhoods exhibit a functional specialisation of urban amenities, with in general more specialised or luxury goods or services offered in urban centre(s). Residents may thus enjoy goods and services in their direct vicinity, as well as in other locations in the city, particularly for specialised or luxury amenities. In our study, the proposition is put forward and tested that the citizens' satisfaction with their neighbourhood is not only determined by the place-specific supply of amenities in the direct vicinity but also by the presence of user amenities elsewhere in the city, depending on the distance and accessibility to these other areas. Such systemic features resemble Christaller's (1933) central place theory which was focused on a regional scale. We assume here a hierarchical urban space constellation in which the city as a whole has a multifunctional hierarchy of characteristic 'urban villages' that offer different packages of goods and services to the urban consumer (Mulligan *et al.* 2012). Ultimately, a city is a network comprising of a network of villages. An intriguing question is therefore how the residential appreciation of a neighbourhood ('village love') is depending on the packages of amenities offered in the neighbourhood of residence as compared to the city as a whole.

As mentioned earlier, in recent years, the notion of the '*village in the city*' has become very much 'en vogue', witness statements like 'The neighbourhood is the answer' (see Russell 2020, in his publication on '*Rekindling Democracy*'). The argument is that community and individual life can flourish better and is more fulfilling in characteristic urban neighbourhoods or streets, as such a settlement pattern will likely enhance feelings of well-being, longevity, health, safety, care and child raising. The concept of the 'village in the city' has often been inspired by urban settlement concepts in China (Franklin and Tait 2002;

Chung 2010; Hin and Xin 2011; Sharifi *et al.* 2021). In China, villages in the city are often regarded as socio-economic or cultural–demographic enclaves, while elsewhere the (scarce) literature on urban villages refers usually to – sometimes planned – urban neighbourhoods with a distinct small-scale character. In our study, we will refer to villages in the city as a fractal urban economic–functional and socio-demographic morphological phenomenon taking the form of a city of interconnected quarters in a modern urban geography (Bell and Jayne 2004). Thus, the urban village conceptualisation of a city or urban agglomeration embodies a systemic multilayer view on urban life that is spatially distinguished into interdependent geographical units with a specific place identity at a human scale of daily life. An urban village is an organic concept that has developed in tandem with the evolution of the city.

It is noteworthy that a village has a social–cultural connotation in which historical authenticity, community sense, small-scale economy and place identity play a critical role (see e.g. Pinto 2000; Peng *et al.* 2020). As argued by Jane Jacobs (1961); 'eye-level' communication and observation are often critical for enhanced well-being feelings of citizens, in contrast to 'high-level' perceptions of urban life. Consequently, characteristic neighbourhood communities are normally not found in skyscraper settlement patterns, but in human '2-D environments' (see also Arribas-Bel *et al.* 2011; Scholten 2017).

The above-mentioned view on the city as a constellation of different complementary villages is clearly in agreement with a fractal or multiscalar perspective on the urban fabric (Bettencourt and Sahasranaman 2019). Furthermore, it is noteworthy that, in the recent public discourse of a 15-minute city a similar argumentation has arisen (see Moreno 2020; Moreno *et al.* 2021); the focus on 'hyper-local' intra-city mobility constellations is clearly related on a desired access-oriented urban structure that obeys low threshold requirements of intra-city mobility, under strict conditions of human health, liveability, safety, inclusiveness and sustainability. In the same spirit, the 10-minute walkability concept for urban neighbourhoods (i.e. urban villages) has come to the fore, for instance, in Portland (Oregon). These new perspectives call for a solid evidence-based and analytical underpinning. The quantitative analysis of the spatial–functional nexus of the 'city-village' calls for an advanced statistical and spatial–economic research effort supported by a wealth of spatio-temporal data at urban neighbourhood ('village') level (see also Logan *et al.* 2022). This will be further addressed in Section 4.

