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ARTICLE

Understanding the relationship between residential environment, social exclusion, and life satisfaction of private renters in Shenzhen

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Abstract

The recent revival of the private rented sector in many regions highlights the importance of understanding the well-being of private renters. While there is a consensus that private renters are less satisfied with their life than homeowners, little attention has been given to examining the life satisfaction of private renters from different sub-sectors, nor has the underlying mechanism linking residential environment and life satisfaction been thoroughly investigated. The present paper aims to address these gaps by examining the life satisfaction of private renters from different sub-sectors in Shenzhen, China. We propose a model, based on Amérigo and Aragones' (1997) theoretical framework, that links residential environment, social exclusion, and life satisfaction. The model fits well with the data collected from 619 renters. The results showed that only 38% of the respondent private renters were satisfied with their life. Furthermore, we found urban village renters were significantly less satisfied with their life compared with renters living in commercial housing and Long-term Rented Apartments. Path analysis results suggest that some objective aspects of the residential environment, renters' perceived social exclusion, and their residential satisfaction could explain a substantial proportion of the variances in life satisfaction while the influence of demographic variables was found to be insignificant. Perceived equal citizenship rights, perceived discrimination, and perceived reasonable rent were shown to have significant effects on life satisfaction. The paper concludes with a discussion on policy implications aimed at enhancing the life satisfaction of private renters.

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1 Introduction

The private rented sector has recently witnessed rapid growth in many countries due to increasing labour force mobility, affordability crisis of owner-occupied housing, as well as shrinking government investment in social housing (De Boer & Bitetti, 2014; Li, et al., 2022; Ronald & Kadi, 2018). However, a number of studies have revealed that the subjective well-being of private renters is at stake because of problems such as deprived housing conditions, insecure tenancy, and deteriorating affordability (Chisholm, et al., 2020; Jin, et al., 2023; Oswald, et al., 2022). It highlights the need for understanding the life satisfaction of private renters as realizing a greater satisfaction with life is not only regarded as one of the main personal goals in life but has also become a primary pursuit of public policies (Diener, 2009; Mouratidis, 2020; Veenhoven, 2012). Life satisfaction is the degree to which a person positively evaluates the overall quality of his or her life as a whole (Veenhoven, 1996). Amidst various determinants of life satisfaction, the residential environment has been proven to be one of the most important aspects (Fernández-Portero, et al., 2017; Liu, et al., 2017). In recent years, there has been a growing interest in the relationship between the residential environment and inhabitants' well-being (Bond, et al., 2012; Dong & Qin, 2017; Ettema & Schekkerman, 2016; Li & Liu, 2018; Ma, et al., 2018; Maass, et al., 2016; Mouratidis, 2021; Tsai, 2015; Yin, et al., 2020). Several studies have reported that renters have lower levels of life satisfaction than homeowners and therefore advocate the promotion of homeownership (Herbers & Mulder, 2017; Zheng, et al., 2020; Zumbro, 2014).

Although these studies have deepened our understanding of the relationship between the built environment and life satisfaction, there are two significant gaps. First, extant studies mainly distinguish between homeowners and renters with a handful of studies also incorporating other tenure types such as public rental housing and factory dormitory (Xie, 2019). Few studies have further differentiated between different types of private rental housing when examining renters' life satisfaction. A plethora of literature has indicated that the private rented sector is made up of various submarkets which accommodate different groups of renters (Hu, et al., 2022; Hulse, et al., 2019; Li, et al., 2021; Marsh & Gibb, 2019). Second, while several studies confirmed that renters face social exclusion (Hulse & Burke, 2000; MacDonald, et al., 2018), which leads to low life satisfaction (Bayram, et al., 2012; Bellani & D'Ambrosio, 2011), few studies have examined the role of social exclusion in the relationship between residential environment and life satisfaction among renters. It is especially important and interesting in the Chinese context because renting is a socially despised tenure (Nie, 2016) and renters are excluded from several basic social benefits such as community healthcare service (Huang, et al., 2017) and access to public schools (Feng & Lu, 2013).

This article attempts to bridge these gaps by introducing the concepts of 'sub-sector' and 'social exclusion' into the study of life satisfaction, by analysing data collected from private renters in Shenzhen, a city of renters. The purpose of this study is twofold: to explore what specific aspects of the residential environment contribute to private renters' life satisfaction; and to unravel the underlying mechanisms linking residential environment, social exclusion, and life satisfaction based on an appropriate theoretical framework. In specific, the paper addresses the following questions.

1) To what extent are renters in different sub-sectors satisfied with their life in general?
2) Does renters' life satisfaction differ between different sub-sectors?

3) What are the determinants of renters' life satisfaction?
4) What is the relationship between residential environment, perceived social exclusion, and life satisfaction of private renters?

The findings of the paper may deepen our understanding of the mechanism underlying renters' life satisfaction. The conceptual framework could also be adopted by future empirical research. In addition to its scientific contributions, the policy recommendations presented in this paper can also serve as guidance for improving the life satisfaction of Chinese private renters.

The remainder of the paper is organized as follows: in the subsequent section, it introduces the concept of 'sub-sector' and gives a brief overview of social exclusion faced by renters in the Chinese context to operationalize the research questions. It will then go on to the theoretical framework of this paper based on some selected literature on the relationship between residential environment, social exclusion, and life satisfaction. Then we introduce our study city, the data collection process, and the statistical methods, followed by the results, discussion, and limitations. Finally, policy implications will be discussed.

