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## Article

# Assessing Quality of Life and Walkability for Urban Regeneration: The Piave Neighbourhood in Mestre-Venice

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**Abstract:** Urban regeneration works on the tangible and intangible assets of a city or part of a city. The research aimed at formulating an assessment methodology that allows for the simultaneous consideration of the tangible and intangible aspects that constitute the qualities of a part of a city. The theoretical frame of reference identifies conceptual frameworks to guide the assessment. Quality of life (QOL) and walkability (W) are chosen as the intangible and tangible dimensions, respectively. The methodology designed had to take summary variables into account for tangible elements. Similarly, walkability was summarised in complex variables carried over to observable and measurable variables. Finally, the QOL and W variables are considered in their dialectical and dynamic relationship. The statistical tools used to assess quality of life and walkability were different. The assessment of QOL and walkability was carried out using the tool of confirmatory factor analysis (CFA), which can estimate latent variables from observed variables. The interaction between the variables was investigated using structural equation modelling (SEM). The sample surveyed to investigate the quality of the Piave neighbourhood, in the mainland part of the city of Venice, consists of 169 people. The results of the models highlight the relevance of the method used, given the satisfactory statistical indexes obtained. The results are also relevant from an empirical point of view. The study highlights the fact that the significant quality of the space that ensures high levels of accessibility is far from being matched by the quality of social relations, deemed problematic by the majority of those interviewed.

**Keywords:** CFA; SEM; walkability; QOL; urban regeneration

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## 1. Introduction: Assessing Urban Regeneration: The Quality of Life and Walkability Categories

The urban agenda has changed dramatically in recent years. The phase of expansive growth has given way to a new phase in which the issue of regeneration is paramount [1–10]. The nature of the concept of urban and territorial regeneration is considered an action aimed at transforming the tangible and intangible components of cities and territories, based on a reading of the urban phenomenon as a complex interweaving of spatial and socio-economic aspects [11–14]. The concept of urban regeneration encompasses more than just renewal activities. As a comprehensive development process, the term “urban regeneration” includes not only renewal activity—which focuses primarily on physical change—but should also be applied to social and economic contexts [4,15]. Urban regeneration increases urban prosperity and quality of life by bringing underused assets back into use and redistributing opportunities, ensuring accessibility to services, affordability, and community involvement to support local economic development [16,17].

Public space is an essential component of these interventions [16]. This means that regeneration action must focus on aspects related to the physical qualities of infrastructure, collective facilities and private heritage, as well as the intangible aspects of community life related to its integration and cohesion. This “comprehensive and integrated vision and

action [...] leads to the resolution of urban problems and [...] seeks to bring about a lasting improvement in the economic, physical, social and environmental condition of an area that has been subject to change" [17].

The regeneration of cities and neighbourhoods takes on these multiple dimensions in a continuous and integrated way, within the general objectives of sustainability and circularity of development [9,15,18–22].

Urban regeneration needs to be based on rigorous methodological frameworks that can balance the interests of conservation, economic development, urban quality and community wellbeing [23]. To support decision making, the multicriteria approach is considered a traditional method of decision analysis [24–27].

Nevertheless, drawing up a programme of interventions and actions, and thus a framework of priorities, requires the ability to identify the difficulties facing a city or one of its neighbourhoods, and to recognise whether they are caused by deficiencies in physical resources, whether they relate to social issues, or to the problematic nature of the interaction between the two components involved [28,29].

The research aims to establish a link between the physical characteristics of urban areas and their social issues. This link is the first of five overarching themes that Roberts identifies as the primary objectives of urban regeneration. The assessment should take into account both the tangible and intangible aspects of the urban area [13,15–17,30].

To do so involves solving two nodes. The first concerns the formulation of solid conceptual frameworks for identifying the tangible and intangible characteristics that constitute the qualities, positive or negative, of a neighbourhood. The second concerns the consequent formulation of adequate evaluation tools that allow the measurement of these same qualities in order to provide a representation of the criticalities and opportunities of a city or neighbourhood.

The topic of the intangible assets available to a city has been the subject of numerous economic and social studies [31–34]. The concepts of social capital, well-being and quality of life are at the centre of a lively debate [35,36]. In all cases, the aim is to consider the quality of objective and subjective individual conditions and collective relations from the perspective of the individual and the community.

Among the diverse conceptual formulations, the one that is most consistent with the objectives of this study is that of quality of life (QOL). The study of the dimensions of the concept of quality of life implies the consideration of the state of personal satisfaction in relation to primary and secondary needs, referring to the biological, psychological and social components of the individual [37,38].

The concept of quality of life can be further articulated along two dimensions. The first, related to tangible and objective aspects, implies a quantitative assessment of the well-being of a society in relation to the given cultural, social and environmental context. The objective of the assessment is often dependent on administrative programmes, where it is necessary to assess a social phenomenon in order to determine budgets for basic social needs, as in the case of policies on the right to education or the right to housing. Such assessments often focus on indicators such as per capita income, which makes it possible to determine the number of people living in poverty, or the number of schoolchildren in relation to the total population, which makes it possible to assess access to education.

The second, on the other hand, is intangible and takes into account the perspectives of individuals and their life experiences [39]. This dimension shifts the focus to the individual, psychological and emotional aspects of the concept of quality of life, based on a subjective assessment of one's living conditions [38,40].

QOL is thus an analytical category that summarises an assessment of the objective and subjective state of the individual within a specific local context: "it is a broad ranging concept affected in a complex way by the person's physical health, psychological state, personal beliefs, social relationships and their relationship to salient features of their environment" [38].