DATA AND METHODOLOGY OF ROTTERDAM CASE STUDY

Introduction – Rotterdam has a dynamic history over the past century. Despite its destruction at the beginning of WWII, it has recovered as a major logistic and high-tech transport hub in Western Europe, having become the one but biggest port in the world (see e.g. Vroomans *et al.* 2023). The city centre has turned into a modern skyscraper city, but the surrounding districts have all a different morphology and sociocultural composition, with quite some green and blue amenities. Over the past years, the greater Rotterdam area has turned into a multi-cultural city with a great diversity in districts and neighbourhoods, each with their own historical and cultural identity. This makes Rotterdam particularly suitable as our empirical case study for assessing neighbourhood appreciation or attractiveness through the concept of community or neighbourhood love, as indicated above. We will now first describe the database used in our empirical modelling study.

The database on Rotterdam – The city of Rotterdam has an extensive, well-developed and detailed database, not only on the city as a whole but also on all its districts and its many neighbourhoods. The Rotterdam Neighbourhood data system contains survey and register data about the quality of living and place-related perceptions/experiences of about 12,000 citizens in over 60 neighbourhoods in the city. The data are available biannually since 2014 and contains both objective and subjective quantitative scores within three major themes; Safety, Social and Physical.

The objective variables are typically register data or stated facts from the survey, while the subjective variables comprise surveyed preferences, attitudes or individual valuations. The panel structure of the data set allows us to explore how community characteristics as well as body and soul functions of neighbourhoods can influence the neighbourhood/village love. Starting from the availability and access to urban/neighbourhood amenities, the three constituents of city love were empirically analysed, using the extensive Rotterdam database on objective and subjective indicators. These data are used to create a composite '*urban village love*' index (see Figure 1).

We have constructed the 'village love index' by the mean of seven variables: (i) the share of residents who feel lucky to live in their neighbourhoods, (ii) those who are proud to live in their neighbourhoods, (iii) those who like their neighbourhoods, (iv) those who say they do not experience any problems in their neighbourhoods, (v) the share of residents who feel connected to the neighbourhood, (vi) those who feel responsible for their neighbourhoods and (vii) the share of residents who do volunteering work for their neighbourhoods. For access to amenities, an index of accessibility of shopping facilities is constructed by the mean of the share of homes within a standard distance to bakery, grocery, butcher and pharmacies, while the share of homes within standard distance to schools (at all levels) is considered as school accessibility. Similarly, the share of homes within standard distance to sport facilities and those within standard distance to public transportation (of all available options) are used to construct sport and transportation accessibility measures. We have used Open Street Map (OSM) data to extract information about blue (river) and green (trees, forest, etc.) amenities. We have calculated the mean distance to natural amenities from neighbourhoods' centres as a measure of natural amenity accessibility. The OSM data include also non-automated road networks. We use this information to run a line density function[1] as a measure of walkability of neighbourhoods. Again, from the OSM data, we calculate mean distances of neighbourhood centres to historical buildings as a measure of both historical sites and tourism activity. Finally, the distance to city centre (in this case Rotterdam main train station) from each neighbourhood's centre is calculated as a crude measure of centrality. In Figure 2, we have mapped the distribution of our constructed measure of village love.

The maps from this figure demonstrate a great variety in village (or neighbourhood) love feelings among Rotterdam residents. Despite some small variations over time, the pattern from Figure 2 is rather robust: In the Northern and Central parts of the city, we find the highest village or neighbourhood indices. For example, the right-upper urban neighbourhood in Figure 2 (in dark colour) is Nesselande, a recently built new urban area in Rotterdam. This is a high income and green area, with a high quality of life, a high degree of safety and a strong community sense; it has a very high neighbourhood love index. In contrast, if we look at the neighbourhoods in the lower part of the city (e.g. Charlois, an ethnically diversified low-income area), we find a very low neighbourhood love index. These results may be caused by site-specific amenities, a strong local cohesion feeling, a good access to central city amenities and good access to green provisions. In a previous study, Kourtit *et al.* (2022) have demonstrated that access to attractive amenities has a significant impact on the city love index. However, it is still not yet clear which amenities are critical to have close access to (leading to a strong neighbourhood love index) and which amenities are equally appreciated by residents when available somewhere else in the city or region. This calls for more research on the residents' mental map of neighbourhoods. This spatial identification of critical amenities shaping neighbourhood love is the key question for the present study.