2 Key concepts

2.1 Sub-sectors of the private rented sector

It has long been recognized that the rental market is composed of several sub-markets, and housing policies should be formulated accordingly (Rugg, et al., 2002). Li et al. (2021) classified the private rented sector in urban China into three sub-sectors, which are the urban village sub-sector, commercial rented sub-sector, and Long-term Rented Apartment (LTRA) sub-sector. The low quality and informality of urban village housing distinguish itself from the other two sub-sectors (Li, et al., 2021). The emergence of urban villages is due to rapid urban sprawl and consequent farmland acquisition by the local government. The residential lands of the villagers were reserved because of the high costs to relocate them. The local villagers are not legally entitled to capitalize on their assets through land or housing sales, so they redevelop their housing at high densities to maximize their profits by leasing the units out (Liu, et al., 2010). Most urban villages are densely populated, accompanied by inadequate lighting and poor infrastructure. Housing conditions in urban villages can be described as overcrowded, with a lack of basic facilities such as indoor toilets and kitchens (Wu, 2016). The term commercial housing (or commodity housing) was coined to describe market housing in China as opposed to the old-style welfare housing during the planned economy era (Flock, et al., 2013). Since the abolishment of the welfare housing system in 1998, commercial housing has become the main housing supply in urban China. Commercial housing is privately developed housing on leased land from the local government and located in a gated community that provides a host of social, commercial, and recreational services (Hendrikx & Wissink, 2017; Wu, 2005, 2012). LTRAs are dwellings managed by corporate landlords with a tenancy period often longer than one year (Chen, et al., 2022). LTRA companies can either lease the properties that they own (asset-heavy model) or obtain the leasing rights of properties from individual homeowners, refurbish them, and then sublet the properties on behalf of landlords (asset-light model) (Chen, et al., 2022). For the ameni-

ties and services provided, rents for LTRA are generally 15 to 30% higher than comparable spaces nearby (South China Morning Post, 2018).

2.2 Social exclusion of renters

Social exclusion can be broadly defined as "the lack or denial of resources, rights, goods and services, and the inability to participate in the normal relationships and activities, available to the majority of people in a society, whether in economic, social, cultural or political arenas (Levitas, et al., 2007, p. 81)". A number of studies have paid attention to the social exclusion of private renters, while virtually all of them were conducted in western contexts (Hulse & Burke, 2000; MacDonald, et al., 2018). Hulse and Burke (2000) summarized that private rentals can create social exclusion in six broad ways such as discrimination and the inability to link private renters with support services.

Renters can perceive social exclusion in societies where homeownership is normalized (Costarelli, et al., 2022). Several studies have documented that renting contributes to feelings of shame and not being respected by others (Garnham & Rolfe, 2019; McKee, et al., 2020; Soaita & McKee, 2019). Similarly, Chinese culture implies that home is not only a place for living, but also a sign of wealth, a symbol of well-being, social status, and *mianzi* (face) (Huang, 2004; Yao, et al., 2013). *Mianzi* is defined as the recognition by others of an individual's social standing and position (Lockett, 1988). In Chinese culture, it is vital to maintain a person's *mianzi* or dignity and prestige (Buckley, et al., 2010). Therefore, it is a common mindset in China that renting makes people lose *mianzi*, especially for those living in low-end rentals (Sohu News, 2021). In addition, social exclusion has been used to describe a dynamic process that excludes people from the benefits enjoyed by full citizens (Walker & Walker, 1997, p. 8). In China, homeownership serves as the threshold for accessing certain public resources such as community healthcare services (Huang, et al., 2017) and education services (Feng & Lu, 2013). If parents do not own housing in the area, their children cannot attend quality public schools nearby (Feng & Lu, 2013). Furthermore, social exclusion can also occur in the form of discrimination. Several studies have revealed that renters face discrimination in urban China, especially those living in urban villages (Du, et al., 2018; Wong & Liu, 2017). For example, Du et al. (2018) found very few private renters in urban villages established an attachment to either the neighbourhood or to the city because of discrimination and social exclusion from the locals and their landlords. In their interview with urban village renters, some felt discrimination from the locals through their "tongue of speaking and ways of expression" while some even had the experience of being attacked by the locals. Therefore, in this paper, we operationalize social exclusion as perceived losing *mianzi*, perceived inequality in terms of citizenship rights, and perceived discrimination as renters.

3 Theoretical framework

Various theories have been put forward to conceptualize life satisfaction such as telic theories (Emmons, 1986; Michalos, 1980), activity theories (Csikszentmihalyi & Figurski, 1982), and associationistic theories (Schwarz & Clore, 1983). In this paper, we adopt the Bottom-Up Theory (Andrews & Withey, 2012; Campbell, et al., 1976) which posits that life
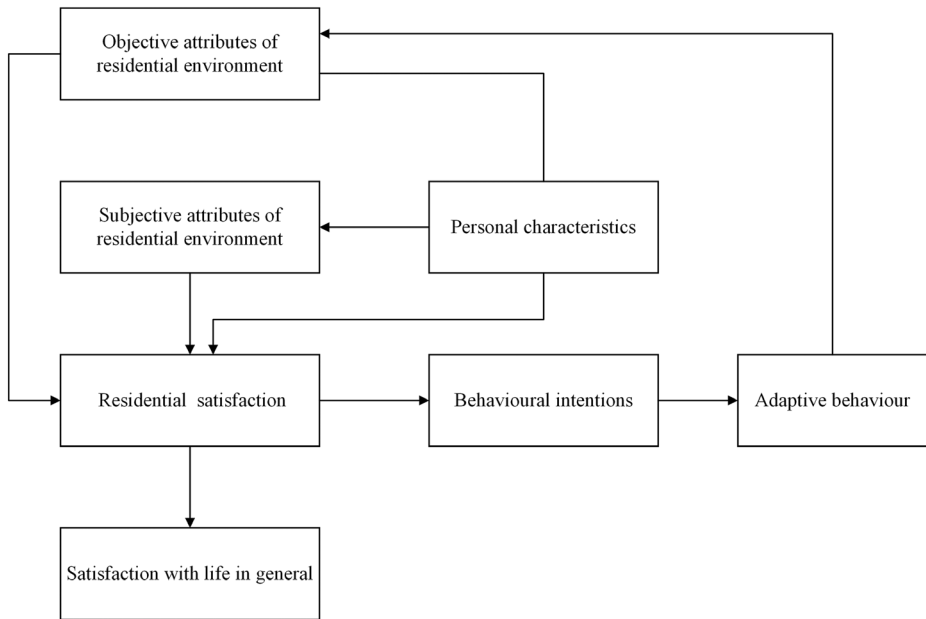
Fig. 1 A theoretical framework linking residential environment and life satisfaction Source: Amérigo and Aragones (1997)