The nature and quality of tangible assets are also the subject of a rich and structured scientific production. The assets that make up spatial welfare are the subject of comprehensive administrative inventories and can be objectively measured [41–43]. However, the effort here is less about measuring the individual elements that make up the stock of public and private property available to a community and more about its functionality in relation to more general sustainable development goals.

The choice of an appropriate conceptual framework must take into account the need for an integrated view of the development of the physical aspects of space. Among the various options in this regard, the possibility of conceptually organising the tangible resources of a neighbourhood in relation to the concept of walkability is important. In the urban context, the notion of quality of life merges with that of a liveable environment [44,45], which focuses on urban design qualities promoting social interaction, liveliness, walkability and sustainability [46,47].

Although it has not been comprehensively defined scientifically [48], walkability is interpreted in the scientific literature as the readiness of the physical environment to be walked and is therefore considered an essential requirement for urban living [49,50].

Two dimensions distinguish walkability. The first is objective. The presence of urban amenities in a given space makes it possible to walk or cycle around and enjoy the opportunities that the neighbourhood offers [51,52]. The ability of people to reach specific destinations on foot is then assessed in terms of accessibility [53–55]. In such a case, the concept relates to proximity, the geometric distance to specific destinations [51], and is also connected to the density of the urban development [56,57].

The second dimension is subjective and relates to how individuals feel when they move their bodies in space. The shape of space and the articulation of functions are considered determinants of the choice of mobility mode [56–58], as they influence the perception of the space in which people move. This can have the effect of either incentivising or devaluing the experience [59–61], respectively, promoting the possibilities or limitations of experiencing the space, which is more or less capable of providing new opportunities for encounters and social relationships [62–65]. The quantity and quality of access to opportunities offered by the city consequently affect people's overall well-being [66–68].

The concept of walkability is therefore consistent with the theoretical framework of this research for several reasons. Firstly, the category of walkability epitomises the goal of sustainable cities in tangible aspects of collective life. Secondly, it holds infrastructure and collective facilities together by configuring their systemic interaction, thus avoiding an analytical examination of them, which is as precise in its individual parts as it is ineffective in the overall rendering of the tangible quality of a neighbourhood. Finally, it allows them to be assessed using indicators and methods, which are then critically compared in public debate [69].

The assessment of the opportunities and difficulties of a neighbourhood in terms of its regeneration can thus be based on a robust conceptual framework. For the reasons outlined above, the concepts and categories developed around QOL and walkability provide the basis for developing an assessment of the strengths and weaknesses of a neighbourhood in terms of its regeneration.

## **2. Materials and Methods: A Methodological Proposal for Assessing the Quality of Life and Walkability of the Piave Neighbourhood in Mestre-Venice**

### *2.1. Methodology Used: Factor Analysis and Structural Equation Modelling*

The purpose of this section is to present the functional tools for assessing the tangible and intangible aspects of a city or neighbourhood. The methodology must be able to resolve several critical aspects. The first relates to the subjectivity of the assessment of QOL based on citizens' experiences [70,71].

QOL is a synthesis of a more comprehensive assessment of complex variables such as the quality of the relationship with family and the community, the relationship with work

and with the environment [38]. These variables need to be based on facts and measurable elements. This allows assessments to be based on tangible elements.

Similarly, walkability is a complex variable that summarises a broader set of elements, such as the quality of public spaces, the presence of green spaces and safe pavements [68]. Again, these aspects can be further broken down into elements that can support and articulate the summary assessment.

Finally, the methodology must be able to relate the complex variables under study to represent their dynamic interaction. If space and society are connected, then the methodology should necessarily connect the dimensions of QOL and walkability to verify if and how they are related [69].

To evaluate the QOL and walkability of a neighbourhood, confirmatory factor analysis (CFA) is used as a tool [72]. Factor analysis aims at estimating latent variables from surveyed variables [72], making it an appropriate method for examining perceived quality of life and walkability.

Confirmatory rather than exploratory factor analysis was chosen. This is because the theoretical assumptions of the research are clear and defined. The study does not aim at aggregating variables for the sake of simplicity. Instead, it proposes a guided reconciliation of multiple aspects into broader variables.

CFA facilitates the construction of a latent factor measurement model combining observed variables [72]. Each element, which does not overlap conceptually with others, defines a single latent factor [73,74].

Lastly, the study examines the correlation between variables and their associated impacts by utilising the structural equation model (SEM). SEM was introduced by Sewall Wright in 1934. It is one of the latest methods in multivariate data analysis [75,76].

The tool has evolved from a methodology known as “causal modelling” [77–79]. SEM enables the modelling of the relationships between latent factors based on a priori hypotheses. The path diagram, which is composed of causal links [80], represents the causal model of the hypothesis tested quantitatively, with the margin of error being verified [81,82].

The assessment of goodness of fit involves the examination of several indices, including the comparative fit index (CFI) and the root mean square error of approximation (RMSEA) [83,84].

The CFI ranges from 0 to 1, where a score of 0 suggests inadequate model adaptation and a score of 1 indicates excellent fit [85]. Values above 0.90 are deemed satisfactory from a statistical viewpoint [86]. However, the second index considers all positive values, but it sets the maximum threshold at which the model is considered valid at 0.06 [83].

Once the overall reliability of the model has been evaluated, it is crucial to examine the statistical significance of the connections that bind the components of the framework. Pearson’s correlation coefficient is useful for examining linear relationships. To be considered reliable, the  $p$ -value associated with the calculated correlation must be less than 0.5. Values less than 0.001 are indicative of the highest-quality correlations [87].

## 2.2. Field of Investigation and Characteristics of the Questionnaire

The Piave district, located on the mainland of Venice, has been a challenging area for several years. Part of the municipality of Mestre-Carpenedo covers an area of approximately 1.5 square kilometres and has a population of 21,146 (Municipality of Venice, Statistics on Municipal Registry Data, years 2021 and 2022).