Methodology – To answer the research question on the impact of amenities on neighbourhood love, we need to specify a model that accounts for the spatial structure of the data as well as the panel information from the multi-annual set of neighbourhoods in the city. When constructing our empirical framework, we rely on so-called 'urbanometrics' as a new form of urban econometric modelling including spatial dependency factors (see Kourtit

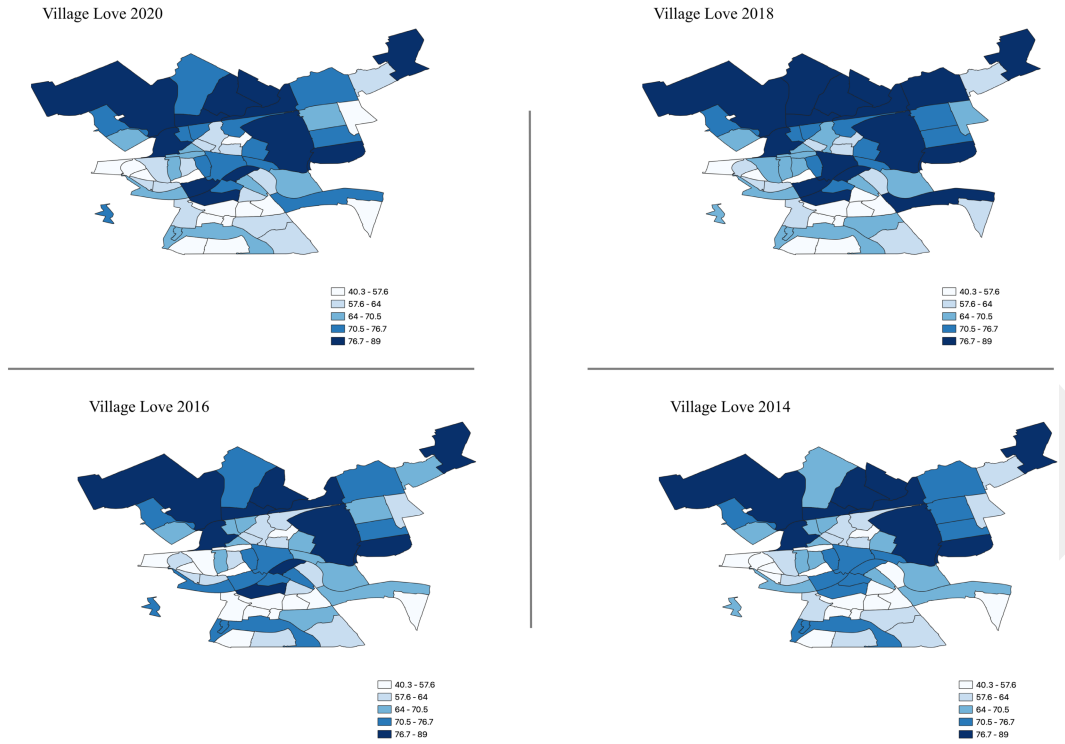

Figure 2. *Urban neighbourhood/'village' love in Rotterdam, 2014–2020.*

et al. 2022). Urbanometrics in this study is operationalised by quantifying citizens' appreciation of their neighbourhoods and analysing the dimensions of contentment with their neighbourhood by appropriate models. Following the above conceptual framework, we assume that the village love will reveal itself in hierarchical form from neighbourhood to district scale. Therefore, we use a multilevel modelling framework, where village love is defined as a function of amenities available in the immediate neighbourhood, while the district level is allowed to vary at a higher level. Multilevel models are invaluable for analysing data with a hierarchical or clustered structure (Hox 1998). Their utility becomes evident in many fields when, for instance, variation in the outcome variable occurs at multiple levels. Consider the example of students clustered within classrooms, and classrooms further clustered within schools, resulting in a three-level hierarchy. In this scenario, a multilevel modelling framework becomes essential for the analysis of student success. Another instance of clustered structure may arise in longitudinal settings, where observations are organised as time units clustered within repeated measures of outcomes for individual subjects. Such a model for our analysis (called here 'urbanometric model'; see Kourtit *et al.* 2022) can be specified as follows:

$$VL_{tid} = \beta_{tid} x_{tid} + u_i + \in_d + e_{itd} \qquad (1)$$

where VL_{ti} is our measure of village love in neighbourhood i in this time frame t; x_{ti} denotes covariates; u_i is neighbourhood level random effects; and e_{it} is an error term. The time frame refers to distinct time periods, that is, the years 2014, 2016, 2018 and 2020. With the panel structure, the model produces equivalent statistics to a random effects model, but we also allow covariates to vary at random at a district level d. This allows us in turn to control the variation at three levels: district time, neighbourhood level

and district level. By running first the model without explanatory covariates x_{tid}, we obtain so-called null model statistics, which form a baseline for the comparison of variance with the models including covariates at the neighbourhood and district level.

The maximum likelihood (ML) model specified in (1) can be extended to incorporate spatial autocorrelation observed in the data. Local Spatial Autocorrelation (LISA) statistics serve the purpose of identifying the presence of spatial patterns in a variable at a given local scale (Ord and Getis 2001). When statistically significant clusters are detected, LISA reveals that similar values are concentrated in geographically proximate locations (Anselin 1995). The LISA measures shown in Figure 3 indicate that the Southern and Northern parts of the city are subject to varying levels of village love and are also geographically clustered (high in the North and low in the South) in an increasing degree from 2014 to 2020. This statistical outcome calls for the use of a spatial dependence model.

The presence of spatial dependence within the model challenges the assumption of independent sampling, necessitating the selection of suitable models to address this issue based on spatial autocorrelation techniques (see e.g. Elhorst 2014).

We have already noted that the attractiveness of a given locality may be determined by the presence of amenities in close-by localities. As argued by Pierewan and Tampubolon (2014), we have to deal with this by adding spatially autocorrelated residuals in (1) as follows:

$$VL_{ti} = \beta_{ti} x_{ti} + u_i + e_{it} \tag{2}$$

and

$$e_{it} = \rho \sum_{i=1}^{k} w_{ijt} e_{ijt} + \varepsilon_{it}, \tag{3}$$

where e_{it} are spatially autocorrelated residuals; ρ is a spatial dependence parameter; w_{ijt} is a spatial contiguity weight matrix; and ε_{it} are random errors. So, this is a typical example of a microspatial urbanometric model incorporating intra-city spatial dependences. In the following section, we present the results from the spatial dependence multilevel model introduced above.