satisfaction can be regarded as the sum of satisfaction in various domains. In their seminal book, *The Quality of American Life*, Campbell et al. (1976) identified 15 domain satisfactions that influence life satisfaction such as marriage, family life, health, neighbourhood, housing, etc. These domain satisfactions result from a process of external stimuli and cognitive responses (Cao, 2016). Based on Campbell's model, Amérigo and Aragones developed a theoretical framework (Fig. 1) that brought in the concept of "residential satisfaction" and incorporated both objective and subjective attributes of residential environment, as well as subjects' life satisfaction and migration behaviour (Amerigo, 1992; Amérigo & Aragones, 1997).

According to the model, the objective attributes of the environment become subjective once they are evaluated by the individual, giving rise to a certain degree of residential satisfaction (Amérigo & Aragones, 1997). Personal characteristics influence residential satisfaction directly and indirectly by influencing subjective attributes of the residential environment. According to Amerigo (1992), "personal characteristics" in this model include socio-demographic characteristics, personality, and standard of comparison which means the way in which people compare their current situation to their own situation in the past or to other people's situations. In this model, only residential satisfaction is directly associated with life satisfaction[1], while other factors influence life satisfaction through residential satisfaction. In the remainder of this chapter, a literature review is conducted to find out what objective and subjective attributes of the residential environment and what personal characteristics might influence residential satisfaction.

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[1] Note also that other domains that might influence life satisfaction, such as work and health are omitted from the model.

3.1 Objective attributes of the residential environment

Existing literature has shown that residential/life satisfaction is influenced by many characteristics of the dwelling and neighbourhood (Emami & Sadeghlou, 2021). Housing quality is an important predictor of residential satisfaction (Elsinga & Hoekstra, 2005; Vera-Toscano & Ateca-Amestoy, 2008). For instance, many studies have shown that residents living in larger housing have higher residential satisfaction (Chen, et al., 2013; Foye, 2017; Huang, et al., 2015), while indoor facilities were also found to be correlated with residential satisfaction (Li, et al., 2021; Wang, et al., 2019). Another well-studied predictor is homeownership, which has been found to contribute positively to residential satisfaction and life satisfaction in many previous studies (Diaz-Serrano, 2009; Hu, 2013; Jansen, 2014; Zumbro, 2014). Since our research objects are private renters, we use another concept termed sub-sector to capture the difference among private rented dwellings. As described in Sect. 2.1, we adopted the taxonomy of Li et al. (2021) and classified the private rented sector into three sub-sectors, which are the urban village sub-sector, commercial rented sector, and LTRA sub-sector. Besides housing conditions, the neighbourhood environment is also considered an important component of the residential environment. The neighbourhood environment often refers to facilities for daily public use and service (Lee, et al., 2013). Public facilities such as markets, schools, clinics, good quality of public transport, and green areas are important to support the daily life of the dwellers and enhance residents' quality of life (Ambrey & Fleming, 2014; Nurizan & Hashim, 2001; Rioux & Werner, 2011; Wilson, et al., 1995). For private renters, landlord services can also influence their residential satisfaction levels (James, 2007; Paris & Kangari, 2005). Finally, higher rent on the one hand might point to larger space or better quality, which is associated with higher residential satisfaction. High rent might also result in relatively low housing satisfaction, especially if the relationship between rent and housing quality is not optimal (Elsinga & Hoekstra, 2005).

In summary, the following objective attributes of the residential environment have been found to be important concerning residential satisfaction: housing space, housing quality, rental subsector, public facilities, landlord services, and rent. Notably, an index was used to measure housing quality, public facilities, and landlord services to avoid too many variables in the model (see Table 1). In particular, one point is added in the index if a specific indoor facility/public facility/landlord service is present.

3.2 Subjective attributes of the residential environment

Once the objective attributes of the residential environment are evaluated by the residents, they become subjective attributes (Amérigo & Aragones, 1997). In their original paper, Amérigo and Aragones (1997) operationalized subjective attributes of residential environment by asking the residents to "quantify how he/she perceives the feature (a lot, quite a lot, a little, or not at all) in his/her own residential environment". For private renters, the rent level is an important objective attribute, which also can be perceived by the inhabitants as reasonable or not reasonable. Previous studies have found that whether renters perceive their rent as affordable could also influence their life satisfaction (Mason, et al., 2013; Pollack, et al., 2010). We expect the actual rent is associated with the perception of reasonable rent, which could contribute to residential satisfaction. Therefore, we use perceived reasonable rent as a subjective attribute of the residential environment.

