

# Indoor and Outdoor Residential Factors of High-Density Communities

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Effective residence planning is crucial to encourage sustainable housing development. Residents in densely populated cities inevitably have negative residential experiences caused by compact land use. Still, this situation is improvable through optimizing the physical environment or increasing service facilities that cater to dwellers' residential preferences.

Keywords: indoor ; outdoor ; residential environment ; residential satisfaction

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## 1. Introduction

As property sales have become slow-moving in the past few years, stimulating property consumption to improve living conditions has become a new approach to real estate development. Some inhabitants might become unsatisfied with their current accommodation, so they are inclined to buy another asset. They expect to seek to change their current residence for habitable, better-equipped, or more convenient dwellings <sup>[1]</sup>. However, this strategy does not observably enhance the gross sales of housing estates. A report from the National Bureau of Statistics shows that in 2018, the total sales growth rate was 14.7%, and in 2019, it was 10.3%. In 2020, the entire housing sales increased by 10.8% and by 5.3% in 2021. Three reasons may cause this situation: population sprawl and limited land use policy increased housing prices in megacities <sup>[2]</sup>. Significantly, the rise in housing prices was evident in densely populated cities <sup>[3]</sup>. The rapidly growing population promotes urban sprawl <sup>[4]</sup>, especially in urban housing <sup>[5]</sup>. Young, unmarried, highly educated persons fiercely intend to migrate to large cities <sup>[6]</sup> due to plentiful employment opportunities and well-equipped infrastructures <sup>[7]</sup>. Because housing prices have increased rapidly in many metropolises <sup>[8]</sup>, this phenomenon could impact the life of the original residents. Potential consumer groups needed help to afford a high-price dwelling. In addition, early-stage large-scale residential construction led to design neglect, resulting in a wait-and-see attitude among potential property buyers. Usually, the sentiment or confidence of target consumer groups is rooted in the housing market <sup>[9]</sup>, housing quality, neighborhoods, and public amenities accessibility <sup>[10][11]</sup>.

As a result, the environmental aspects of residences are a considerable way to develop dwellings in dense communities. The survey of the residential condition of large-population cities could adequately express the current developing status of residences. This study could be conducted through a survey of post-occupancy evaluation that includes indoor physical environmental factors, neighborhoods, and surrounding public amenities. Besides, an approved urban residential environment involves surrounding landscape conservation, traffic management, and economic livability <sup>[12]</sup>. The provision of social infrastructure is also linked to sustainable communities and urban sustainability <sup>[13]</sup>. According to disciplinary and sociological theory, the post-occupancy evaluation uses the concept of residential satisfaction. Residential satisfaction has been in use since the early 1960s as the basis for optimizing the housing design, where feedback was collected from residents of housing projects about residents' views on the physical features of proposed housing developments and then feeding those views back into the design process <sup>[14]</sup>. Thus, the residential satisfaction survey could enhance residents' quality of life and provides a dwelling construction basis for urban development. The degree to which individuals' needs and aspirations are met by their housing conditions is worth knowing not only for researchers but also for housing developers and planners <sup>[15]</sup>. The residential satisfaction research will benefit the sustainable development of urban housing via a humanized design.

## 2. Residential Satisfaction

Residential satisfaction is conceptualized as an individual's cognitive response to the residential environment <sup>[16]</sup>. Besides, housing satisfaction studies usually integrate objective and subjective attributes <sup>[17]</sup> based on the physical characteristics of housing and neighborhoods to assess residential experiences <sup>[18]</sup>. The physical characteristics of housing and the neighborhoods are critical factors in determining the level of residential satisfaction <sup>[14]</sup>.

