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Multiple urban resource configurations underlying high city satisfaction in 83 European cities

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Article

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Abstract

Why do cities with different perceived living conditions receive similarly favourable evaluations from residents? Using city-level aggregates for 83 European cities from the 2023 Perception Survey on the Quality of Life in European Cities, this study examines how environmental, social, institutional and service resources combine in relation to High City Satisfaction (HCS). Fuzzy-set qualitative comparative analysis identifies three sufficient HCS configurations, indicating that high city satisfaction is associated with more than one observed resource profile among the surveyed cities. Environmental Quality and Social Trust recur across all three configurations, but neither meets the set-theoretic criterion for individual necessity. Necessary Condition Analysis identifies sample-based ceiling effects for all six resources, with the largest effect sizes observed for Essential Public Service Quality and Local Administrative Quality. The absence of HCS is associated with a structurally different cumulative-deficit pathway centred on low Social Trust and low Local Administrative Quality. The findings distinguish three analytically distinct resource roles: recurrence in sufficient configurations, strict necessity, and constraints on outcome attainability. They also show that high city satisfaction is configurationally plural, whereas one identified pathway to its absence is organised around accumulated resource deficits.

1. Introduction

Cities are experienced as bundles of environmental, social, institutional and service conditions rather than as collections of isolated attributes. This point is central to urban quality-of-life (QoL) research, which has long distinguished objective characteristics of places from residents' subjective evaluations of those characteristics (Cummins, 2000; Diener & Suh, 1997; Marans & Stimson, 2011; Pacione, 2003). Recent reviews continue to describe urban QoL as a multidimensional construct in which the physical environment, public services, social relations, safety and governance are closely connected to how people evaluate urban life (Mouratidis, 2021; Răducan et al., 2025; Rüger et al., 2023; Samavati & Veenhoven, 2024). For comparative urban research, residents' evaluations are therefore not merely an alternative to objective indicators; they provide evidence about how urban conditions are experienced at the place level.

City satisfaction captures one such place-based evaluation. It concerns the city as a living environment and is related to, but conceptually narrower than, overall life satisfaction or general QoL (Ballas, 2013; Sirgy & Cornwell, 2002). The 2023 Report on the Quality of Life in European Cities shows that satisfaction with living in the city is high on average but varies markedly across the 83 surveyed cities and across European regions (De Dominicis et al., 2023). The same survey reports substantial cross-city differences in environmental quality, safety, interpersonal trust, public services, inclusiveness and local administration. The coexistence of similar outcome levels with different profiles of perceived urban conditions raises a comparative question that is less visible when each domain is examined separately: do high-satisfaction cities share one common resource profile, or can different combinations of urban conditions be associated with the same favourable outcome?

Existing research provides a strong basis for asking this question but does not settle it. Comparative studies have linked urban conditions, urbanisation and perceived livability to subjective well-being and life satisfaction across European cities and regions (Lenzi & Perucca, 2018; Okulicz-Kozaryn & Valente, 2019; Węziak-Białowolska, 2016). More recent European evidence has examined public services, environmental quality, safety and social trust using regression or structural-equation approaches (Heraud et al., 2023; Nicolás-Martínez et al., 2024). These studies clarify how particular urban conditions are associated with residents' evaluations on average. What remains less clear is how the multidimensionality of urban QoL is organised across cities. Similar levels of city satisfaction may rest on different combinations of environmental, social, institutional and service conditions, and the same resource may play different roles across those combinations. It is also unclear whether the resource structures associated with favourable city evaluations are mirrored in cities where such evaluations are absent. Addressing these questions requires attention to urban resource configurations rather than to individual domains in isolation.

Configurational reasoning is suited to this task because it treats outcomes as potentially arising from conjunctions of conditions rather than from additive net effects alone. Three ideas are particularly relevant. Conjunctural causation means that the role of one condition can depend on the other conditions with which it is combined. Equifinality allows different combinations to be sufficient for the same outcome. Causal asymmetry means that the sufficient structure associated with an outcome need not be the inverse of the structure associated with its absence (Fiss, 2011; Furnari et al., 2021; Ragin, 2009; Schneider & Wagemann, 2012). These ideas shift the empirical question from identifying the single strongest urban attribute to identifying the resource architectures within which favourable city evaluations occur.

The present study examines 83 European cities using the official city-level aggregates from the 2023 Perception Survey on the Quality of Life in European Cities. High City Satisfaction (HCS) is the outcome. Six perceived urban conditions are examined: Environmental Quality (ENV), Perceived Safety (SAFE), Social Trust (TRUST), Local Administrative Quality (ADMIN), Essential Public Service Quality (EPSQ), and Urban Inclusiveness (INCL). Fuzzy-set Qualitative Comparative Analysis (fsQCA) is used to identify sufficient configurations for HCS and its absence. Necessary Condition Analysis (NCA) addresses a complementary question: whether low levels of individual resources constrain the level of HCS that is observed as attainable. This distinction allows three resource roles to be kept separate—recurrence within sufficient configurations, strict set-theoretic necessity, and necessity in degree expressed as an attainability constraint (Dul, 2016; Vis & Dul, 2018).

The study addresses three research questions:

RQ1. What configurations of environmental, social, institutional and service conditions are sufficient for High City Satisfaction across European cities?

RQ2. How do the configurations associated with the absence of High City Satisfaction differ from those associated with its presence?

RQ3. To what extent do individual urban resources constrain the attainable level of High City Satisfaction?

The contribution lies in clarifying how multidimensional urban resources are organised and how they can matter in different ways. First, the study moves beyond identifying relevant QoL domains by showing that similarly favourable city evaluations can be associated with alternative city-level resource architectures rather than one uniformly favourable profile. Second, it distinguishes three empirically different resource roles: recurrence within sufficient configurations, strict set-theoretic necessity, and constraints on attainable outcome levels. A resource may recur across successful configurations without being indispensable, while a resource that fails a strict necessity test may still constrain how high HCS is observed to rise. Third, the study shows that the sufficient structure associated with the absence of HCS is not simply the inverse of those associated with its presence, providing a configurational interpretation of asymmetry in comparative urban QoL. Throughout, the city is the unit of analysis: the findings concern city-level resource configurations and aggregated resident evaluations rather than individual-level causal processes.

2. Theoretical background and framework

2.1. City satisfaction as a place-based urban QoL outcome

Quality of life is commonly approached through both objective conditions and subjective evaluations. Objective indicators describe characteristics such as income, services, environmental conditions or infrastructure, whereas subjective indicators capture how people evaluate their lives and living environments (Cummins, 2000; Diener & Suh, 1997). Urban QoL research has developed this distinction at several spatial scales, from neighbourhoods to cities and metropolitan regions, and has repeatedly shown that objective and subjective indicators overlap only imperfectly (Marans & Stimson, 2011; McCrea et al., 2006). This imperfect correspondence is one reason why residents' evaluations remain analytically important even when administrative or environmental indicators are available.

City satisfaction is one such evaluation, but its object should be defined carefully. Life satisfaction concerns a person's evaluation of life as a whole (Diener et al., 1985; Sirgy, 2012). Neighbourhood satisfaction is narrower and concerns the residential environment immediately around the home (Sirgy & Cornwell, 2002). City satisfaction instead refers to the city as a place to live. The European city survey measures satisfaction with living in the city separately from satisfaction with life and with the neighbourhood, supporting its treatment as a distinct place-based outcome (De Dominicis et al., 2023). It is therefore best understood as one component of urban QoL rather than as a complete measure of well-being.