Table 1 Description of variables

Variable	Description
Personal characteristics	
Age	Continuous
Male	0 = female, 1 = male
Income	0 = low to middle (household monthly income < 10,000 RMB), 1 = middle to high income (> 10,000 RMB)
Marital status	0 = not married, 1 = married
Local hukou	0 = non-local hukou, 1 = local hukou
Length of residence	0 = less than 3 years, 1 = above 3 years
Education	0 = do not have a bachelor's degree, 1 = have a bachelor's degree
Commuting time	0 = less than 15 min, 1 = more than 15minuts
Objective attributes	
Housing space	0 = less than 40 m^2, 1 = above 40 m^2
Housing quality index	1 point is added if the dwelling has a bedroom/ bath or shower/ balcony/ hot water/ air conditioner/ elevator/ cooking facilities (0–7 scale)
Sub-sector	1 = urban village, 2 = commercial housing, 3 = LTRA
Public facilities index	1 point is added if there is a market/ primary school/ hospital/ park/ shopping mall/ subway entrance/ bus station within one-kilometre range (0–7 scale)
Landlord service index	1 point is added if the landlord signs a written contract/ makes any requested repairs promptly/ ensures that living conditions are hazard-free/ maintains a "pest-free" environment/ gives notice before entering the dwelling (0–5 scale)
Rent	Monthly total rent(RMB), continuous
Subjective attributes	
Perceived reasonable rent	0 = rent is not reasonable, 1 = rent is reasonable
Perceived equal rights	"I think private renters and homeowners have the same citizenship rights", 1–5 scale from "strongly disagree" to "strongly agree", same below
Perceived discrimination	"I feel being discriminated against because I'm a renter."
Perceived losing *mianzi*	"I feel losing *mianzi* telling people I'm renting"

Somerville (1998) originally applied the theory of social exclusion to housing processes and discussed several mechanisms of how social exclusion is related to topics such as housing production, housing tenure, and neighbourhood effects. For example, Somerville (1998) argued that distinctive structures of housing provision could have characteristic exclusionary effects. Commodified forms of housing structures (e.g., commercial housing) are potentially more exclusionary than decommodified forms of housing provision (e.g., social housing). In addition to the differences between housing tenures, social differentiation within each tenure should not be downplayed (Somerville, 1998). It suggests that tenants living in different sub-sectors might experience different levels of social exclusion. Some renters could be socially excluded, for instance, if their rent is too high, or their living circumstances prevent 'human flourishing' (Healey, 1997), or if they are cut off from the means by which they can empower themselves (Somerville, 1998). Therefore, in this study, we consider social exclusion as a subjective attribute of the residential environment because social exclusion is influenced by some objective attributes of the residential environment. In Sect. 2.2, we have operationalized the social exclusion of renters into perceived losing *mianzi*, perceived inequality in terms of citizenship rights, and perceived discrimination as renters. We linked every objective attribute to every subjective attribute of the residential environment because we have no theoretical evidence that supports or does not support any of these relationships.

This is because the social exclusion of renters has rarely been studied. In other words, the testing of relationships between objective and subjective attributes is explorative rather than confirmative in nature.

In Amérigo and Aragones' (1997) model, subjective attributes cannot influence life satisfaction directly but through residential satisfaction. However, Verkuyten (2008) found that perception of discrimination could influence life satisfaction via other domains of life satisfaction, next to residential satisfaction. Therefore, a direct relationship was added from perceived discrimination to life satisfaction in our model.

3.3 Personal characteristics

Although the relationships between demographic variables and life satisfaction are weak (Proctor, et al., 2009), some personal characteristics have been found to influence residential satisfaction. Factors that have been found to positively influence residential satisfaction include higher age (Boschman, 2018), being female (Emami & Sadeghlou, 2021), higher income (Zanuzdana, et al., 2013), being married (Lin & Li, 2017), better educated (Ibem & Amole, 2013), having a local hukou (Ren & Folmer, 2017), and less commuting time (Shen, et al., 2021). Length of residence was found to be significantly associated with residential satisfaction, but it remains unclear whether the relationship is positive or negative (Adams, 1992; Amole, 2009; Chen, et al., 2013; Lim, et al., 2017; Lin & Li, 2017). In the present paper, the above eight personal characteristics are used as control variables.

Based on Amérigo and Aragones' (1997) theoretical framework and the literature review, the following model is proposed (Fig. 2). In the next section, we will use an empirical study to examine this model.
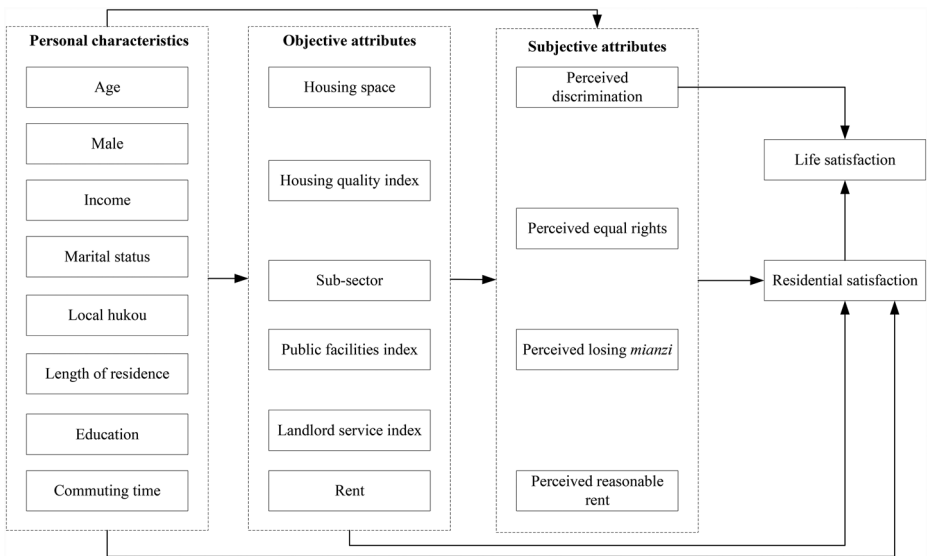

Fig. 2 The theoretical framework of the present paper Source: Adapted from Amérigo and Aragones (1997)

4 Empirical research

4.1 Data

Shenzhen is one of the first-tier cities in China, ranking third in terms of GDP in 2019, only behind Beijing and Shanghai. It was chosen for the current study city for the following reasons. First of all, Shenzhen has the highest proportion of private renters among all Chinese cities. According to a recent report, 77% of the population lives in the private rented sector in Shenzhen (China Construction News, 2022). In addition, the private rental sector in Shenzhen appears to be more diversified than in other cities (Li, et al., 2021), which enables us to collect sufficient data from each sub-sector. Furthermore, as one of the pilot cities chosen by the central government to promote private renting (Yang, 2019), Shenzhen has shown its enthusiasm and determination to develop the private rented sector. For example, Shenzhen municipality claimed to renovate more than one million units in the urban villages before 2020 by involving professional developers (Zhou, 2019). Therefore, this research contributes to practical policymaking for urban planners.