In some factual cases, provided services and public facilities surrounding the house have strongly influenced overall satisfaction <sup>[19]</sup>. Buys and Miller <sup>[20]</sup> believe that internal dwelling design, including facilities and size, is associated with residential satisfaction. David et al. highlighted that the interior dwelling environment, the exterior environment of the dwelling, and security concerns correlated with residential satisfaction <sup>[21]</sup>. Francescato <sup>[22]</sup> and Amole <sup>[23]</sup> explained that residential satisfaction is multi-dimensional. The various dimensions of residential satisfaction include a housing unit, neighborhood environment, estate management, and social services <sup>[24][25]</sup>.

### **3. Demographic Characteristics**

Empirical studies have identified essential demographic elements correlated with evaluating housing satisfaction <sup>[18]</sup>. Age is a crucial predicted factor in measuring residential satisfaction <sup>[3][5][26][27][28]</sup>. Usually, older people tend to be more satisfied with their dwellings than younger people <sup>[14]</sup>. Married or higher-income households tend to positively evaluate the residential environment <sup>[14][16][29][30]</sup>. Because higher economic status could support a suitable residential condition or choose new housing <sup>[31]</sup>, income is a correlative variable of residential satisfaction <sup>[32]</sup>. Some scholars show the survey results that a couple with children is more satisfied with their housing <sup>[33][34]</sup>. Lu's survey <sup>[15]</sup> indicated that married couples without children have higher neighborhood satisfaction than parents. Education and health also directly correlate with residential satisfaction <sup>[3][5][34][35]</sup>. Education level significantly impacts a person's income <sup>[31]</sup>. Moreover, socio-demographic variables such as gender and family size <sup>[19][24][26][36]</sup> also affect residential evaluation.

### **4. Indoor Elements**

The physical features of dwellings are a critical indoor element in enhancing residential satisfaction. In higher-density communities, inadequate size and uncontrolled noise could hurt residents' life satisfaction <sup>[30]</sup>. Thus, the unit size is a primary determinant of the residential demand of households <sup>[37][38]</sup>. The size of the living room or dining room also directly affects residential comfort <sup>[3][18][38][39]</sup>. The condition (the number or size of space) of storage space, bathrooms, and bedrooms could influence residential satisfaction <sup>[14][39][40][41]</sup>. According to residential standards, a unit should provide separate bedrooms for children of different gender <sup>[41]</sup>. A separate kitchen could optimize the residential experience as a building feature <sup>[3][40]</sup>. The number of elevators is also associated with housing congestion <sup>[29][41][42]</sup>. The accessory space, such as parking and balconies, could promote the convenience and comfort of daily life <sup>[14][41]</sup>.

Results of some studies reveal that housing services, including cleanliness, maintenance, security, noise control, and privacy, can impact residential satisfaction <sup>[37][39][43][44]</sup>. The building age and duration of residence are related to residential satisfaction <sup>[14][15][29]</sup>. Donggen and Fenglong <sup>[16]</sup> believe that residents engage in more daily activities and spend more time at home, which leads to more residential satisfaction. Therefore, it is reasonable to assume that the affective feelings or experiences generated from daily activities at home or in the neighborhoods may contribute to residential satisfaction.

The research on indoor air presents strong evidence that natural ventilation is more supportive of health than mechanical ventilation <sup>[45]</sup> and is beneficial to thermal emission reduction or improving climate <sup>[46]</sup>. Besides, ventilation is the process of exchanging indoor (polluted) air with outdoor (presumably fresh and clean) air and makes residents feel comfortable <sup>[47]</sup>. Thus, the condition of natural ventilation has also been an effective predictor of residential satisfaction.

Furthermore, there is evidence verified that the generation of falls and depression potentially originate from inadequate residential light, and natural light is more effective than artificial light in daily life <sup>[48]</sup>. Natural light significantly reduces energy use in buildings <sup>[49][50]</sup>; it is comfortable and healthy illumination in the control of the physiological and psychological senses of living beings <sup>[51][52][53]</sup>. Physical aspects of housing, such as ventilation, lighting, and orientation of windows, also contribute to overall housing satisfaction <sup>[14]</sup>.