Over the last few decades, the ethnic composition of the neighbourhood has undergone significant changes. Part of the original population has moved out of the area. This has given way to new, predominantly Asian, communities. As a result, the businesses have changed significantly.

The difficulties in public safety and sociability [88–92] compelled the authorities to designate the district as a pilot site for examining the proposed methodology. The area is served by a railway station, which increases its connectivity to other neighbouring towns

and the nation. Unfortunately, the area is also a hub for drug trafficking, which has a significant impact on residents' confidence and overall standard of living.

The initial phase of the research focused on obtaining assessments of quality of life and walkability through a semi-structured questionnaire (see Table 1).

**Table 1.** Survey topics.

Topics	Indicators
Queries regarding the socio-demographic delineation of the sample	Age, years of residence, gender, nationality, religion, education, school attendance, work, physical activity, lifestyle (total walking time), income
Subjective assessments of QOL	Physical health, mental health, lifestyle and degree of physical activity, job satisfaction, work flexibility (time and place), appreciation of the work environment, work–life balance, work productivity, time spent with the family, activities carried out together with family members, relationship with family members linked to the care dimension, social relations of the neighbours, differentiation of the neighbours by age and ethnicity, involvement in community activities, overall appreciation of the neighbourhood, social context and relationships, attachment to place
Subjective assessments of Walkability	Pedestrian accessibility to the workplace, pedestrian accessibility to the school, pedestrian accessibility to the hospital, pedestrian accessibility to places for sports activities, pedestrian accessibility to community places, pedestrian accessibility to places of leisure, pedestrian accessibility to essential services, pedestrian accessibility to complementary services, choice of means of transport, Journey times, perception of safety, comfort linked to the functionality of the space, appreciation of the mobility experience

The 233 participants provided their responses using a Likert scale with seven rating options, ranging from 1 (negative) to 7 (positive), including an intermediate point of 4 (neutral), to provide the required variability for subsequent model implementation [93].

The selected QOL indicators indicate their satisfaction with their private and public spheres (see Table 2).

They relate to personal health (physical and mental health, lifestyle and degree of physical activity), the working environment (concerning the position held, personal productivity, flexibility and work–life balance), social relations and general satisfaction with the neighbourhood.

The social relations indicators are classified into two categories: those associated with family activities and those associated with the community, which mainly consider the diversity of the neighbours in terms of age and origin [94].

The walkability indicators presented in Table 3 refer to the accessibility of the neighbourhood's streets, assessed in terms of daily activities, and the quality of the neighbourhood's streets, which refers to an overall spatial perception. The walkability of a neighbourhood is related to the distance between places [68] and the density of urban development [56,95] and assesses the possibility of walking to the places where daily activities take place. These include education, health services, exercise, leisure and other community activities.

The assessment of street quality within the neighbourhood is also measured by the level of satisfaction with the design of the physical environment. Safety, comfort, and pleasantness have been identified as the three primary indicators.

**Table 2.** QOL items.

Factors	Items
Health	How would you rate your physical health? How would you rate your mental health? Do you lead an active lifestyle?
Work	How satisfied are you with your job? Can you choose working time flexibly? Can you choose workplaces flexibly? Are you satisfied with the working environment? Do you feel productive in your work?
Family	Do you spend time with your family? Are you involved in family activities? Do you care for each other in the family?
Community	Do you talk to your neighbours often? Are your neighbours different in age? Are your neighbours different by nationality? Do you often engage in community activities?
Neighbourhood	Do you like your neighbourhood? Are you satisfied with the social environment of your neighbourhood? Will you stay in your neighbourhood?

**Table 3.** Walkability items.

Factors	Items
Accessibility	Are the places where you work accessible on foot? Is the school accessible on foot? Is the hospital accessible on foot? Is the place where you can practise sports accessible on foot? Are community activities accessible on foot? Are the places you frequent in your free time accessible on foot? Are the shops accessible on foot? Are the services accessible on foot?
Spatial perception	Are the streets of the neighbourhood safe for walking? Are the pavements of the neighbourhood comfortable? Do you like to walk along the streets of the neighbourhood?

### 2.3. Data Collection

The questionnaire was created using Google Forms, an online form-creation tool. The interview is distributed and promoted through social media platforms (CAWI, computer-assisted web interview). To address selection bias, we conducted a face-to-face interview campaign using the PAPI (paper and pencil Interview) method. This approach enabled us to include people who were excluded from the first methodology.

The questionnaire was conducted among residents from 4 December 2022 until 15 January 2023. The CAWI method obtained 125 valid responses through automated compilation. This method made data collection simple and required fewer resources.

The data collection campaign was integrated with three days of PAPI surveys to limit self-selection bias among respondents. Forty-four of the 54 face-to-face interviews resulted in the identification of valid cases. The total number of registered cases amounts to 169 valid interviews (see Table 4).

### 2.4. Data Analysis

The survey results include three distinct clusters of variables: Sociographic variables for profiling participants, QOL indicators, and walkability indicators. The latter are the variables that reflect these factors and therefore constitute the basic elements on which to build the models [69].

**Table 4.** Interview.

Method	Interviews Acquired	Valid Responses
Computer-assisted web interview (CAWI)	179	125
Paper and pencil interview (PAPI)	54	44
Both	233	169

The measurement model and the causal model rely on data acquired about the components of QOL and walkability. IBM SPSS Amos 26.0, in its default configuration [96], facilitated the processing of the data using CFA and SEM. This software is one of the most widely used computational tools in multivariate analysis [82].