This place-based distinction matters for two reasons. First, research on happiness and urban environments indicates that people respond not only to material conditions but also to perceived amenities, public goods, social relations and environmental quality (Ballas, 2013; Samavati & Veenhoven,

2024). Second, the same urban feature can be experienced differently across places and populations. Studies of European regions and cities report substantial spatial heterogeneity in the relationships between urbanisation, livability and well-being (Lenzi & Perucca, 2018; Okulicz-Kozaryn & Valente, 2019). Research comparing neighbourhood satisfaction in different urban contexts similarly finds that the relevance of safety, amenities, density and green space can vary with place (Mouratidis & Yiannakou, 2022). These findings support a comparative perspective in which high city satisfaction need not be tied to one fixed urban profile.

The present analysis is conducted at the city level. Each case represents an urban context summarised by aggregated resident evaluations. HCS should therefore be read as high membership of a city in the set of places receiving strongly favourable aggregate evaluations, not as a statement that every resident within the city is highly satisfied. This distinction becomes especially important when interpreting configurations, because aggregated city patterns cannot establish which individual residents hold particular perceptions or how those perceptions combine within persons.

2.2. Urban resources underlying city satisfaction

The six conditions in the analysis represent distinct aspects of the perceived urban environment. They are treated as resources in a broad place-based sense: conditions that residents encounter in everyday urban life and that may contribute to a city being experienced as functional, secure, socially supportive or institutionally accessible. The term does not imply that all conditions are interchangeable, nor that higher values mechanically produce higher satisfaction. Instead, it provides a common language for examining how different domains are assembled within city-level configurations. Recent urban QoL research supports this domain-based view while also stressing that the choice and meaning of indicators depend on spatial scale and context (Răducan et al., 2025; Takano et al., 2023).

Environmental Quality (ENV) captures residents' evaluations of air quality, noise and cleanliness. Environmental conditions are longstanding components of urban QoL because they directly shape the everyday experience of streets, homes and public space (Pacione, 2003). Evidence also shows that subjective environmental evaluations should not be treated as simple substitutes for objective environmental indicators (McCrea et al., 2006). Reviews of urban happiness link cleaner environments and access to public goods with more favourable well-being evaluations, while also documenting variation across settings (Samavati & Veenhoven, 2024). ENV is intentionally narrow in the present study: it does not measure green-space provision, climate, carbon performance or a city's overall sustainability.

Perceived Safety (SAFE) captures whether residents feel safe walking alone at night in the city. Fear of crime is shaped by the experience of places and cannot be reduced to recorded crime rates alone (Lorenc et al., 2013). Safety also appears repeatedly in research on neighbourhood satisfaction and urban livability, although its relative importance differs across contexts (Mouratidis & Yiannakou, 2022). SAFE is therefore interpreted as perceived security in a specific everyday urban situation. It is not a general measure of policing, crime incidence, daytime safety or neighbourhood-level safety.

Social Trust (TRUST) represents the relational environment of the city. Generalised interpersonal trust is associated with social connectedness and well-being, but its meaning depends on whom respondents have in mind when assessing ‘most people’ (Delhey et al., 2011; Helliwell & Putnam, 2004). Urban QoL research also links social capital to residents’ evaluations of urban life (Amerian, 2024). In this study, TRUST refers only to generalised trust in other people in the city. It is distinct from trust in government, confidence in public services and administrative legitimacy.

Urban Inclusiveness (INCL) concerns whether the city is perceived as accommodating social diversity. Urban social sustainability scholarship treats inclusion as related to participation, access, social relations and the ability of different groups to share urban life (Dempsey et al., 2011). Integration research likewise emphasises that social inclusion has several dimensions and cannot be reduced to simple co-presence (Ager & Strang, 2008). At the same time, encounters across difference do not automatically produce meaningful inclusion (Valentine, 2008). The empirical measure used here is deliberately bounded: it summarises whether the city is viewed as a good place to live for gay or lesbian people and for immigrants from other countries. It should not be interpreted as a comprehensive measure of equality, rights or inclusion across all social groups.

Local Administrative Quality (ADMIN) represents residents’ evaluations of the administrative interface through which they deal with local public authorities. Administrative-burden research shows that citizen-state interactions impose learning, compliance and psychological costs, making the accessibility and clarity of administrative processes relevant in their own right (Moynihan et al., 2015). Satisfaction with public organisations is also shaped by expectations and by how residents experience service encounters rather than by objective performance alone (James, 2009). Recent evidence from local government research further shows that administrative arrangements can be associated with resident satisfaction, although the relationship varies by context (Tran & Dollery, 2023). ADMIN therefore covers request resolution, procedural clarity, administrative fees and online access to information and services. It is narrower than governance quality, political accountability or institutional trust.

Essential Public Service Quality (EPSQ) captures satisfaction with public transport, healthcare and education. These services support routine mobility, health and human-development needs and are therefore central to everyday urban functioning. Studies of subjective well-being in urban contexts report associations between public services and residents’ evaluations of their living environment (Heraud et al., 2023; Van Ryzin, 2004), while comparative research on citizen satisfaction also shows that perceived service quality varies between urban contexts and is closely related to broader evaluations of place (Ochoa-Rico et al., 2024). EPSQ is distinct from ADMIN: it concerns substantive services, whereas ADMIN concerns the interface through which residents interact with local public authorities.

The six conditions are therefore conceptually distinguishable even though they may covary empirically. Their boundaries also matter for interpretation. All are based on resident perceptions, not objective performance records. Four are domain composites and two are direct indicators. None is treated as a reflective measure of a single latent ‘urban quality’ factor. This specification is consistent with the

study's configurational purpose: to examine how theoretically distinct urban conditions combine, rather than to reduce them to one composite index.

2.3. From multidimensionality to resource configurations

Recognising that urban QoL is multidimensional is not the same as explaining how its dimensions work together. Most net-effect approaches estimate the average association of one condition while holding others constant. That information is valuable, but it does not answer whether a condition matters only in the presence of particular companion conditions or whether different combinations can be sufficient for the same outcome. Configurational theory addresses this problem by treating the relevant explanatory unit as a combination of conditions (Fiss, 2011; Furnari et al., 2021). A recent QoL application similarly shows how social and mobility conditions can form alternative configurations rather than a single linear pathway (Zhang et al., 2026).

Three set-theoretic principles follow. First, conjunctural causation implies that the relevance of one resource depends on the configuration in which it appears. Second, equifinality means that more than one configuration can be sufficient for HCS. Cities can therefore resemble one another in their outcome while differing in the underlying arrangement of resources. Third, causal asymmetry means that the sufficient configurations associated with ~ HCS need not be the logical opposite of those associated with HCS (Ragin, 2006, 2009; Schneider & Wagemann, 2012). The analysis consequently treats HCS and ~ HCS as separate outcomes rather than assuming that one can be inferred from the other.

A further distinction concerns what it means for a resource to be important. A condition may recur across several sufficient configurations without being strictly necessary for all cases of HCS. Set-theoretic necessity asks whether membership in the outcome is consistently contained within membership in a condition. NCA asks a different question: whether low levels of a condition constrain the maximum level of the outcome that is empirically attainable (Dul, 2016; Vis & Dul, 2018). Recurrence, necessity in kind and necessity in degree are therefore not interchangeable labels. Keeping them separate makes it possible to describe a resource as recurrent without calling it indispensable, or to identify an attainability constraint without treating it as a sufficient cause.

This framework also avoids assuming substitution among resources. If one condition is absent from a sufficient configuration, it does not follow that another condition has compensated for it. The empirical evidence can establish that alternative sufficient combinations exist; it cannot, in a cross-sectional city-level design, identify the temporal process through which one resource replaces or offsets another. The theoretical claim is therefore limited to resource interdependence and configurational plurality.

2.4. Configurational framework of High City Satisfaction

Figure 1 summarises the analytical framework. The six conditions are grouped into environmental, social, institutional and service domains. Their relationship with HCS is modelled configurationally through conjunction, equifinality and resource interdependence rather than through a single additive profile. The absence of HCS is examined separately to allow asymmetric sufficient structures to emerge.

The framework does not assign a priori priority to any individual condition and does not presume that recurrent conditions will be necessary.