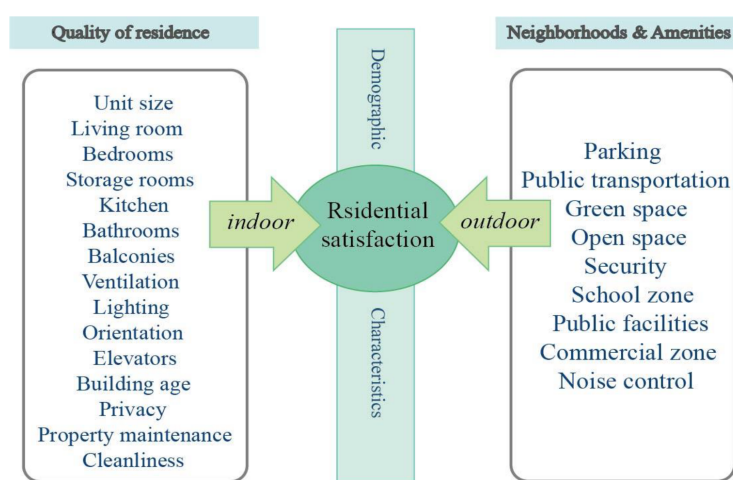
### **5. Outdoor Elements**

Neighborhoods and amenities are outdoor elements that could universally impact residential comfort and convenience, which are listed as research variables to measure residential satisfaction <sup>[16][21][40]</sup>. Neighborhood characteristics include the physical environment, local facilities and services, and socioeconomic environment <sup>[26]</sup>. The physical environment includes open space, public facilities, traffic systems, and amenities <sup>[3][26]</sup>. The open space is a common area of urban communities helping residents' social contacts <sup>[54]</sup>, which might support dwellers' informal meetings, social interaction, necessary activity, and outdoor play <sup>[19][30]</sup>. The local facilities or services could be measured through four items: health centers, entertainment, commercial institutions, and public transportation <sup>[25][38]</sup>.

The housing position with convenient public transportation could help reach destinations such as the town center, schools, markets, etc. [37]. High public transportation coverage is essential for achieving livable and more sustainable urban patterns [55]. In daily life, neighborhood activities include shopping, walking for leisure, outdoor physical activities, and social interactions with neighbors [16][56]. The neighborhoods of communities usually are composed of a series of elements—commercial services, recreation services, public institutions, green space, and common areas [16][25][26][30][37][54][57][58]. These profoundly improved urban function and changed urban formations [59].

In Chinese cities, children can enroll in a nearby public school based on their household registration and the housing property to receive nine years of compulsory education (from primary to junior school) [60]. Nevertheless, the local government can only financially support some public schools equally. As a result, excellent schools become scarce resources, and housing located in school zone become a popular concept in the real estate market. Thus, residential areas providing school opportunities can promote neighborhood satisfaction [3][18][25]. Moreover, people who live in a community with adequate parking spaces are more satisfied with their dwelling environment [3][24][38].

According to the contribution of the literature, the conceptual framework can be listed in **Figure 1**. Indoor and outdoor residential elements directly impact residential satisfaction and relate to personal residential demands.



**Figure 1.** Conceptual framework.

## 6. The Existing Primary Studies in China

In recent years, studies on residential satisfaction have begun to be carried out in China [61]. Some current studies surveyed about residential satisfaction in specific living environments such as urban villages, redeveloped neighborhoods, and public rental housing [3][26][61][62][63] or surveyed residential satisfaction via used affective experience [16]. Other scholars investigated surrounding facilities that can positively affect residential satisfaction, for example, parks [64], green spaces [65], and premium schools [60]. The housing condition [66] and environmental satisfaction [67] also become clues to survey households' residential evaluation. Moreover, several studies analyzed and researched residential satisfaction through observed specific population groups. The respondents have the same homogeneous socio-demographic characteristics, such as displaced residents [29], a group of migrants [24], and older persons [21].

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