### 3. Results: The Results of the Factor Analysis and the Structural Equation Model

#### 3.1. Descriptive Statistics

The sample queried, heterogeneous in terms of age and characteristics, shows cohesion in formulating values regarding their living conditions and the space they live in. In particular, the analyses reveal a partially problematic framework, mainly related to the social aspects of the neighbourhood and the public space. This situation seems to be balanced by an assessment of the private aspects of life that are essentially solid and satisfactory.

The sample consisted of 101 women (59.8%) and 68 men (40.2%). The average age of the respondents was 50 years, ranging from 11 to 88 years. Almost all the respondents were of Italian nationality (97.6%). Taking into consideration the resident population of the neighbourhood, only 62% of the population of the neighbourhood is actually of Italian nationality. This creates a distortion that needs to be taken into account. 65.1% of the respondents (110 cases) declared themselves to be Catholic.

The data on the educational level of the respondents deserves further investigation. Statistics show that 53.8% of the respondents have a university degree or equivalent (91 cases), compared to a regional percentage of 9.92%. Those in the sample with a high school diploma are 35.5% (60 cases), in line with the regional statistics, and only 10.7% have a lower level of education (18 cases), whereas in the Veneto Region, the percentage of the population with a similar level of education is almost 60%. The differences can be tentatively attributed to two reasons: the first is related to the higher level of education of the urban population, and the second to a possible self-selection process of the better educated to present themselves in public and participate in the survey.

A limited proportion of the sample—11.8%—attend school. As a result, only 20 respondents completed this section by answering the questions about the time it takes to get to school and the means of transport used.

On the other hand, the majority of the respondents are employed (67.5%); the section on this class contains 114 questionnaires.

Regarding active lifestyle habits, 78.1% walk more than 30 min a day, 44.4% are active in sports and 72.8% choose to walk or cycle for their daily journeys.

The sociographic characteristics of the participants, as described in the frequency analysis in Appendix A, are considered a fundamental aspect in determining preferences and assessments. Therefore, the interpretation of the results takes into account the description of the sample.

Descriptive statistics on quality of life and walkability are shown in Tables 5 and 6, with evidence of negative average scores. The survey on quality of life, shown in Table 5, highlights positive assessments for aspects connected to the personal sphere, related health (from V1 to V3), working life (from V4 to V8)—although the latter is on average inflexible in terms of time and place (variable V5)—and family life (from V9 to V11).



**Table 5.** QOL descriptive statistics.

Observed Variable	Average	sd
V1: Physical health	5.29	1.11
V2: Mental health	5.74	1.18
V3: Lifestyle and degree of physical activity	5.15	1.41
V4: Job satisfaction	5.59	1.14
V5: Work flexibility (time and place)	3.32	1.94
V6: Appreciation of the work environment	5.25	1.39
V7: Work–life balance	4.75	1.49
V8: Work productivity	5.90	1.00
V9: Time spent with the family	5.54	4.40
V10: Activities carried out together with family members	5.32	1.74
V11: Relationship with family members linked to the care dimension	6.07	1.24
V12: Social relations of the neighbours	4.55	1.73
V13: Differentiation of the neighbours by age and ethnicity	4.45	1.50
V14: Involvement in community activities	2.92	1.98
V15: Overall appreciation of the neighbourhood	3.14	1.90
V16: Social context and relationships	2.37	1.58
V17: Attachment to place	4.66	2.13

7-point Likert scale: 0 (negative) to 7 (positive), 4 neutral value.

**Table 6.** Walkability descriptive statistics.

Observed Variable	Average	sd
V18: Perception of safety in the space	2.27	1.42
V19: Comfort linked to the functionality of the space	3.60	1.70
V20: Appreciation of the experience linked to active mobility	3.41	2.05
V21: Pedestrian accessibility to community places	5.61	1.57
V22: Pedestrian accessibility to places of leisure	5.53	1.66
V23: Pedestrian accessibility to essential services	6.07	1.44
V24: Pedestrian accessibility to complementary services	5.70	1.72
V25: Pedestrian accessibility to the hospital and healthcare facilities	2.04	1.64
V26: Pedestrian accessibility to schools and educational institutions	4.30	2.85
V27: Pedestrian accessibility to the workplace	4.53	2.51
V28: Pedestrian accessibility to places for sports activities	4.82	2.49

7-point Likert scale: 0 (negative) to 7 (positive), 4 neutral value.

The statistics highlight a problematic situation concerning aspects of social life (from V12 to V14) and perceptions of the external environment of the neighbourhood (from V15 to V17). In particular, there is a low level of involvement in collective and community activities (V14), and the overall appreciation of the neighbourhood appears to be impaired (V15), with a negative assessment, particularly of the intangible aspects of the social environment (V16).

The observations on the overall appreciation of the neighbourhood (V15) and, in particular, of the social environment (V16) can be considered precise and accurate evaluations, which clearly show dissatisfaction with the state of the neighbourhood.

More specifically, observations on attachment to the place (V17), which we consider to be a summary variable of the respondent's relationship with this part of the city, can be linked in particular to long-standing roots in the neighbourhood. The average length of stay recorded is 27 years.