Figure 1. Configurational framework for High City Satisfaction and its absence

3. Methods

3.1. Research design and unit of analysis

The study uses a city-level comparative configurational design. fsQCA was selected because the research questions concern conjunctural sufficiency, multiple pathways and possible asymmetry between HCS and ~ HCS rather than uniform net effects (Ragin, 2006; Schneider & Wagemann, 2012). The city is the analytical case. Although the underlying survey was administered to individuals, the measures analysed here are official city-level aggregates. Results are therefore interpreted as set relations among cities, not as causal relationships among individuals (Robinson, 2009).

The six conditions are treated as components of an urban resource system rather than as competing predictors. NCA complements fsQCA by evaluating whether low levels of individual resources constrain attainable HCS. Separate sufficiency analyses for HCS and ~ HCS are used to examine causal asymmetry. The analytical sequence was fixed around the predefined outcome and six conditions; robustness tests were used to assess sensitivity rather than to search for a preferable specification.

3.2. Data source and city sample

Data were drawn from the 2023 Perception Survey on the Quality of Life in European Cities, commissioned by the European Commission's Directorate-General for Regional and Urban Policy and conducted by Ipsos. Fieldwork took place between January and April 2023. The survey covered 83 cities in European Union member states and selected non-EU European countries, with at least 839 interviews in each city and 71,153 completed interviews overall (De Dominicis et al., 2023). The common questionnaire covers satisfaction with living in the city, environmental conditions, public services, perceived safety, interpersonal trust, inclusiveness and local public administration.

The analysis uses the official city-level aggregate dataset rather than reconstructing city estimates from the respondent-level microdata. This choice keeps the analysis aligned with the published survey reporting framework and uses indicators collected in the same wave, questionnaire and city definition. Favourable-response indicators are expressed as percentages of substantive responses, excluding 'don't know', refusal and non-response categories in line with the survey's reporting convention. The aggregate file used in the analysis is the revised version released on 18 September 2024.

The survey documentation distinguishes weights for within-city estimation from weights intended for pooled estimates across cities. The within-city calibration weight (w1) combines survey-design and post-stratification adjustments for age, gender and education. A population weight (w1_pop) additionally incorporates city population size for estimates that combine cities. Because the present study treats

each city as one analytical case rather than estimating a population-weighted European average, larger cities do not receive greater weight in the configurational analysis.

3.3. Outcome and condition construction

HCS is based on Q2_1 (‘I’m satisfied to live in my city’) and is measured as the percentage of respondents who strongly or somewhat agree. All seven raw measures are expressed on a 0–100 scale. HCS, SAFE and TRUST are direct city-level indicators. ENV, ADMIN, EPSQ and INCL are composites created by equally weighting the component indicators assigned to each predefined domain. For a multi-item condition, the city-level composite was calculated as:

$$C_i = \frac{1}{m} \sum_{j=1}^{m} x_{ij}$$

1

where C_i is the composite score for city i, x_ij is the favourable-response percentage for indicator j in city i, and m is the number of component indicators. The components are treated as substantively related facets of a domain rather than as interchangeable reflective indicators of an unobserved latent variable (Diamantopoulos & Winklhofer, 2001). Equal weighting preserves a transparent aggregation rule and avoids assigning differential importance that was neither theoretically specified nor estimated in the research design.

Construct content was fixed before calibration. ADMIN excludes perceived corruption because the primary construct concerns administrative performance and accessibility, whereas corruption is conceptually closer to institutional integrity and also contains a documented missing observation for Tirana. EPSQ is restricted to public transport, healthcare and education to represent essential everyday services rather than recreational or cultural amenities. INCL uses perceptions concerning gay or lesbian people and immigrants from other countries; a broader version that also includes racial and ethnic minorities is examined only as a robustness specification. Table 1 reports the operationalisation and primary calibration anchors.

Table 1
Outcome and condition operationalisation and primary calibration

Set	Role	Survey indicator(s)	Construction	Full non-membership	Crossover	Full membership
HCS	Outcome	Q2_1 City satisfaction	Positive agreement (%)	81	90	93
ENV	Condition	Air quality; noise; cleanliness	Equal-weight mean of 3 favourable evaluations	40	60	78
SAFE	Condition	Q2_3 Safety at night	Positive agreement (%)	60	70	80
TRUST	Condition	Q2_6 Generalised city trust	Positive agreement (%)	50	65	80
ADMIN	Condition	Request resolution; procedural clarity; administrative fees; online access	Equal-weight mean of 4 favourable evaluations	50	60	70
EPSQ	Condition	Public transport; healthcare; education	Equal-weight mean of 3 satisfaction indicators	55	72	85
INCL	Condition	Good place for gay/lesbian people and immigrants	Equal-weight mean of 2 favourable evaluations	60	78	88

Note. HCS = High City Satisfaction; ENV = Environmental Quality; SAFE = Perceived Safety; TRUST = Social Trust; ADMIN = Local Administrative Quality; EPSQ = Essential Public Service Quality; INCL = Urban Inclusiveness. Anchors are ordered as full non-membership / crossover / full membership.

3.4. Calibration

The direct calibration method transformed each 0–100 measure into fuzzy-set membership scores using three qualitative anchors: full non-membership, the crossover points and full membership (Pappas & Woodside, 2021; Ragin, 2009). Anchors were not set mechanically from fixed empirical percentiles. Their selection combined the substantive meaning of the percentage scale, the response patterns documented in the European city survey and the observed distribution across the 83 cities. The distribution served as a diagnostic so that the anchors differentiated substantively different cases; it was not the sole basis for defining membership. This approach follows the principle that calibration

should be theoretically and substantively interpretable rather than a purely statistical rescaling exercise (Geremew et al., 2024; Rasoolimanesh, 2026).

For HCS, the crossover of 90 marks maximum ambiguity about membership in the set of high-satisfaction cities in a survey where satisfaction is generally high; 93 represents clear membership and 81 clear non-membership. The same logic was applied to the conditions by distinguishing clearly favourable, ambiguous and clearly unfavourable positions on their original percentage scales. Primary anchors are shown in Table 1 and the survey item codes are repeated in Supplementary Table S1. No case fell exactly at the 0.50 crossover. Alternative calibration choices were evaluated only in the robustness analysis and did not replace the primary specification.

3.5. Analytical procedure

3.5.1. Set-theoretic necessity

Set-theoretic necessity was assessed separately for HCS and ~ HCS. Each favourable condition and its negation was tested independently of its later role in the sufficiency solutions. A consistency threshold of .90 was used as the criterion for potential necessity, with coverage considered alongside consistency to evaluate the empirical relevance of the set relation (Ragin, 2006; Schneider & Wagemann, 2012).

3.5.2. Necessary Condition Analysis

NCA examined necessity in degree using the original 0–100 measures (Dul, 2016; Vis & Dul, 2018). Ceiling envelopment–free disposal hull (CE-FDH) lines were estimated for each condition. Effect size (d) captured the degree to which low condition values constrained high HCS, and statistical significance was assessed with 10,000 permutation tests (Dul et al., 2020). Bottleneck tables were used to identify the condition levels below which progressively higher HCS values were not observed as attainable in the sample. NCA outputs were interpreted as sample-based ceiling constraints, not as sufficient causes, marginal effects or policy thresholds. They were not used to remove conditions or modify the fsQCA calibration.