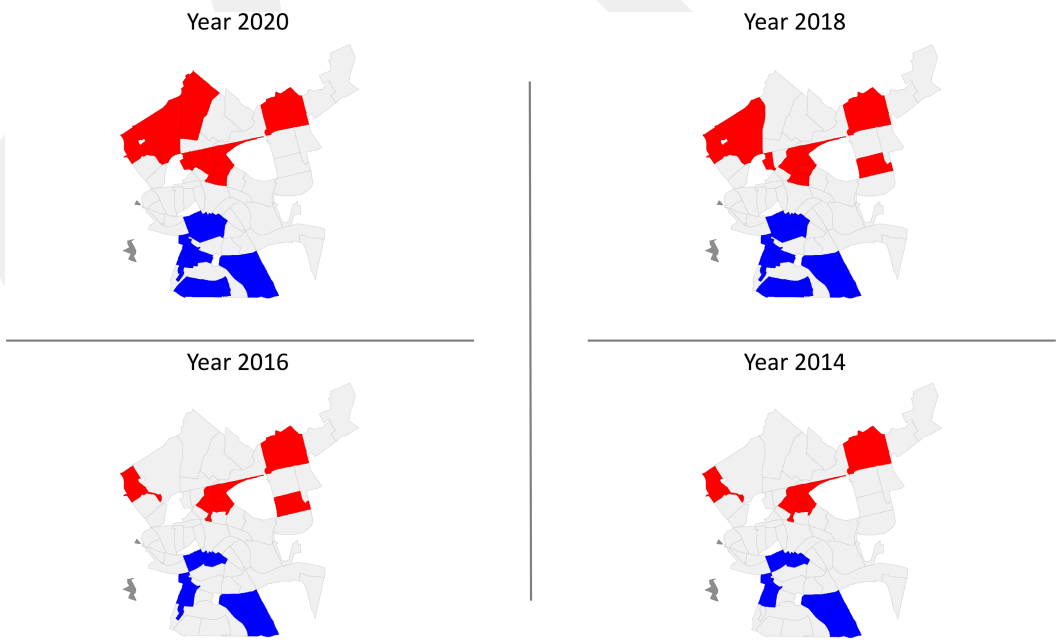

Figure 3. *Local spatial autocorrelation in village love in Rotterdam.*

EMPIRICAL RESULTS

In this section, we present and interpret the findings of our Rotterdam neighborhood study, employing a spatial multilevel model that considers a hierarchy of amenities valued by residents. While central place theory traditionally operates at a regional scale, our study applies this framework to the neighborhood level within the city. The outputs of the urbanometric Christaller type of model on spatial interactivity are shown in Table 1.

Table 1. *Spatial multilevel model outputs with 'village love' as the dependent variable*

Variables*	Null Model	Model 1
Accessibility of school (school)		
Accessibility of transport services (transport)		
Accessibility of shopping (shopping)		
Accessibility sports facilities (sports)		
Accessibility of natural amenities (nature)		
Accessibility of historic buildings (historic buildings)		
Walkability index (walkability)		
Share of low income residents (low income)		−54.3913***
		(4.8543)
Distance to central station (lndistcenter)		
school#lndistcenter		0.0322***
		(0.0072)
transport#lndistcenter		0.0285***
		(0.0068)
shopping#lndistcenter		0.03266***
		(0.0103)
sports#lndistcenter		0.0344***
		(0.0084)
nature#lndistcenter		−0.6542***
		(0.2878)
historicbuildings#lndistcenter		−0.0002
		(0.0018)
walkability#lndistcenter		0.6588
		(0.6094)
2016.year		1.0782**
		(0.4390)
2018.year		2.6906***
		(0.4358)
2020.year		3.9066***
		(1.4565)
p	0.9754***	0.9754***
	(0.0004)	(0.0004)
Constant		83.6581***
		(8.8427)
ICC (1st level)	0.0806	0.0493
ICC (2nd level)	0.4596	0.4753
ICC (3rd level)	0.4597	0.4753
Observations	248	248
Number of groups	62	62

****p < 0.01, **p < 0.05, *p < 0.1.*
Data source: Rotterdam database and OpenStreetMap data.
Standard errors in parentheses.

In line with the LISA maps shown in Figure 3, the spatial autocorrelated term p shows a significant and positive coefficient. The parameter p, akin to LISA statistics, signals the spatial dependence of village love in geographically proximate neighbourhoods. In simpler terms, it suggests a strong probability that neighbouring neighbourhoods will exhibit similar levels of village love. This is not surprising, since LISA maps (see Figure 3) illustrate the presence of a significant spatial autocorrelation, while our diagnosis, based on the Lagrange multiplier test, has pointed out a spatial error model. Again, the coefficient p in the model justifies the use of the spatial multilevel model for our data analytics.