The field survey was conducted in August 2020. Four districts of Shenzhen were selected for the field survey, namely Baoan, Nanshan, Futian, and Longgang. It is because these four districts are the most densely populated areas in Shenzhen, accounting for 67% of the city's whole population (Shenzhen Bureau of Statistics, 2019). Furthermore, they include two inner-city districts and two outer-city districts, thus enabling us to have a more diverse sample.

An online pre-test of 30 private renters in Shenzhen was undertaken prior to the large-scale administration of the survey. We adjusted a few questions based on the feedback to make the questions more understandable. For the field survey, leaflets were circulated to the residents in different communities and passers-by after confirming that they were private renters in each district. Respondents could participate in the survey by scanning the QR code on the leaflet, while printed questionnaires were also available on request. Due to the small market share of the LTRA sub-sector, we visited about 300 households living in LTRAs after being permitted by the apartment managers. Some managers of LTRA also assisted us in distributing the leaflets to the renters.

In total, 615 online questionnaires and 52 paper questionnaires were collected, of which 619 have valid information on the variables used in this research. Among the 619 respondents, 285 (46%) lived in urban village housing, while 206 (33%) and 128 (21%) lived in commercial rented housing and LTRAs. Given the fact that very little official data exists on the characteristics of private renters, the gender ratio and the age structure of the whole population are used to determine the representativeness of the obtained sample. It is considered acceptable because 77% of the whole population are renters (China Construction News, 2022). As shown in Table 2, our sample is relatively representative of the whole population in terms of age and gender ratio. However, our sample is not representative of the whole private rented sector because we include larger proportions of renters living in commercial rented housing and LTRAs. It is operationalized to ensure adequate respondents in each sub-sectors, which enables us to examine the differences between sub-sectors.

	The whole Shenzhen	Our dataset
Table 2 Data representativeness		
Age		
15–29 (%)	49	48
30–59 (%)	48	50
>60 (%)	3	2
Male (%)	54	54
Sub-sector		
Urban village (%)	83	46
Commercial rented housing (%)	12	33
LTRA (%)	5	21

Notes: Data on age structure and gender ratio come from Shenzhen Bureau of Statistics (2010) and Shenzhen Bureau of Statistics (2019) respectively. People under the age of 15 were excluded. Market shares of the three sub-sectors are the estimation of Li et al. (2021)

4.2 Measurement

In Sect. 3, factors that might influence residential satisfaction have been identified based on a literature review. This section describes how each factor was measured in this study.

Following Elsinga and Hoekstra (2005), we use a housing quality index to indicate housing quality on the objective dimension. Specifically, one point is added if there is a bedroom/ bath or shower/ balcony/ hot water/ air conditioner/ elevator/ cooking facilities in the dwelling. By the same token, the public facility index and landlord service index are generated. In specific, one point is added if there is a market/ primary school/ hospital/ park/ shopping mall/ subway entrance/ bus station within one-kilometre range to establish the public facility index. Similarly, one point is added if the landlord signs a written contract/ makes any requested repairs promptly/ ensures that living conditions are hazard-free/ maintains a "pest-free" environment/ gives notice before entering the dwelling to establish the landlord service index.

The subjective attributes: perceived equal rights, perceived discrimination, and perceived losing *mianzi* are measured by asking the respondents to what extent they agree with the statements. Responses are scored through a five-point Likert scale ranging from 1 "strongly disagree" to 5 "strongly agree". It should be noted that the following characteristics: housing space, perceived reasonable rent, household income, marital status, length of residence, educational attainment, and commuting time are categorical variables in the original questionnaire. We recoded them into binary variables for the convenience of further statistical analysis. To determine the thresholds for recoding housing space, income, length of residence, and commuting time, the mean life satisfaction level was plotted for each category of the particular variable. Housing space, income, and commuting time turned out to have a monotonic, sometimes even almost linear, relationship with life satisfaction. These variables were split, based on the criterion that each category had a comparable sample size. Therefore, upper-middle income, 15 min, and 40 m² have been chosen as the thresholds for recoding household income, commuting time, and housing space, respectively. The analysis for the length of residence showed that the life satisfaction of renters living for more than three years at the same address was much lower than renters living either less than one year or between one to three years at the same address. Therefore, we have chosen three years as the threshold for recoding the length of residence.

Following Li et al. (2021), neighbourhood satisfaction, housing satisfaction, and landlord satisfaction were used to measure the residential satisfaction levels of renters. In specific, respondents were asked, "How satisfied are you with your neighbourhood/current dwelling/

landlord service?" Responses are scored through a five-point Likert scale ranging from 1 "very dissatisfied" to 5 "very satisfied". The mean value of the above three items was used for renters' residential satisfaction. The reliability statistic Cronbach's alpha was employed to test whether the three items could be averaged. Usually, a value of alpha above 0.70 is considered to reflect a reliable scale (Nunnally, 1994). The results showed a high correlation (Cronbach's alpha=0.821) among these three items (n=619), suggesting these items are internally related and can be combined into one overall score for residential satisfaction.