3.5.3. Truth-table construction and sufficiency analysis

With six conditions, each truth table contained 64 logically possible configurations. Thirty-one rows contained at least one empirical case. The primary frequency threshold was two cases, excluding singleton rows while retaining 66 of the 83 cities for Boolean minimisation. Sufficiency consistency and coverage for a configuration X and outcome Y were calculated as:

$$Consistency\,(X \Rightarrow\ Y) = \frac{\sum \min\,(X_i, Y_i)}{\sum\ X_i}$$

2

$$Coverage\,(X \Rightarrow\ Y) = \frac{\sum \min\,(X_i, Y_i)}{\sum\ Y_i}$$

3

Rows were coded as sufficient when raw consistency was at least .85 and proportional reduction in inconsistency (PRI) consistency at least .75. The .85 raw-consistency cut-off is more demanding than the common .80 benchmark, while the PRI criterion reduces the risk of retaining configurations that are also strongly associated with the opposite outcome (Greckhamer et al., 2018; Pappas & Woodside, 2021). The same frequency, consistency and PRI rules were applied to HCS and ~ HCS.

Boolean minimisation generated complex, intermediate and parsimonious solutions. Under the specified directional expectations, no logical remainder qualified as an easy counterfactual, so the intermediate and complex solutions were identical. Configurations were evaluated using consistency, PRI consistency, raw coverage and unique coverage, together with overall solution consistency and coverage. The analysis follows established QCA practice while retaining case-level interpretation rather than treating the minimised expressions as variable-centred regression equations (Fiss, 2011; Oana & Schneider, 2024).

3.5.4. Core and peripheral conditions

Core-peripheral status was determined by comparing parsimonious and intermediate solutions. Conditions appearing in both were classified as core, whereas those appearing only in the intermediate solution were classified as peripheral (Fiss, 2011). This status is a property of Boolean solution comparison and is not interpreted as indicating the largest effect, greatest substantive importance or highest policy priority.

For HCS, Boolean minimisation yielded two equally valid parsimonious expressions: TRUST*ADMIN + SAFE*INCL and TRUST*ADMIN + SAFE*EPSQ. EPSQ and INCL are both present in C3, but their individual status as the additional core condition accompanying SAFE cannot be uniquely distinguished across the two parsimonious solutions. The ambiguity is therefore reported rather than resolved by researcher discretion. The same solution-comparison rule was applied to ~ HCS. Complex, intermediate and parsimonious solutions are shown in Supplementary Table S2.

3.6. Robustness and case-based interpretation

Robustness was assessed through 23 alternative specifications varying calibration anchors, raw-consistency and PRI thresholds, frequency thresholds and the operationalisation of INCL. A deliberately reduced five-condition model excluding EPSQ was also examined. These checks test sensitivity and structural stability rather than identify a preferable model (Oana & Schneider, 2024). Except for the reduced specification, the theoretical condition set remained unchanged. The primary calibration and solutions remained the basis for interpretation.

Case-based interpretation was conducted only after the primary solutions had been fixed. Bialystok, Leipzig and Oslo were examined as typical HCS cases; Skopje and Tirana as typical ~ HCS cases; and Prague, Vienna, Miskolc and Valletta as diagnostic or deviant cases. The cases were used to clarify how the set relations appear in concrete cities and to identify the empirical boundaries of the sufficient solutions (Schneider & Rohlfing, 2013). Case interpretation did not alter constructs, anchors, conditions or Boolean solutions.

4. Results

4.1. Descriptive patterns and inter-set associations

HCS ranged from 62.03 to 97.08 (M = 86.88, SD = 8.11; median = 89.85), showing generally favourable but clearly differentiated evaluations across the 83 cities. ENV displayed the widest dispersion (M = 60.83, SD = 15.83), followed by TRUST (M = 63.91, SD = 14.80) and INCL (M = 74.38, SD = 13.89). HCS correlated most strongly with EPSQ (r = .797) and ENV (r = .776), followed by TRUST (.719), SAFE (.654), ADMIN (.648) and INCL (.596). No inter-condition Pearson correlation exceeded .80. Table 2 reports the descriptive statistics and correlations.

The correlation matrix is used only as a descriptive diagnostic. The relatively high HCS–EPSQ and HCS–ENV correlations do not establish necessity or sufficiency, and inter-condition correlations do not determine whether sets are redundant. The set-theoretic analyses therefore address a different question: whether condition membership is required for HCS or whether particular combinations form sufficiently consistent subsets of the outcome.

Table 2. Descriptive statistics and inter-set associations (N = 83)

Panel A. Descriptive statistics

Set	Minimum	Maximum	Mean	SD	Median
HCS	62.03	97.08	86.88	8.11	89.85
ENV	23.70	85.09	60.83	15.83	63.04
SAFE	37.64	87.39	69.27	12.56	71.70
TRUST	27.34	87.34	63.91	14.80	67.13
ADMIN	26.81	81.94	60.85	10.19	62.37
EPSQ	35.69	93.81	71.69	12.43	72.49
INCL	35.73	93.89	74.38	13.89	79.28

Panel B. Pearson correlations

Set	HCS	ENV	SAFE	TRUST	ADMIN	EPSQ	INCL
HCS	—						
ENV	.776	—					
SAFE	.654	.717	—				
TRUST	.719	.724	.688	—			
ADMIN	.648	.574	.456	.385	—		
EPSQ	.797	.648	.438	.639	.635	—	
INCL	.596	.434	.308	.664	.295	.718	—

Note. Correlations are descriptive diagnostics and are not interpreted as necessity, sufficiency or causal effects.

4.2. Set-theoretic necessity and NCA constraints

None of the six favourable condition sets met the .90 necessity threshold for HCS. Consistency ranged from .767 for INCL to .874 for ENV. Likewise, none of the six negated conditions met the threshold for ~HCS; the highest necessity consistencies were ~TRUST (.778) and ~ENV (.777). Under the primary calibration, there is therefore no evidence that one favourable urban resource is individually necessary for HCS or that one individual deficit is necessary for ~HCS.

NCA produced a different pattern. All six CE-FDH effects were statistically significant: EPSQ (d = .330), ADMIN (.326), TRUST (.261), ENV (.233), SAFE (.198) and INCL (.185; p = .025; all others p < .001). For an HCS level of 93 on the original 0–100 scale, the estimated bottleneck values were ENV 57.83, SAFE 66.89, TRUST 68.24, ADMIN 53.98, EPSQ 72.03 and INCL 67.50. For HCS = 95, the corresponding values were 68.22, 80.74, 68.85, 69.72, 73.41 and 84.74. Table 3 reports both necessity analyses.

The findings distinguish strict set necessity from necessity in degree. No individual condition met the prespecified .90 set-theoretic necessity criterion for HCS, whereas NCA identified sample-based ceiling patterns for all six resources. The bottleneck values are empirical attainability constraints within this sample. They do not imply that raising a city to the stated condition value would cause the corresponding HCS level.

Table 3. Set-theoretic necessity for HCS and ~HCS and NCA constraints on HCS

Panel A. Set-theoretic necessity analysis

Condition for HCS	Consistency	Coverage	Condition for ~HCS	Consistency	Coverage
ENV	0.874	0.800	~ENV	0.777	0.859
SAFE	0.791	0.746	~SAFE	0.726	0.773
TRUST	0.798	0.785	~TRUST	0.778	0.791
ADMIN	0.821	0.726	~ADMIN	0.684	0.790
EPSQ	0.829	0.765	~EPSQ	0.741	0.810
INCL	0.767	0.748	~INCL	0.736	0.756

Panel B. Necessary Condition Analysis for HCS

Condition	CE-FDH d	p	Bottleneck HCS = 93	Bottleneck HCS = 95
ENV	0.233	<.001	57.83	68.22
SAFE	0.198	<.001	66.89	80.74
TRUST	0.261	<.001	68.24	68.85
ADMIN	0.326	<.001	53.98	69.72
EPSQ	0.330	<.001	72.03	73.41
INCL	0.185	0.025	67.50	84.74

Note. In Panel A, the criterion for set-theoretic necessity was consistency ≥ .90. Panel B uses the original 0–100 measures, CE-FDH ceiling lines and 10,000 permutation tests. Bottleneck values are constraints on observed attainability, not sufficient causes or policy thresholds.