In the model, we interact each of the neighbourhood variables with its distance to the centre (following the structure of central place theory). This choice is motivated by the hypothesis that the appreciation of one's neighbourhood will depend on the relative location of the neighbourhood from the centre. The centre represents both the location of main activities of the city, but also often the direction of mobility (e.g. commuting for school or job). We also assume that everyone potentially passes via the centre when accessing to a given third-order amenity elsewhere, based on Lösch (1940)'s proposition on spatial territories. From our model experiments, we find that the predicted village love values estimated from our model indicate that, with respect to the base line year 2014, the village love in Rotterdam has consistently increased throughout the study period.

Next, in subsequent analyses, we also investigated the determinants of this appreciation by accessibility-related factors. Overall, in line with our theoretical framing – including intra-urban inter-activity and central place theory – access to amenities is positively associated with village love, as a neighbourhood's distance from the centre increases. For instance, having access to primary and secondary schools within a standard distance is positive for village love, when a neighbourhood is far from the centre. The same relationship holds for all amenities with a similar coefficient size. The interaction between distance to the centre and the mean distance to historical buildings does not have a significant relationship with village love. Furthermore, the interaction between distance to centre and walkability index does not yield significant results. Kourtit *et al.* (2022) show that access to historical buildings and walkability positively associate with 'neighbourhood love'. Our study shows that the relative position of neighbourhoods from the city centre does not affect the relationship between village love and the latter two factors. In addition, while access to amenities of daily use correlates with village love due to the relative positions of neighbourhoods with respect to the city centre, we have also identified both historical (potentially tourism-related) amenities and walkability of neighbourhood which have a direct relationship with village love irrespective of the location of the neighbourhood. Finally, the interaction between access to natural amenities and the variable distance to centre shows significant coefficients. We find thus that as both types of distances (to nature and city centre) increase, village love decreases.

To better understand the spatial interaction effects, we now categorise accessibility of amenities (by making a distinction ranging from very low to very high) and distance (very close to very far) and predict next the marginal effects on the village love. The plots in Figure 4 show that when a neighbourhood is located relatively further from the city centre, access to amenities contributes to the village love. Indeed, the village love ranks from high to low, based on the distance from the centre. This also means that when the distance to the centre is very low, high access to amenities creates negative externalities. Besides, Figure 5 indicates that when a neighbourhood is located centrally and has a high access to blue and green amenities, village love ranks the highest.

Finally, the results from our null models indicate that differences among the years under consideration explain 8% of the variation in village love and that differences among neighbourhoods and districts explain the remaining variation equally. This potentially points out a strong difference in village love between localities at two scales (districts and neighbourhoods) and some degree of