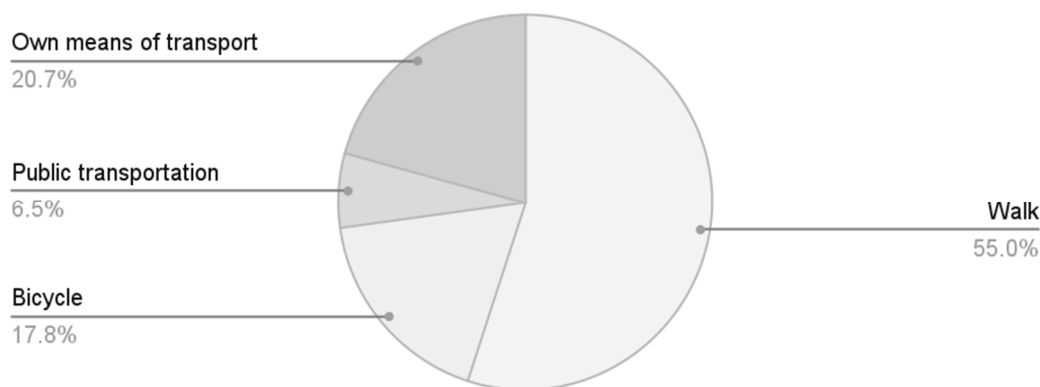
Concerning the assessment of the neighbourhood spaces, the survey presented in Table 6 highlights several important aspects. Negative assessments concern aspects related to the active experience in the space (from V18 to V20). In particular, respondents report a poor perception of safety (V18), coupled with a poor quality of mobility on foot or by bicycle (V20).

Concerning pedestrian accessibility (from V21 to V28), a distinction can be made between ratings for places of social interest (from V21 to V25) and places of personal interest (from V26 to V28). For the first group, the accessibility rating is on average positive. The survey shows positive ratings for the accessibility of places of community (V21), leisure (V22), essential (V23) and complementary (V24) services, with small standard deviations, a sign of uniformity in the distribution of values around the mean.

The only exception is the negative assessment of the accessibility of the hospital (V25). It has been relocated in a decentralised position near the city centre and is therefore difficult to reach on foot.

The accessibility of places of personal interest—places related to one’s education (V26), workplace (V27) and places dedicated to sports activities (V28)—is positive, although tending towards neutral. However, the standard deviation is more pronounced, a sign of greater heterogeneity in the assessments surveyed.

Concerning places of social interest, a relevant finding concerns the choice of transport mode. The assessment of accessibility is consistent with the results of the choice of means of transport used, as illustrated in Figure 1. Specifically, 72.8% of respondents walk or use a bicycle, compared to only 20.7% using their own motorised means of transport.



**Figure 1.** Modes of travel.

Of the places mainly reached by car or public transportation, the hospital, workplace and school cannot be reached on foot.

These results are consistent with the travel time data (Table 7). The average time taken to reach the hospital and places of education and work exceeds the time taken to cross the neighbourhood as a whole. This is 15 min, calculated from the pedestrian crossing of Via Piave, the central axis on which the neighbourhood is based.

**Table 7.** Travel time. Descriptive statistics.

	Average <sup>1</sup>	sd <sup>1</sup>
Travel time to community places	8	5
Travel time to places of leisure	13	13
Travel time to essential services	9	7
Travel time to complementary services	10	6
Travel time to hospitals and healthcare facilities	18	9
Travel time to schools and educational institutions	22	13
Travel time to the workplace	25	22
Travel time to places for sports activities	12	9

<sup>1</sup> [minutes].

Other places of social interest are within walking distance. The total travel time to reach essential and complementary services, places of leisure and places related to sports and community activities is less than 15 min (Table 7).

### 3.2. Measurement Model

The measurement model in Table 8 confirms the latent structure of the factors reflected in the described variables. The model also reveals the measurement drivers of the factors through the regression coefficients. In particular, the latent factors related to walkability provide a framework in which the variables related to community aspects play a predominant role. The use of collective resources and places of social interest are drivers of walkability.

**Table 8.** CFA results.

Measurement Model			
Latent Variable	Observed Variable	Coeff.	p-Value
Health	Physical health	0.55	-
	Mental health	0.44	**
	Lifestyle and degree of physical activity	0.40	**
Work	Job satisfaction	0.77	-
	Work flexibility (time and place)	0.36	**
	Appreciation of the work environment	0.85	**
	Work–life balance	0.52	**
	Work productivity	0.60	**
Family	Time spent with the family	0.82	-
	Activities carried out together with family members	0.79	**
	Relationship with family members linked to the care dimension	0.73	**
Community	Social relations of the neighbours	0.55	-
	Differentiation of the neighbours by age and ethnicity	0.40	**
	Involvement in community activities	0.64	**
Neighbourhood	Overall appreciation of the neighbourhood	0.80	-
	Social context and relationships	0.72	**
	Attachment to place	0.51	**
Accessibility	Pedestrian accessibility to places for sports activities	0.23	-
	Pedestrian accessibility to community places	0.92	*
	Pedestrian accessibility to places of leisure	0.72	*
	Pedestrian accessibility to essential services	0.23	*
	Pedestrian accessibility to complementary services	0.23	*
Spatial perception	Perception of safety	0.69	-
	Comfort linked to the functionality of the space	0.38	**
	Appreciation of the experience linked to active mobility	0.76	**

df: 248; CFI: 0.893; RMSEA: 0.052; \* p-value < 0.05; \*\* p-value < 0.001.

Concerning the factors of walkability, the proposed measurement model excludes the variables related to the pedestrian accessibility of the school attended, the workplaces and the hospital, which are considered to be outside the Piave neighbourhood. This is because the time it takes to reach these places can exceed 15 min, and they are reached mostly by motorised means.

The measurement model therefore shows sufficient goodness of fit indices to consider the structure valid. Specifically, the model has 248 degrees of freedom, the CFI is 0.893, close to 0.90, while the RMSEA is 0.052.

Once the substantive goodness of fit of the model has been verified, it is possible to consider the relationships in the hypothesised framework based on their statistical

significance. The benchmark is Pearson's linear correlation index. The  $p$ -value associated with all the linear relationships examined is less than 0.5. On the measurement model, it is then possible to read the standardised regression coefficients for each variable, from which we can identify the main variables that reflect each factor.