4.3. Configurations for High City Satisfaction

The sufficiency analysis identified three HCS configurations (Table 4). Configuration consistency ranged from .965 to .969 and all PRI values exceeded .94. The overall solution had coverage of .690, consistency of .948 and PRI of .918. C1 (ENV*SAFE*TRUST*ADMIN) had raw coverage of .569 and unique coverage of .085. TRUST and ADMIN were core, with ENV and SAFE peripheral. C2 (ENV*TRUST*ADMIN*EPSQ*INCL) had raw coverage of .531 and unique coverage of .047; TRUST and ADMIN again formed the core, accompanied by peripheral ENV, EPSQ and INCL. C3 (ENV*SAFE*TRUST*EPSQ*INCL) had raw coverage of .558 and unique coverage of .074. SAFE was the invariant core condition, while the two equally valid parsimonious solutions did not permit EPSQ and INCL to be uniquely distinguished as the additional core condition.

The three configurations demonstrate equifinality: more than one sufficient urban resource architecture is associated with HCS. They are not, however, entirely disconnected. ENV and TRUST are present in all three configurations. Their recurrence should not be interpreted as individual necessity because neither

ENV (.874) nor TRUST (.798) reached the .90 necessity criterion. ADMIN is not specified in C3; the blank status means that the configuration does not constrain ADMIN as either present or absent. The overlap between raw and unique coverage also shows that C1–C3 should not be treated as mutually exclusive city types.

4.4. Causal asymmetry and the absence of High City Satisfaction

The analysis of ~HCS identified one cumulative-deficit configuration: ~ENV*~TRUST*~ADMIN*~EPSQ*~INCL. Its consistency was .969, PRI .952 and raw coverage .400. Parsimonious minimisation reduced the expression to ~TRUST*~ADMIN. Low TRUST and low ADMIN therefore formed the core of the identified pathway, with low ENV, EPSQ and INCL peripheral. SAFE was not specified, meaning that neither its presence nor its absence was constrained by this configuration.

The ~HCS pathway is not a simple reversal of C1–C3, providing evidence of causal asymmetry in the identified sufficient set relations. Its raw coverage of .400 also places an important boundary on interpretation. C4 represents a substantively relevant sufficient pathway to ~HCS, not an exhaustive description of all cities with high membership in the absence of HCS.

Table 4. Configurations for High City Satisfaction and its absence

Condition / metric	C1	C2	C3	C4: ~HCS deficit
ENV	•	•	•	⊖
SAFE	•		●	
TRUST	●	●	•	⊗
ADMIN	●	●		⊗
EPSQ		•	▯	⊖
INCL		•	▯	⊖
Raw coverage	0.569	0.531	0.558	0.400
Unique coverage	0.085	0.047	0.074	0.400
Consistency	0.965	0.967	0.969	0.969
PRI	0.947	0.948	0.953	0.952

Note. ● = core condition present; • = peripheral condition present; ⊗ = core condition absent; ⊖ = peripheral condition absent; blank = unspecified. ▯ indicates presence in C3 where EPSQ and INCL cannot be uniquely distinguished as the additional core condition across the two equally valid parsimonious solutions. Overall HCS solution coverage = .690, consistency = .948, PRI = .918.

4.5. Robustness of the configurational results

Across the 23 robustness specifications, HCS solution consistency ranged from .917 to .974, PRI from .872 to .964 and solution coverage from .558 to .740. At least two HCS pathways were retained in 22 of the 23 specifications. The exact C1, C2 and C3 configurations recurred in 19, 18 and 16 specifications, respectively. Replacing the primary two-indicator INCL measure with the three-indicator alternative left both the HCS and ~HCS solutions unchanged, while the reduced five-condition model continued to produce three HCS pathways. The cumulative-deficit form identified for ~HCS was retained in all 22 six-condition robustness specifications (Table 5).

The robustness evidence is therefore strongest for the structural conclusions—plurality of HCS pathways and the persistence of the cumulative-deficit form for ~HCS—rather than for exact configuration identity under every analytical choice.

Table 5. Robustness of the configurational results

Robustness feature	Primary result	Robustness evidence
Equifinality for HCS	Three pathways	≥ 2 pathways in 22/23 specifications
C1 recurrence	ENV*SAFE*TRUST*ADMIN	19/23 exact
C2 recurrence	ENV*TRUST*ADMIN*EPSQ*INCL	18/23 exact
C3 recurrence	ENV*SAFE*TRUST*EPSQ*INCL	16/23 exact
HCS solution consistency	.948	.917–.974
HCS solution PRI	.918	.872–.964
HCS solution coverage	.690	.558–.740
Alternative INCL measure	Primary INCL2	HCS and ~HCS unchanged with INCL3
Reduced model	Six conditions	Three HCS pathways retained without EPSQ
~HCS structure	Cumulative resource deficit	Retained in all 22 six-condition specifications

4.6. Typical and deviant city cases

Case analysis illustrates both the configurations and their limits. Bialystok exemplifies C1 (HCS = 91.8; HCS membership = .854; C1 membership = .772), Leipzig represents C2 (HCS = 95.0; HCS membership = .993; C2 membership = .663), and Oslo most clearly represents C3 (HCS = 93.7; HCS membership = .974; C3 membership = .920). Oslo’s comparatively weak ADMIN coexists with strong C3 membership, in

which ADMIN is unspecified. This pattern illustrates the case profile but does not establish that other resources compensate for weaker administration.

Skopje and Tirana illustrate C4. Skopje had HCS = 72.3, HCS membership = .003 and C4 membership = .982. Tirana had HCS = 65.9 and C4 membership = .770 despite comparatively favourable SAFE. The Tirana case is consistent with SAFE being unspecified in C4; it does not imply that safety is generally unimportant for city evaluations.

The diagnostic cases show where the solutions do not fit as closely. Prague combined high HCS (92.8; membership = .940) with very low membership in the HCS solution (.072), indicating limited coverage by C1–C3. The analysis cannot determine whether Prague reflects another combination within the existing six-condition space, influences outside that space, or both. Vienna had stronger HCS-solution membership (.611) than HCS membership (.342), making it a consistency-deviant boundary case. Miskolc and Valletta had low HCS membership (.006 and .062) but weak C4 membership (.104 and .014). Valletta's raw city-satisfaction score was 81.7%, further illustrating why low membership in the calibrated HCS set should not be equated with general resident dissatisfaction.

Table 6 summarises the typical and deviant city cases discussed above.

Table 6. Typical and deviant city cases

City	Case role	HCS raw	HCS mem.	Configuration	Config. mem.	Interpretive relevance
Bialystok	Typical HCS	91.8	.854	C1	.772	Typical membership in C1
Leipzig	Typical HCS	95.0	.993	C2	.663	Typical membership in C2
Oslo	Typical HCS	93.7	.974	C3	.920	Strong C3 membership with ADMIN unspecified
Skopje	Typical ~HCS	72.3	.003	C4	.982	Strong cumulative-deficit membership
Tirana	Typical ~HCS	65.9	<.001	C4	.770	C4 despite relatively favourable SAFE
Prague	Deviant coverage	92.8	.940	HCS solution	.072	High HCS poorly covered by C1–C3
Vienna	Consistency/boundary	88.0	.342	HCS solution	.611	Configuration membership exceeds HCS membership
Miskolc	Deviant ~HCS	74.2	.006	C4	.104	Low HCS membership, weak C4 membership
Valletta	Deviant ~HCS	81.7	.062	C4	.014	Low HCS membership, weak C4 membership

Note. Configuration membership refers to the primary solution. Case labels are interpretive aids; they do not define mutually exclusive city types.

5. Discussion

5.1. Multiple urban resource architectures underlie High City Satisfaction

The first result is relevant to comparative urban QoL research: the identified sufficient HCS configurations differ in their resource composition rather than representing a single uniformly favourable urban profile. C1 and C2 are organised around a TRUST–ADMIN core but differ in their supporting conditions. C1 combines that core with ENV and SAFE, whereas C2 combines it with ENV, EPSQ and INCL. C3 has a different structure: SAFE is the invariant core, ADMIN is unspecified, and ENV, TRUST, EPSQ and INCL are jointly present. High city satisfaction is therefore compatible with more than one urban resource architecture.