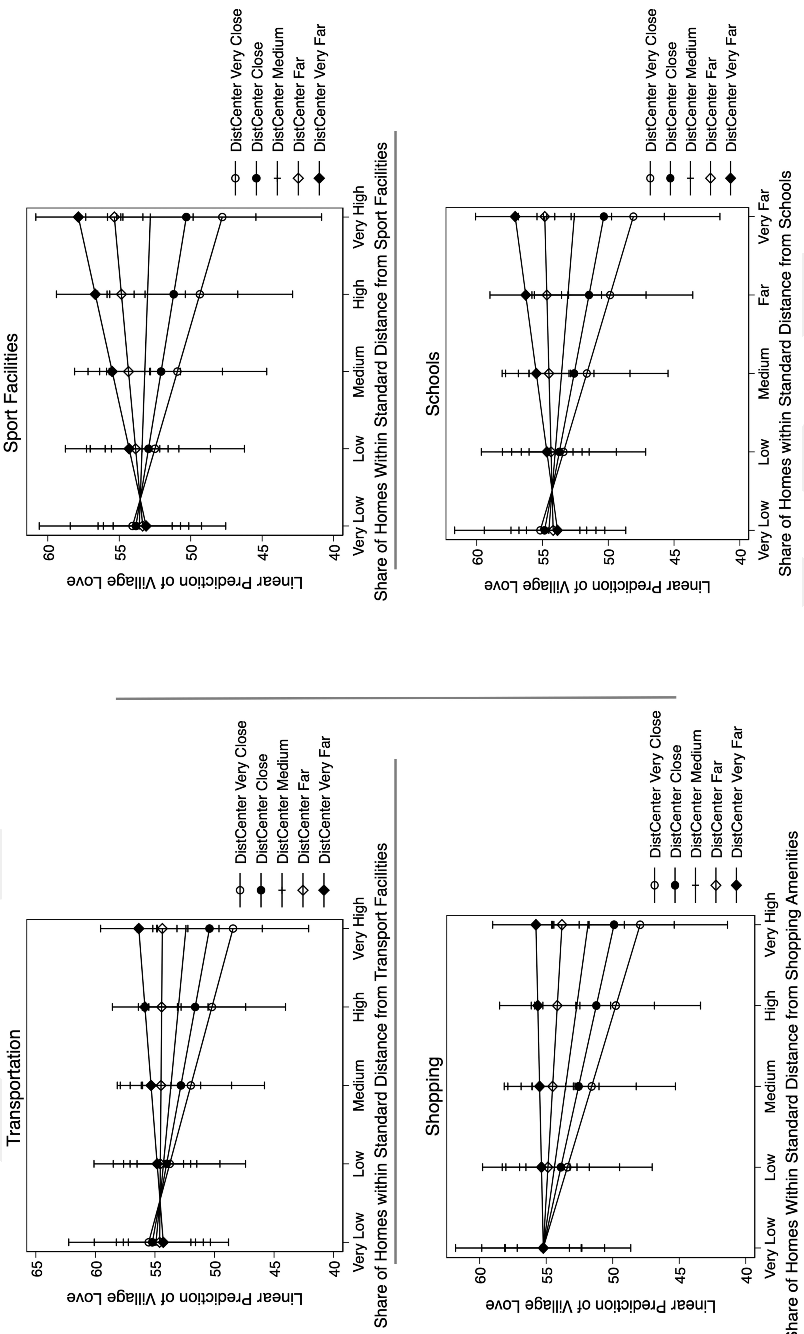

Figure 4. *Predicted village love for varying distances to centre and access to amenities.*

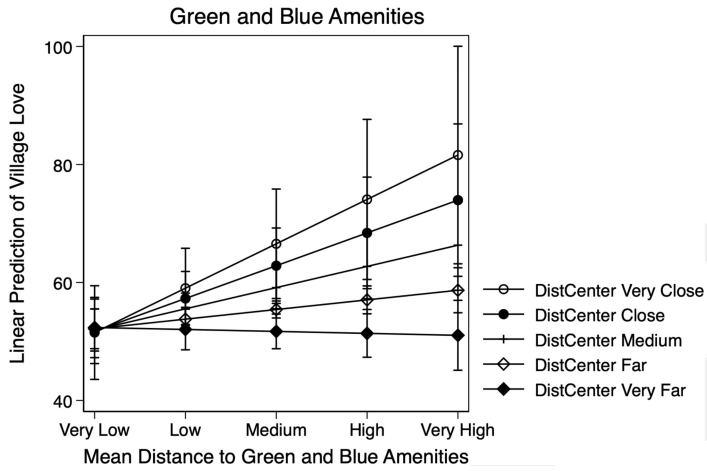

Figure 5. *Predicted village love for varying distances to centre and to green/blue amenities.*

sociocultural segregation (as also indicated by LISA). We are now able to explain an additional 4% of variation in model (1) by including neighbourhood level accessibility-related covariates and distance to city centre. Nevertheless, the prevalence of low-income families in a given neighbourhood shows a strong correlation with the degree of village love, as is evidenced by the coefficient associated with the 'share of low-income families' variable in Table 1. In these findings, we draw upon earlier research in the extant literature that has identified a potential positive correlation between income level and life satisfaction (see e.g. Cramm *et al.* 2012; Hou 2014).