As far as the personal dimension of quality of life is concerned, the "health" factor mainly refers to the qualitative perception of one's physical health with a coefficient of 0.55, while the "work" factor is mainly measured by the appreciation of the work environment (0.85) and the satisfaction linked to the position held (0.77). The "family" factor, on the other hand, is mainly related to the time spent with family members (0.82) in shared activities (0.79).

Concerning social and public space, the "community" factor, an indicator of the quality of the neighbourhood's relational assets, depends on individual involvement in collective and community activities (0.64). The "neighbourhood" factor, on the other hand, is measured by the variables related to the overall appreciation of physical (0.80) and social (0.72) space.

The "accessibility" factor is reflected in particular in the observations on pedestrian accessibility to the community (0.92) and to places of leisure (0.72). Finally, as far as "spatial perception" is concerned, the most influential variables relate to the perception of safety (0.69) and the appreciation of the experience of active mobility (0.76).

The measurement model is also able to reveal correlations between latent factors, which are possible indicators of causal relationships. Table 9 shows the statistically valid correlations between the factors of walkability and QOL.

**Table 9.** CFA results—correlations.

Correlation	Coeff.	$p$ -Value
Work ↔ Health	0.538	**
Work ↔ Neighbourhood	0.259	*
Health ↔ Family	0.405	*
Family ↔ Community	0.311	*
Community ↔ Neighbourhood	0.593	**
Neighbourhood ↔ Spatial perception	1.047	**
Community ↔ Spatial perception	0.551	**
Health ↔ Spatial perception	0.400	*

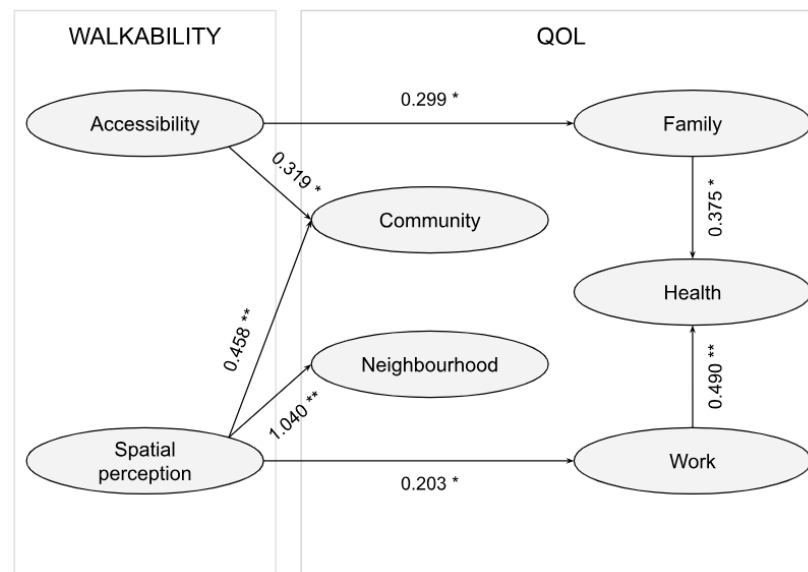
\*  $p$ -value < 0.05; \*\*  $p$ -value < 0.001.

The correlation value ranges from 0 to 1. However, in some cases, values above 1 can indicate the possibility that two latent factors are correlated due to the redundancy of observations [97]. In other words, the observed variables could theoretically contribute to the definition of both. This is the case for factors relating to aspects of the neighbourhood that are assessed from an overall assessment and experiential perspective.

The second most relevant covariance link, in addition to the one just mentioned, is between community and neighbourhood. The community is also related to the perception of space, while the latter is related to the perception of one's health, which in turn is related to the family environment.

### 3.3. Structural Model

Based on the correlation links highlighted in the measurement model, the analysis considered a plurality of structural models capable of explaining these links according to the results of the observations recorded by the statistical sample. Figure 2 shows the path diagram selected for its statistical robustness.



**Figure 2.** SEM results (\* *p*-value < 0.05; \*\* *p*-value < 0.001).

The model captures a plurality of relationships by integrating the interactions between the latent factors of walkability and those inherent in the QOL of the neighbourhood. In particular, the exogenous factors of walkability are considered to be causal to those inherent in the QOL. The arrows indicating direct causal relationships are unidirectional. The direction of the arrow indicates the QOL factors on which the effect of the walkability factors is measured.

The relationships thus constructed are validated by some diagnostic indices. The CFI is 0.889, while the RMSEA is 0.053. The model is therefore quite reliable. Table 10 shows the SEM results with the standardised coefficients and their statistical significance (*p*-value).

**Table 10.** SEM results.

Structural Model			
Dependent Variable	Explanatory Variable	Coeff.	<i>p</i> -Value
Health	Family	0.375	*
	Work	0.490	**
Work	Spatial perception	0.203	*
Family	Pedestrian accessibility	0.299	*
Community	Pedestrian accessibility	0.319	*
	Spatial perception	0.458	**
Neighbourhood	Spatial perception	1.040	**

CFI: 0.889; RMSEA: 0.053; \* *p*-value < 0.05; \*\* *p*-value < 0.001.

The results delineate a dynamic and plural framework in which the subjective and objective dimensions are integrated into an assessment that concerns tangible and intangible aspects, as well as personal and collective ones. A positive assessment of the personal dimension of life, which is influenced by spatial factors in its logistical and organisational aspects, contrasts with a less favourable assessment of social and collective life. The latter does not seem to affect the quality of private life but rather constitutes a problematic element in the value-creating aspects resulting from the quality of collective infrastructure and facilities.