This result answers a different question from the one addressed by net-effect or structural models. European research has established that perceived urban quality, public services, social trust, security and other place characteristics are associated with well-being and life satisfaction (Nicolás-Martínez et al., 2024; Okulicz-Kozaryn & Valente, 2019; Węziak-Białowolska, 2016). Studies at finer spatial scales likewise show that the associations between urban conditions and satisfaction vary across places (Heraud et al., 2023; Mouratidis & Yiannakou, 2022). The configurational evidence further shows that similarly high city-level satisfaction is observed alongside different combinations of these conditions. Cross-city similarity in HCS therefore does not imply similarity in the full underlying resource profile.

The robustness results make this conclusion more defensible than any single Boolean expression. At least two HCS pathways remain in 22 of 23 specifications, whereas the exact C1–C3 forms vary more. The stable empirical point is consequently the plurality of sufficient arrangements, not the claim that every element of each primary configuration would recur under any reasonable specification. This is important for comparative interpretation because it discourages the search for one template of a ‘high-satisfaction city’.

5.2. Recurrence, necessity and attainability are different resource roles

The second contribution is a distinction between three ways in which an urban resource can matter. ENV and TRUST appear in all three HCS configurations. It would be tempting to call them necessary or indispensable on that basis, but the necessity analysis does not support such a conclusion: ENV reaches .874 and TRUST .798, both below the .90 threshold. Their recurrence is therefore solution-specific evidence of a shared foundation across the identified pathways, not proof that every HCS city must possess high membership in those sets.

NCA introduces a third role. Although no favourable condition met the prespecified .90 set-theoretic necessity criterion, NCA identified statistically significant sample-based ceiling effects for all six resource measures. EPSQ and ADMIN have the largest CE-FDH effect sizes, and the bottleneck requirements become more demanding for several conditions when the target increases from HCS = 93 to HCS = 95. The result is not contradictory. Strict necessity asks whether HCS is contained within a condition set; NCA asks whether low values of a condition leave an empty region in which very high HCS is not observed (Dul, 2016; Vis & Dul, 2018). A resource can fail to meet the set-theoretic necessity criterion while still exhibiting an observed upper-bound association in NCA.

This distinction helps sharpen the language of ‘importance’ in urban QoL studies. Reviews of urban happiness identify recurring associations with environmental conditions, public goods, services and social environments (Samavati & Veenhoven, 2024), while public-administration research links service and administrative quality to resident satisfaction (Ochoa-Rico et al., 2024; Tran & Dollery, 2023). The present results do not rank these domains by importance. They show instead that recurrence in successful combinations, universal necessity and upper-bound constraint are empirically different roles. Treating them as equivalent would obscure rather than clarify how resources relate to city satisfaction.

The distinction also limits policy interpretation. The NCA bottleneck values are not targets at which a policy intervention can be expected to deliver a particular HCS score. They describe the observed sample: below certain condition levels, specified high outcome values did not occur. Likewise, the absence of ADMIN from C3 does not show that administration can be substituted away. It only shows that the C3 solution does not constrain ADMIN as present or absent.

5.3. Causal asymmetry and cumulative resource deficits

The HCS and ~ HCS analyses differ not only in the signs of their conditions but also in their configurational form. HCS is associated with three favourable architectures. The identified pathway to ~ HCS instead combines low ENV, TRUST, ADMIN, EPSQ and INCL, with low TRUST and low ADMIN as core conditions. SAFE is unspecified. The sufficient structure for the absence of HCS is therefore not the logical reverse of any one HCS pathway.

Substantively, C4 highlights the co-occurrence of unfavourable evaluations across multiple urban domains. Among the cases covered by this pathway, ~HCS is associated with deficiencies spanning environmental, social, institutional and service domains rather than with a single isolated shortfall. This result is compatible with a broader urban QoL literature that treats environmental quality, social capital, public services and local institutions as interconnected components of lived urban conditions (Amerian, 2024; Marans & Stimson, 2011; Răducan et al., 2025). The contribution here is narrower: it identifies a specific sufficient conjunction of deficits rather than asserting a general process of urban decline.

The raw coverage of .400 is central to this interpretation. C4 does not cover all cases with high membership in ~ HCS. Miskolc and Valletta, for example, have low HCS membership without strong membership in C4. Causal asymmetry should therefore be read as a difference between the sufficient structures that were identified, not as evidence that all non-high-satisfaction cities follow one cumulative-deficit model.

5.4. Implications for comparative urban QoL assessment

Taken together, the findings support a profile-based approach to comparative urban QoL assessment. Domain indicators remain useful because they show where residents evaluate particular aspects of urban life favourably or unfavourably. Configurational analysis adds a second layer by asking how those domain evaluations are assembled within cases. For high HCS, the relevant diagnostic question is not

whether a city meets a universal checklist, but which broader resource architecture its profile most closely resembles and where that profile departs from the sufficient patterns observed elsewhere.

For city administrations, the NCA results provide a different diagnostic. A resource that is not specified as present in every HCS configuration may nevertheless exhibit a sample-based ceiling association in the NCA results. Public services and administrative quality are especially relevant in this respect in the present sample. This does not justify universal numerical thresholds, but it does suggest that very weak service or administrative evaluations should not be dismissed merely because another sufficient configuration omits or downplays a related condition.

The ~ HCS result shifts attention from single problem indicators to the possibility of cross-domain accumulation. Where weak evaluations of trust, administration, environmental quality, public services and inclusiveness coincide, focusing on only one domain may overlook the broader pattern of unfavourable city-level evaluations. At the same time, the limited coverage of C4 cautions against treating the identified deficit configuration as a universal diagnosis. Comparative configurations are best used to guide closer investigation of a city's profile, not as ready-made intervention packages.

6. Conclusion and implications

6.1. Conclusion

This study asked how perceived urban resources combine in relation to High City Satisfaction across 83 European cities. The answer is not a single resource recipe. Three sufficient HCS configurations were identified, and at least two pathways remained in 22 of 23 robustness specifications. ENV and TRUST recurred across the primary HCS configurations, but neither met the prespecified .90 criterion for individual set-theoretic necessity. NCA identified sample-based ceiling effects for all six resource measures, with the largest effect sizes observed for EPSQ and ADMIN. The separate analysis of ~ HCS identified a different cumulative-deficit pathway centred on low TRUST and low ADMIN.

The resulting contribution can be stated in three parts. First, comparably high city satisfaction was observed alongside different configurations of urban resources. Second, recurrence, strict necessity and attainability constraints describe different empirical roles: a resource can recur without being indispensable, and a non-necessary resource can still constrain the upper range of the outcome. Third, the sufficient structure associated with the absence of HCS is not a simple reversal of the structures associated with its presence. These distinctions provide a more precise vocabulary for comparative urban QoL research than a single statement that particular domains are 'important'.

6.2. Practical implications

For urban planners, administrators and public-service providers, the results are most useful as a diagnostic framework. The three identified HCS configurations indicate that cities with similarly favourable aggregate evaluations can exhibit different combinations of resource strengths. A city can

therefore compare its perceived resource profile with the identified configurations to determine whether weaknesses are isolated within an otherwise favourable arrangement or form part of a broader pattern. Such comparison does not estimate the effect of a particular intervention, but it can help structure subsequent investigation.

The NCA findings add a warning against interpreting configurational plurality as unlimited flexibility. Low levels of some resources are associated with constraints on very high HCS. In the observed sample, EPSQ and ADMIN show the largest CE-FDH effect sizes. These values should be treated as evidence about attainable combinations in the data, not as policy thresholds or promises that raising a condition to a particular score will raise satisfaction by a specified amount.