Life satisfaction was measured by asking the respondents "In general, to what extent are you satisfied with your life?" Respondents can choose from 1 (very dissatisfied) to 5 (very satisfied). The 5-point single-item measurement has been used in previous national surveys such as the Chinese General Social Survey (CGSS) and China Household Finance Survey (CHFS), allowing for further comparison.

Table 1 shows all the variables included in our analysis and how each variable was measured.

4.3 Statistical method

The present study aims to examine the relationships between objective and subjective attributes of the residential environment, social exclusion, and residential/life satisfaction. As shown in Fig. 2, objective attributes of the residential environment are determined by personal characteristics because residents with different characteristics might have various preferences and choices for the residential environment. While objective attributes can influence residential satisfaction directly and indirectly through subjective attributes of the residential environment. Subjective attributes of the residential environment can only influence life satisfaction indirectly through residential satisfaction. To test the proposed model, path analysis was adopted. Path analysis is an extension of the regression model and a special form of Structural Equation Modelling (SEM)[2], used to test the fit of the correlation matrix against two or more causal models (Garson, 2013). It takes into account the relationship between the independent variables and calculates all paths simultaneously in one single analysis (Streiner, 2005). Path analysis and SEM have recently become a frequently used statistical method in the field of housing and urban studies (Jin, et al., 2022; Li, et al., 2022; Prieto-Flores, et al., 2011).

Since only continuous and binary variables can be entered into path analysis, the 'subsector' was coded into dummy variables (urban village as the reference group). As with most studies, the maximum likelihood (ML) estimation method was chosen because it yields the most precise (smallest variance) estimates. To obtain the confidence interval and significance of indirect effects, bootstrap[3] is also employed. The analysis was performed through AMOS 21 in SPSS.

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[2] The main difference between SEM and path analysis is that path analysis assumes all variables are measured without error while SEM uses latent variables to account for measurement error (Garson, 2013).

[3] Bootstrapping is a re-sampling technique that randomly draws several sub-samples of the same size as the original sample to provide statistical test evidence on the variability of parameter estimates and fit indices (Byrne, 2010).

5 Results

5.1 Descriptive analysis

5.1.1 Personal characteristics

The personal characteristics of the respondents are summarized in Table 3. The respondents are generally young, with a mean age of 31 years. 54% of the respondents were male, which is consistent with the whole population in Shenzhen. Half of the sample was married and above middle income. Only about one-quarter of the respondents had a local hukou or lived in their dwelling for more than three years. Notably, our sample was generally well-educated. 39% of the participants had a bachelor's degree. However, sample characteristics vary considerably between sub-sectors. Respondents living in urban village housing were slightly older, more likely to be married and non-local, had lower income, and were less educated than the average level. While they seemed to live longer in their housing and spent less time commuting. Renters living in commercial housing are more likely to be affluent, well-educated, and local. LTRA renters have very distinctive features: young, single, male, well-educated, and short residence.

Table 3 Descriptive results

	Urban village N=285	Commercial rented housing N=206	LTRA N=128	Total N=619
Personal characteristics				
Age (mean)	32.5	30.9	28.1	31.1
Male (%)	53	51	61	54
Income (>10,000, %)	40	60	54	50
Marital status (married, %)	61	49	28	50
Local hukou (%)	15	37	22	24
Length of residence (>3 years, %)	37	18	9	25
Education (bachelor and above, %)	24	56	46	39
Commuting time (>15 min, %)	64	67	70	66
Objective attributes				
Housing space (>40 m^2, %)	41	54	36	45
Housing quality index (mean, 0–7 scale)	4.1	5.7	5.0	4.8
Public facilities index (mean, 0–7 scale)	3.9	4.2	4.0	4.0
Landlord service index (mean, 0–5 scale)	2.2	2.7	3	2.6
Rent (RMB)	1820	2717	2143	2185
Subjective attributes				
Perceived equal rights (score=4 or 5, %)	50	69	61	59
Perceived discrimination (score=4 or 5, %)	26	17	18	21
Perceived losing *mianzi* (score=4 or 5, %)	28	14	17	21
Perceived reasonable rent (%)	32	29	31	31
Residential satisfaction (3<score≤5, %)	42	63	55	51
Life satisfaction (score=4 or 5, %)	30	43	47	38

5.1.2 Objective attributes of the residential environment

With respect to the objective attributes of the residential environment, most rental dwellings were not spacious. Only 45% of the housing units exceeded 40 square meters, while the proportion is higher in the commercial housing sub-sector. In addition, commercial housing overwhelmed urban village housing and LTRAs in terms of housing quality. The surrounding public facilities did not vary much between sub-sectors, while LTRA renters received better landlord services. The rent of commercial housing is much higher than that of urban village housing and LTRA.

5.1.3 Subjective attributes of the residential environment

59% of respondents believed that they had the same citizenship rights as homeowners, although this proportion is much higher for commercial housing renters (69%) and LTRA renters (61%) than urban village renters (50%). Only 21% of the respondents agreed that they were discriminated against because they were renters. However, this proportion seems higher for urban village renters (26%) than for commercial housing renters (17%) and LTRA renters (18%). Similarly, only 21% of the respondents felt losing *mianzi* telling people he or she was renting. The proportion of urban village renters was much higher (28%) than commercial housing renters (14%) and LTRA renters (17%). Although only about 20% of private renters perceived social exclusion on the three aspects respectively, 41% of them perceived social exclusion on at least one of the three aspects.

Participants' perceptions of whether the rent is reasonable did not vary much between sub-sectors. About 30% of private renters perceived their rents to be reasonable, although urban village renters were slightly more likely to perceive their rents as reasonable.

5.2 Life satisfaction levels among sub-sectors

This section first answers the first research question "To what extent are renters in different sub-sectors satisfied with their life in general?". Table 4 compares the mean life satisfaction levels of renters living in the three sub-sectors respectively. Only 30% of urban village renters were satisfied with their life while 43% and 47% of commercial housing renters and LTRA renters expressed their satisfaction respectively. Interestingly, urban village renters were more likely to be dissatisfied and neutral than commercial housing and LTRA renters, although the proportion of very dissatisfied was the same for the three sub-sectors.