The positive assessment of the private sphere derives from the assessment of personal health, family life and working life. Family life, which includes a dimension of care and reciprocity, and work life, which is given by the appreciation of the environment and the position held, have a positive influence on the perception of one’s health, both physical and mental (0.375 and 0.490, respectively).

The path shown in the right part of Figure 2 is directly influenced by the assessment of the active experience of urban space. On the one hand, the accessibility of places has a positive impact on the family environment (0.299). Specifically, the pedestrian accessibility of social places influences life within the domestic context, favouring the sharing of time and activities between members of the family. On the other hand, the subjective assessment of one's own experience in the neighbourhood affects working life, although this relationship is less intense (0.203). The objective and subjective evaluation of the exogenous dimension of space has a significant impact on aspects related to the private dimension of life, directly in terms of family and working life and indirectly in terms of personal health.

The social and public dimension of life is instead isolated in the centre of the path diagram in Figure 2. Relational and social assets, measured by the "community" and "neighbourhood" factors of QOL, have no causal links to the latent factors of the private sphere. Physical and mental health do not depend in this case on social relationships.

Instead, it is the aspects related to subjective and objective spatial perception that influence the assessment of the neighbourhood's relational assets. In particular, the accessibility of places influences the evaluation of community life (0.319). The objective assessment of the space in terms of the feasibility of walking to social places influences involvement in community activities.

The subjective evaluation of one's own experience of urban space also influences the overall evaluation of community life (0.458). The drivers of spatial perception in this case are the perception of safety and the overall appreciation of the active experience of the space. These are the basis for community involvement as a voluntary choice of aggregation.

The overall appreciation of the neighbourhood and social context is also a function of a subjective evaluation of the urban space. In this case, the presence of a regression coefficient higher than one (1.040) should again be highlighted. For this reason, the hypothesis of a redundancy of measurements is renewed. The experience of space is linked to an overall appreciation of the neighbourhood. This highlights the importance of spatial and public aspects in the choices related to everyday life.

All the relationships identified between walkability factors, exogenous factors, and quality of life factors, endogenous factors, indicate direct proportional relationships.

#### 4. Discussion

The results obtained first show the relevance of the method used. The dimensions of the subjective assessment of life experience are read through the CFA, and their values are based on statistically valid surveys (Table 8). Similarly, the assessment of the quality of space is made thanks to assessments that reflect the nature and quality of the urban opportunities of the neighbourhood.

The use of SEM then makes it possible to relate the assessment of the quality of the space to the dimensions that contribute to the QOL [69] (Table 10). The model previously analysed reproduces the dialectic between the opportunities that the space of the neighbourhood offers to its inhabitants and the results that these opportunities determine, with satisfactory results from a statistical point of view.

The tangible and intangible dimensions of the quality of life in a neighbourhood can therefore be linked by examining the direction and intensity of the relationships highlighted in the model (Figure 2). From a methodological point of view, therefore, the results confirm the potential of CFA and SEM by providing research and a set of tools with some opportunities that this study helps to highlight.

The quality of the CFA and SEM results is also empirical. Reading the results leads to important judgements about QOL and space design in relation to walkability because the results are from a model and variables that consider interactions that are not apparent a priori.

It is useful to consider this point because the interpretations of the SEM can have a wider relevance than the individual case. In the case of the Piave neighbourhood, it is no surprise that accessibility to urban facilities improves the quality of life of families,

with indirect effects on health [98,99]. Indeed, private and family life is facilitated by the proximity of services, which allows for the efficient management of daily activities.

Working life is also influenced by a spatial context that is accessible on foot and by bicycle. Walkability increases work productivity by improving the perception of the living and working environment. These findings confirm those of other studies on this topic [68]. Family life, work life and the balance between the two therefore have a positive impact on perceptions of physical and mental health, which the model helps to delineate accurately (see the right part of Figure 2).

Faced with completely intuitive results from the perspective of the private domain of QOL, the measurement model highlights two problematic aspects. The first is the distinction between assessments of the private and social components of QOL, between assessments of the three factors “family”, “work” and “health” and the two factors “community” and “neighbourhood”. What happens outside the places where people live and work is judged harshly. The results express an unease about the nature and quality of the relationships maintained in the public space.

One element to be taken into account in relation to this last component of quality of life is an apparent discrepancy between the observed variables: Attachment to the neighbourhood and discomfort expressed in regard to the condition of the neighbourhood [100] (Table 5). On average, respondents have lived in the neighbourhood for a long time; the average is 27 years. Prolonged residence justifies an attachment that contradicts negative opinions expressed about the neighbourhood [101].

The second problem concerns the relationship between access to services (see the evaluation of items that measure the latent factor “accessibility”) and the evaluation of the collective dimension of the neighbourhood (see the evaluation of items that measure the latent factor “community”). The literature suggests a virtuous relationship between the two: a walkable city is in line with the development of the community [65].

Other authors [69,102] then highlighted that the quality of the public space, intended to support active mobility forms, is hierarchically more relevant than mere accessibility in the assessment of quality of life. The relevance of the perception of the quality and safety of the neighbourhood’s public space confirms the findings of Jane Jacobs [94].

The model reveals a paradox in the relationship between space and community. The former is characterised by a significant spatial quality that ensures a high level of accessibility for citizens. However, the quality of social relations is judged negatively in relation to a neighbourhood that is relatively well designed and can be adapted to the standards of the *15 min city* [103,104].

The cultural and ethnic transformation of the neighbourhood has therefore eroded the social capital of the community [105]. Drug trafficking has reduced the sense of security that citizens feel in public spaces. Indeed, the social environment can negatively affect the perception of the street, especially when the community is exclusive and threatening [106,107]. In the face of these phenomena, a high-quality public space and high accessibility to urban amenities seem to have little impact.