The cumulative-deficit pathway offers a complementary lesson. Where unfavourable evaluations occur across several urban domains, assessing only one sector may overlook weaknesses elsewhere in the city's resource profile. The configuration suggests value in cross-domain diagnosis, particularly when weak social trust and weak administrative evaluations occur alongside environmental, service and inclusion deficits. Because C4 covers only part of ~ HCS, such diagnosis should remain case-specific.

6.3. Limitations and future research

Several limitations define the scope of the findings. First, the analysis is cross-sectional and uses one survey wave. The identified configurations describe contemporaneous set relations and cannot establish temporal ordering or the processes through which resource profiles change. The term "cumulative-deficit" therefore refers to the simultaneous presence of unfavourable evaluations across multiple urban domains rather than an observed process of resource deterioration over time. Repeated survey waves would allow future research to examine whether cities move between configurations and whether changes in resource combinations precede changes in HCS.

Second, HCS and all six conditions come from the same perception survey. The common measurement context improves comparability across cities but also means that the study captures perceived urban conditions rather than objective environmental, institutional or service performance. Shared sources can introduce method-related covariation (Podsakoff et al., 2003). Moreover, the analysis treats the official city-level percentages as point estimates without explicitly propagating survey sampling uncertainty through calibration or set-theoretic analysis. Future studies could combine resident evaluations with administrative, environmental, mobility and fiscal indicators to test whether similar configurations emerge across data types.

Third, the city is the unit of analysis. Aggregated values cannot establish that residents who evaluate a particular resource favourably are the same individuals who report higher city satisfaction, and city averages can conceal substantial within-city heterogeneity. Multilevel or subgroup analyses could examine how city-level configurations intersect with differences across age, income, education or neighbourhood while avoiding ecological inference from aggregate results (Robinson, 2009).

Fourth, the configurational findings depend on the calibration anchors, truth-table thresholds and available empirical diversity. With six conditions, 64 truth-table configurations are logically possible, but only 31 were empirically observed. Applying the two-case frequency threshold retained 66 cities in rows eligible for Boolean minimisation. Although 23 robustness specifications examined alternative analytical choices, they cannot fully resolve limited empirical diversity or establish that identical solutions would emerge in other samples. The NCA results have a related limitation: the CE-FDH bottlenecks describe sample-based upper-bound patterns, not universal minimum resource requirements or estimates of intervention effects.

Finally, the six-condition framework is deliberately bounded. The deviant cases show that the identified solutions do not exhaust all HCS or ~ HCS cases, but they cannot determine whether uncovered cases reflect other combinations within the existing condition space or omitted contextual factors. The HCS solution coverage of .690 and the C4 raw coverage of .400 further indicate that the identified configurations account for only part of the respective outcome-set memberships. Future research could examine theoretically justified additions such as housing affordability, employment opportunity or objective environmental performance. Comparative applications to other European and non-European cities would also be useful for establishing which configurational patterns travel across institutional and regional contexts.

Declarations

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Competing interests

The authors declare no competing interests.

Data availability

The study uses the publicly available city-level aggregate dataset from the 2023 Perception Survey on the Quality of Life in European Cities, revised on 18 September 2024. The dataset and survey documentation are available from the European Commission’s Directorate-General for Regional and Urban Policy at:

https://ec.europa.eu/regional_policy/information-sources/publications/reports/2023/quality-of-life-in-european-cities_en.

Ethics declaration

No additional ethical approval or informed consent was required for this secondary analysis of publicly available city-level aggregate data.

Author contributions

The authors jointly developed the study conception and theoretical framing. Jinguang Liu conducted the data preparation and formal analyses and prepared the initial manuscript. Yue Xiao contributed to validation, supervision, interpretation and substantive revision. Both authors reviewed and approved the final manuscript.

AI usage statement

During the preparation of this work the authors used Gemini and ChatGPT in order to to assist with translation from Chinese-language drafts, editorial restructuring, terminology checks and English-language refinement. They were not used to generate or alter the source data, construct definitions, calibration anchors, analytical decisions, software outputs or numerical results. All references, interpretations and final wording were checked and approved by the authors, who take responsibility for the content of the manuscript.

References

1. Ager A, Strang A (2008) Understanding integration: A conceptual framework. J Refugee Stud 21:166
2. Amerian M (2024) Identifying the impact of social capital on quality of urban life (evidence from Iran). Soc Indic Res 171(3):921–936
3. Ballas D (2013) What makes a 'happy city'? *Cities*, *32*, S39–S50
4. Cummins RA (2000) Objective and subjective quality of life: An interactive model. Soc Indic Res 52(1):55–72
5. De Dominicis L, Berlingieri F, D'Hombres B, Gentile C, Mauri C, Stepanova E, Pontarollo N (2023) Report on the Quality of life in European cities, 2023. Publications Office of the European Union
6. Delhey J, Newton K, Welzel C (2011) How general is trust in most people? Solving the radius of trust problem. Am Sociol Rev 76(5):786–807
7. Dempsey N, Bramley G, Power S, Brown C (2011) The social dimension of sustainable development: Defining urban social sustainability. Sustain Dev 19(5):289–300
8. Diamantopoulos A, Winklhofer HM (2001) Index construction with formative indicators: An alternative to scale development. J Mark Res 38(2):269–277
9. Diener E, Emmons RA, Larsen RJ, Griffin S (1985) The satisfaction with life scale. J Pers Assess 49(1):71–75
10. Diener E, Suh E (1997) Measuring quality of life: Economic, social, and subjective indicators. Soc Indic Res 40(1):189–216

11. Dul J (2016) Necessary condition analysis (NCA) logic and methodology of necessary but not sufficient causality. Organizational Res methods 19(1):10–52
12. Dul J, Van der Laan E, Kuik R (2020) A statistical significance test for necessary condition analysis. Organizational Res methods 23(2):385–395
13. Fiss PC (2011) Building better causal theories: A fuzzy set approach to typologies in organization research. Acad Manag J 54(2):393–420
14. Furnari S, Crilly D, Misangyi VF, Greckhamer T, Fiss PC, Aguilera RV (2021) Capturing causal complexity: Heuristics for configurational theorizing. Acad Manage Rev 46(4):778–799
15. Geremew YM, Huang W-J, Hung K (2024) Fuzzy-set qualitative comparative analysis as a mixed-method and analysis technique: a comprehensive systematic review. J Travel Res 63(1):3–26
16. Greckhamer T, Furnari S, Fiss PC, Aguilera RV (2018) Studying configurations with qualitative comparative analysis: Best practices in strategy and organization research. Strategic Organ 16(4):482–495
17. Helliwell JF, Putnam RD (2004) The social context of well-being. Philosophical Trans Royal Soc B: Biol Sci 359(1449):1435
18. Heraud J-A, Nguyen-Van P, Pham TKC (2023) Public services, environmental quality and subjective well-being in a European city: the case of Strasbourg metropolitan area. Fulbright Rev Econ Policy 3(2):87–110
19. James O (2009) Evaluating the expectations disconfirmation and expectations anchoring approaches to citizen satisfaction with local public services. J Public Adm Res Theor 19(1):107–123
20. Lenzi C, Perucca G (2018) Are urbanized areas source of life satisfaction? Evidence from EU regions. Papers Reg Sci 97:S105–S122
21. Lorenc T, Petticrew M, Whitehead M, Neary D, Clayton S, Wright K, Thomson H, Cummins S, Sowden A, Renton A (2013) Fear of crime and the environment: systematic review of UK qualitative evidence. BMC Public Health 13(1):496
22. Marans RW, Stimson RJ (2011) Investigating quality of urban life: Theory, methods, and empirical research, vol 45. Springer Science & Business Media
23. McCrea R, Shyy T-K, Stimson R (2006) What is the strength of the link between objective and subjective indicators of urban quality of life? Appl Res Qual life 1(1):79–96
24. Mouratidis K (2021) Urban planning and quality of life: A review of pathways linking the built environment to subjective well-being. Cities 115:103229
25. Mouratidis K, Yiannakou A (2022) What makes cities livable? Determinants of neighborhood satisfaction and neighborhood happiness in different contexts. Land use policy 112:105855
26. Moynihan D, Herd P, Harvey H (2015) Administrative burden: Learning, psychological, and compliance costs in citizen-state interactions. J Public Adm Res Theor 25(1):43–69