To answer the second research question "Does renters' life satisfaction differ between different sub-sectors?", a one-way ANOVA was performed. The results showed that urban village renters had significantly lower levels of life satisfaction than commercial housing renters ($p=0.012$) and LTRA renters ($p=0.001$). However, no significant difference was

Table 4 Life satisfaction of private renters in different sub-sectors

Life satisfaction (LS)	Mean	Very dissatisfied LS=1	Dissatisfied LS=2	Neutral LS=3	Satisfied LS=4	Very satisfied LS=5
Urban village housing	3.2	2%	13%	55%	24%	6%
Commercial rented housing	3.4	2%	8%	47%	36%	7%
LTRA	3.5	2%	5%	46%	38%	9%

found between commercial housing renters and LTRA renters concerning life satisfaction (p=0.281).

5.3 Path analysis

To answer the third and fourth research questions, path analysis was conducted. Table 5 presents the results of the path analysis. The model fit indices suggest that the adapted theoretical model fitted the empirical data quite well (see the notes under Table 5). The squared multiple correlation (R^2) for life satisfaction is 36%, which means a considerable amount of variance in life satisfaction can be explained.

With regard to the determinants of life satisfaction (the third research question), we found subjective factors have generally larger impacts on life satisfaction than objective factors. Residential satisfaction has the largest influence on life satisfaction, judging from the standardized coefficients. Perceived discrimination was shown to have the second-largest and most negative influence on life satisfaction. Among other subjective attributes of the residential environment, perceived reasonable rent and perceived equal citizenship rights were significantly related to life satisfaction. In specific, the more renters perceived to have equal rights, the higher levels of life satisfaction they expressed. However, perceived losing *mianzi* was not significantly associated with life satisfaction. All objective attributes of the residential environment (except rent) were found to be significantly associated with life satisfaction. In specific, renters living in dwellings that are larger than 40 square meters, in better housing quality, with more public facilities nearby, and with more landlord services had significantly higher levels of life satisfaction. In addition, LTRA and commercial housing renters showed higher life satisfaction than urban village renters. Among personal characteristics, only commuting time had a significant total effect on life satisfaction. Renters who spent more than 15 min on commuting were less satisfied with their life.

Concerning the role of social exclusion (the fourth research question), we found social exclusion variables are influenced by some objective attributes of the residential environment such as the 'sub-sector', housing space, and landlord services. In addition, both perceived equal rights and perceived discrimination have significant effects on life satisfaction. To be specific, renters living in commercial housing were significantly more likely to perceive equal rights than those living in urban village housing. Commercial housing renters and LTRA renters were less likely to perceive discrimination than urban village renters. Interestingly, housing space is positively related to perceived discrimination and perceived losing *mianzi*. Furthermore, we found renters receiving more landlord services were more likely to perceive equal rights. On the other hand, perceived equal rights and perceived discrimination were significantly related to residential satisfaction and life satisfaction. Notable, although renters living in urban village housing were more likely to perceive losing *mianzi* than those living in the other sub-sectors, perceived losing *mianzi* was not significantly related to life satisfaction.

Table 5 Standardized total effects of personal characteristics, objective attributes, subjective attributes, and residential satisfaction

	Perceived equal rights	Perceived discrimination	Perceived losing *mianzi*	Perceived reasonable rent	Residential satisfaction	Life satisfaction
Personal characteristics						
Age	-0.032(0.051)	0.029(0.047)	0.001(0.043)	0(0.051)	-0.059(0.049)	-0.038(0.03)
Male	-0.045(0.042)	0.153***(0.04)	0.139***(0.04)	0.014(0.04)	-0.035(0.038)	-0.038(0.024)
Income	0.011(0.046)	-0.006(0.046)	-0.024(0.045)	0.106**(0.046)	-0.019(0.042)	-0.01(0.026)
Marital status	-0.051(0.052)	0.053(0.049)	0.085*(0.046)	-0.079(0.051)	-0.045(0.046)	-0.032(0.028)
Local hukou	-0.009(0.048)	0.024(0.044)	0.007(0.044)	0.042(0.048)	-0.037(0.039)	-0.024(0.024)
Length of residence	0.033(0.045)	0.061(0.044)	0.116***(0.045)	-0.05(0.043)	0.034(0.042)	0.013(0.026)
Education	-0.025(0.05)	-0.052(0.046)	0.01(0.048)	0.078(0.05)	-0.052(0.041)	-0.024(0.026)
Commuting time	-0.012(0.041)	-0.006(0.04)	-0.031(0.04)	-0.036(0.041)	-0.135***(0.038)	-0.078*(0.023)
Objective attributes						
Housing space	-0.041(0.046)	0.092**(0.044)	0.082**(0.043)	0.094**(0.044)	0.089**(0.041)	0.041*(0.026)
Housing quality index	0.011(0.053)	-0.051(0.051)	-0.055(0.051)	0.104**(0.05)	0.14**(0.049)	0.088***(0.031)
Commercial rented housing	0.124***(0.048)	-0.08*(0.046)	-0.104**(0.048)	-0.132***(0.047)	0.139***(0.043)	0.09***(0.026)
LTRA	0.044(0.047)	-0.095***(0.047)	-0.077*(0.049)	-0.083*(0.045)	0.116***(0.042)	0.078***(0.026)
Public facilities index	0.036(0.043)	-0.033(0.042)	-0.025(0.043)	-0.003(0.043)	0.126**(0.039)	0.077***(0.024)
Landlord service index	0.095**(0.045)	-0.056(0.042)	-0.018(0.042)	0.019(0.045)	0.183***(0.047)	0.113***(0.028)
Rent	0.019(0.049)	-0.02(0.049)	-0.025(0.046)	-0.098*(0.049)	-0.037(0.045)	-0.019(0.027)
Subjective attributes						
Perceived equal rights	-	-	-	-	0.104**(0.042)	0.06**(0.025)
Perceived discrimination	-	-	-	-	-0.026(0.05)	-0.131***(0.046)
Perceived losing *mianzi*	-	-	-	-	-0.026(0.055)	-0.015(0.032)
Perceived reasonable rent	-	-	-	-	0.213***(0.037)	0.124***(0.024)
Residential satisfaction	-	-	-	-	-	0.581***(0.032)