The collective life of the neighbourhood no longer nourishes urban capital. As the respondents’ answers show, low participation in collective life is linked to the loss of value of traditional institutions that have promoted trust and knowledge among residents (the church, political parties, labour unions). Other forms of social value creation are struggling to establish themselves.

The places intended for the community exist; they are accessible, but their capacity to create opportunities to meet and thus to create relational value is diminishing. The public space, under the current conditions, therefore, seems to discourage the use of spaces outside the home. The public space, rather than generating relations within the community, appears to be impoverished and unable to represent an opportunity for those who live in the neighbourhood. The lack of connection between physical landscapes and place meanings cuts across the wider physical, cultural and emotional context [108,109].

Private well-being and collective poverty are at odds because of intangible elements—trust, and recognition—which have pauperised the collective experience of public space. Space does not seem to count where security and dislocation are priorities, even if it is in line with the principles of active mobility and high accessibility to urban facilities.

The conclusions of the study call attention to their strengths in terms of policy. The overall reading of the territorial capital and its tangible and intangible components makes it possible to identify the components that are currently deteriorated and in difficulty. The relevance of the research model, capable of identifying latent variables and relating them to each other, is evident in the analysis of the case. It provides crucial references for the formulation of public policies aimed at the regeneration of the neighbourhood.

## 5. Conclusions

The research aimed at formulating an assessment methodology that allows the simultaneous consideration of the tangible and intangible aspects that define the qualities of a part of a city to represent its strengths and weaknesses. The theme is relevant both for the analysis and interpretation of the decline or success of a city or part of a city and for the formulation of policies capable of effectively promoting its regeneration.

The theoretical frame of reference first identifies conceptual frameworks to guide the assessment. Quality of life and walkability are chosen as the intangible and tangible dimensions, respectively.

The methodology designed for the assessment of quality of life had to take into account summary variables, such as the quality of family and community relations, which in turn can be traced back to facts and measurable elements that allow the assessment to be based on tangible elements. Similarly, walkability was summarised into complex variables related to observable and measurable variables. Finally, the variables of QOL and walkability should be considered in their dialectical and dynamic relationship.

Consequently, the assessment of quality of life and walkability was implemented using the tool of confirmatory factor analysis (CFA), which is capable of estimating latent variables from observed variables. The structural equation model (SEM) was used to study the interaction between the variables and the effects.

The sample surveyed to investigate the quality of the Piave neighbourhood, in the mainland part of the city of Venice, consisted of 169 people. The results of the models highlight the relevance of the method used, with more satisfactory statistical indexes both in the measurement model and in the structural model. In this way, the tangible and intangible dimensions of the quality of life in a neighbourhood can be related to each other by examining the direction and intensity of the relationships that the model highlights.

The results are also relevant from an empirical point of view. Indeed, the research highlights a paradox in the relationship between space and community. A significant quality of space, which guarantees a high level of accessibility and is oriented towards *15 min city* standards, is not at all matched by a significant quality of social relations, which is perceived negatively by the majority of respondents.

The cultural and ethnic transformation of the neighbourhood has thus eroded the social capital of the community. Drug trafficking has affected the sense of security that citizens feel when they move around in public spaces. In the face of these phenomena, a public space of high quality and accessibility in terms of urban facilities seems to have little impact. Private well-being and collective poverty are thus juxtaposed with intangible elements. These have impoverished the community's social capital.

Future research will explore the possibilities and limitations of the methodology outlined. Two developments seem particularly interesting. The first concerns the theoretical frameworks used, which can be enriched or replaced. We hypothesise that, even if the frames of reference are modified or possibly replaced, the methodological path of evaluation remains valid and solid. This is because the derivation of latent factors changes accordingly, without compromising a working method aimed at evaluating the tangible



and intangible components of a neighbourhood and the relations that these dimensions maintain between them.

The second research perspective concerns some of the assumptions of the SEM. This involves setting the framework of relationships tested a priori, based on sequences of appropriate theoretical assumptions. However, it may be interesting to test the results of a freer and less constrained exploration in search of new relationships between the tangible and intangible components of the city.

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## Appendix A. Frequency Analysis

Observed Variable	Characteristics	N of Cases	%
Gender	Female	101	59.8
	Male	68	40.2
Nationality	Italian	165	97.6
	Romanian	2	1.2
	Albanian	1	0.6
	Bengali	1	0.6
Religion	None	55	32.5
	Cristiana Cattolica	110	65.1
	Orthodox Christian	2	1.2
	Muslim	1	0.6
	Pastafarian	1	0.6
Education	Degree or similar	91	53.8
	High school diploma	60	35.5
	None of the above	18	10.7
Income	From EUR 0 to 23,120	30	17.8
	From EUR 23,121 to 27,000	20	11.8
	From EUR 27,001 to 31,000	17	10.1
	From EUR 31,001 to 40,000	30	17.8
	From EUR 40,001 to 51,000	22	13.0
	From EUR 51,001 to 63,000	11	6.5
	From EUR 63,001 to 75,000	15	8.9
	From EUR 75,001 to 95,000	10	5.9
	More than EUR 95,001	7	4.1
N/A	7	4.1	

Cont.

Observed Variable	Characteristics	N of Cases	%
Lifestyle (total walking time)	Less than 30 min	37	21.9
	More than 30 min	132	78.1
School attendance	No	149	88.2
	Yes	20	11.8
Work	No	55	32.5
	Yes	114	67.5
Physical activity	No	94	55.6
	Yes	75	44.4
Preferred modes of travel	Walking	93	55.0
	Bicycle	30	17.8
	Public transportation	11	6.5
	Own means of transport	35	20.7

N/A: Not available.

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