27. Nicolás-Martínez C, Pérez-Cárceles MC, Riquelme-Perea PJ, Verde-Martín CM (2024) Are Cities Decisive for Life Satisfaction? A Structural Equation Model for the European Population: CN Martínez. Soc Indic Res 174(3):1025–1051
28. Oana I-E, Schneider CQ (2024) A robustness test protocol for applied QCA: theory and R software application. Sociol Methods Res 53(1):57–88
29. Ochoa-Rico MS, Río JAJ-d, Romero-Subia JF, Vergara-Romero A (2024) Study of citizen satisfaction in rural versus urban areas in public services: Perspective of a multi-group analysis. Soc Indic Res 171(1):87–110
30. Okulicz-Kozaryn A, Valente RR (2019) Livability and subjective well-being across European cities. Appl Res Qual life 14(1):197–220
31. Pacione M (2003) Urban environmental quality and human wellbeing—a social geographical perspective. Landsc urban Plann 65(1–2):19–30
32. Pappas IO, Woodside AG (2021) Fuzzy-set qualitative comparative analysis (fsQCA): guidelines for research practice in information systems and marketing. Int J Inf Manag 58:102310
33. Podsakoff PM, MacKenzie SB, Lee J-Y, Podsakoff NP (2003) Common method biases in behavioral research: a critical review of the literature and recommended remedies. J Appl Psychol 88(5):879
34. Răducan R, Lozsa J, Vîrga D, Matichescu M, Răducan et al (2025) Soc Indic Res, 179(2), 895–921
35. Ragin CC (2006) Set relations in social research: Evaluating their consistency and coverage. Political Anal 14(3):291–310
36. Ragin CC (2009) Redesigning social inquiry: Fuzzy sets and beyond. University of Chicago Press
37. Rasoolimanesh SM (2026) Applying fsQCA, NCA and NConfA in tourism research. Annals Tourism Res 116:104069
38. Robinson WS (2009) Ecological correlations and the behavior of individuals. Int J Epidemiol 38(2):337–341
39. Rüger H, Hoherz S, Schneider NF, Fliege H, Bellinger MM, Wiernik BM (2023) The effects of urban living conditions on subjective well-being: The case of German foreign service employees. Appl Res Qual life 18(4):1939–1963
40. Samavati S, Veenhoven R (2024) Happiness in urban environments: what we know and don’t know yet: Samavati and Veenhoven. J Housing Built Environ 39(3):1649–1707
41. Schneider CQ, Rohlfing I (2013) Combining QCA and process tracing in set-theoretic multi-method research. Sociol Methods Res 42(4):559–597
42. Schneider CQ, Wagemann C (2012) Set-theoretic methods for the social sciences, vol 10. Cambridge University Press, Cambridge
43. Sirgy MJ (2012) Consequences of hedonic well-being, life satisfaction, and eudaimonia. The Psychology of Quality of Life: Hedonic Well-Being, Life Satisfaction, and Eudaimonia. Springer, pp 45–60

44. Sirgy MJ, Cornwell T (2002) How neighborhood features affect quality of life. Soc Indic Res 59(1):79–114
45. Takano T, Morita H, Nakamura S, Togawa T, Kachi N, Kato H, Hayashi Y (2023) Evaluating the quality of life for sustainable urban development. Cities 142:104561
46. Tran CTTD, Dollery B (2023) Administrative intensity and local resident satisfaction in Victorian local government. Public Adm 101(1):318–334
47. Valentine G (2008) Living with difference: Reflections on geographies of encounter. Prog Hum Geogr 32(3):323–337
48. Van Ryzin GG (2004) Expectations, performance, and citizen satisfaction with urban services. J Policy Anal Manag 23(3):433–448
49. Vis B, Dul J (2018) Analyzing relationships of necessity not just in kind but also in degree: Complementing fsQCA with NCA. Sociol Methods Res 47(4):872–899
50. Węziak-Białowolska D (2016) Quality of life in cities–Empirical evidence in comparative European perspective. Cities 58:87–96
51. Zhang Y, Moreira T, Wistow J (2026) Mobilities, social ties, and quality of life in the digital society: A configurational approach. J Transp Health 50:102373

Figures

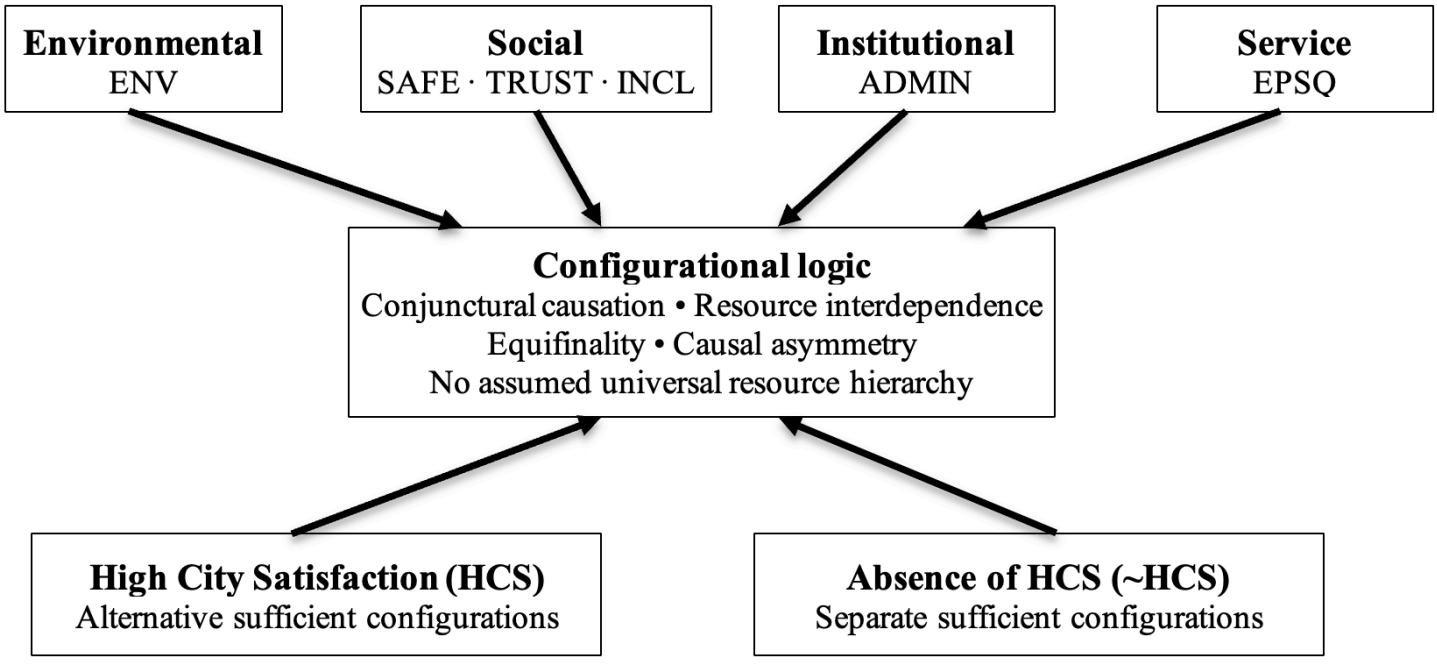


Figure 1

Configurational framework for High City Satisfaction and its absence

Supplementary Files

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