RETROSPECT AND PROSPECT

Cities are potential creators of well-being and happiness, at least when certain areal, social and economic conditions are fulfilled, often in line with the UN SDGs. Given the great variety in urban morphology, population structure, welfare positions and cultural backgrounds, it is clear that for a proper understanding of urban well-being perceptions – denoted in the present study generically as 'city love' – a disaggregated perspective on cities is a sine qua non. To that end, the present paper has made an analytical endeavour to assess and explain 'urban village love' or neighbourhood well-being, by conceiving of neighbourhoods as an interconnected collection of sublocal amenities ('villages'). Thus, the present study has transformed the 'city love' concept into an 'urban village love' concept. The love for an urban neighbourhood comprises in our study three categories: body (material), soul (intangible) and community (social); they are included in the construction of the measurable index.

Access to and potential use of amenities related to these three categories is seen as a determinant shaping 'urban village love'. Such amenities may be found in areas like logistics, transportation, cultural heritage, urban green and water, ecological quality, shopping facilities, community centres, educational facilities, artistic and cultural environment, etc. According to spatial interactivity and central place theory, geographical presence and spatial distance are found to be critical factors for the spatial–economic profile and hence the well-being pattern in space. The hierarchical pattern of the supply of spatial amenities in urban areas was studied here in relation to the 'urban village concept'. The Rotterdam case study appeared to provide a good test example for the geography of well-being, with a focus on neighbourhood love. The conceptual framework based on an 'urbanometric' approach was clearly confirmed in our evidence-based operational study.

Now that the 'village' perspective on big cities has empirically been demonstrated to be a potentially valid concept, it may be interesting to explore future research avenues in this field.

A first major endeavour would be how to favour spatial proximity to attractive urban amenities in various districts or neighbourhoods, as this is of decisive influence for the 'urban village love' of residents in neighbourhoods in the city (a finding also obtained by Akmali Putri 2015). Furthermore, accessibility to selective urban amenities (e.g. shopping centres, culture, urban green) is of decisive importance for urban planning focussed on the citizens' well-being, depending on the characteristics of such amenities in the range of goods or services demanded by residents. Access to urban green and water offers clearly also a positive stimulus to happiness feelings, so that successful urban planning should focus on high-quality amenities and good accessibility. Access to spatially differentiated amenities serving the socio-economic interests of residents appears to be essential.

Our analysis was inspired by a spatially hierarchical perspective on residents' well-being, which means that the portfolio of accessible urban goods and services may be showing a spatially differentiated and specialised profile. Therefore, a balanced package of amenities with a good and differentiated accessibility seems to be a sine qua non for 'urban village love'. Furthermore, bridging and bonding phenomena among neighbourhood communities call for an equilibrated distance between local communities in different densities in the city. It is also plausible that the presence of high-rise buildings (e.g. in the centre) may be appreciated, if the area concerned has a sufficient variety of green areas and low-density communities in its vicinity. A policy lesson from our analysis based on the neighbourhood (or urban village) perspective on cities is that the differentiated supply of a package of amenities in various neighbourhoods may add to positive feelings on the city, provided sufficient access (e.g. through public transport) is guaranteed. It is noteworthy that our analysis of city love at neighbourhoods level presupposes a synergy between material amenities, a sense of local belonging and authenticity and immaterial community (or social) capital. These three constituents of the residents' appreciation for local attractiveness are an integral part of urban sustainability as is also advocated in the UN SDGs and the New Urban Agenda. The concept of 'villages in the city' opens new anchor points for citizen-oriented and place-specific urban planning.

An interesting question for future research may be whether drastic changes in digital and logistic systems (e.g. e-shopping, home deliveries, etc.) will affect the intra-urban hierarchical socio-economic organisation and spatial specialisation, and hence, the neighbourhood and city love patterns identified in our study. There is no doubt that, in the modern 'urban century', the city will continue to be a source of evidence-based innovation research.

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Endnote

[1] https://desktop.arcgis.com/en/arcmap/10.3/tools/spatial-analyst-toolbox/how-line-density-works.htm

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