Notes: 1. ***p<0.01; **p<0.05; *p<0.1

2. Model fit indices[4]: CMIN/DF=2.768, CFI=0.972, RMSEA=0.053, SRMR=0.029

3. Numbers in parentheses are standard errors

4. Total effect=Direct effect+Indirect effect. If there is no indirect effect, the total effect reflects the direct effect

[4] Model fit indices provide the most fundamental indication of how well the proposed theory fits the data. The chi-square to df ratio (CMIN/DF), comparative fit index (CFI), root mean square error of approximation (RMSEA), and standardized root mean squared residual (SRMR) are most recommended indices to be reported by researchers (Hu & Bentler, 1999). Generally, CMIN/DF<3, CFI>0.95, RMSEA<0.06, and SRMR<0.08 reflect a good model fit (Hu & Bentler, 1999).

6 Discussion

The present study aims to explore what specific aspects of the residential environment contribute to private renters' life satisfaction, with a special focus on the role of social exclusion. To the best of our knowledge, it is the first study to examine the life satisfaction of renters within the private rented sector in China. A theoretical framework was first proposed to link the residential environment and life satisfaction of private renters based on Amérigo and Aragones' (1997) previous work. Next, we examined the model with data collected from 619 private renters in Shenzhen, China. The results of path analysis showed our data and model fitted well. 36% of the variances in life satisfaction could be explained by the predictor variables.

First, the results concerning life satisfaction levels will be discussed. We found only 38% of the respondents were satisfied or very satisfied with their life, which is much lower than the national level. For example, Cheng et al. (2016) found that 51% of renters (N=633) living in urban China were satisfied with their life based on the analysis of the 2011 CHFS dataset. Perhaps the type of renter can explain the difference. In our study, a relatively large proportion (46%) of urban village renters was included, only 30% of whom were satisfied with their life in general. Apart from that, all respondents live in Shenzhen, a first-tier city in China. Previous studies have found that the rural population had significantly higher life satisfaction levels than the urban population when holding socio-economic factors constant (Fischer, 1975; Sørensen, 2014). According to Burger et al. (2020), the relationship between the life satisfaction of urban dwellers and economic development is inverted U-shaped. That is, when economic development reaches a certain level, the happiness of the urban population begins to decline while the happiness of the rural population continues to grow, resulting in lower happiness of dwellers in the largest cities compared with dwellers in rural region and smaller cities. This might partly explain the lower life satisfaction levels of our sample.

Next, the results with regard to the difference in life satisfaction between different subsectors will be briefly discussed. We found urban village renters were significantly less satisfied with their life than commercial housing and LTRA renters while no significant difference in life satisfaction was found between commercial housing renters and LTRA renters. It may be because of the relatively poor residential environment in urban villages and the fact that urban village renters were more likely to perceive discrimination and less likely to perceive equal rights compared with commercial housing renters and LTRA renters. This finding echoes Amin's (2006) criticism that "(cities) are the places of low-wage work, insecurity, poor living conditions, and dejected isolation for the many at the bottom of the social ladder daily sucked into them."

With respect to the determinants of life satisfaction, the third research question, we found that the subjective attributes of the residential environment have relatively larger influences than objective attributes and personal characteristics. Residential satisfaction was found to be the most influential determinant of life satisfaction. It is consistent with the study of Oswald et al. (2022), who found housing played a key role in renters' mental health outcomes. Among the four subjective attributes, perceived discrimination was shown to have the largest influence on life satisfaction. In addition, perceived discrimination has a significant direct effect on life satisfaction, implying perception of discrimination might influence life satisfaction through other satisfaction domains. For example, Verkuyten (2008) found

perceived discrimination influenced the life satisfaction of ethnic minority group members in the Netherlands through the mediating effect of 'life satisfaction in the Netherlands', which is considered one of the critical domains of life satisfaction (Campbell, et al., 1976). The second most influential subjective attribute is perceived reasonable rent, highlighting the importance of affordability for renters (Mason, et al., 2013; Pollack, et al., 2010). Perceived equal citizenship rights was found to be positively associated with life satisfaction. This finding is interesting since the past literature has been focused on the impact of income/gender inequality on life satisfaction (Bjørnskov, et al., 2007; Graafland & Lous, 2019; Verme, 2011), while few attempts have been made to untangle the linkage between citizenship rights equality and life satisfaction.

Objective attributes of the residential environment were also shown to be important predictors of renters' life satisfaction. Among all the objective attributes, landlord service was found to have the largest total effect on life satisfaction, followed by the rental sub-sector. Housing space could contribute to life satisfaction significantly, which is consistent with Foye (2017). Housing quality was found to influence not only life satisfaction but also renters' perceived reasonable rent. That is, the higher the housing quality, the more likely the renters believed the rent was reasonable. This finding is understandable since higher housing cost is expected to result in higher housing quality by the inhabitants (Elsinga & Hoekstra, 2005). Although the public facility index was not significantly associated with renters' subjective perceptions, it did influence people's life satisfaction, which is in line with previous studies (Ambrey & Fleming, 2014; Lee, et al., 2013; Liu, et al., 2021). For example, Ambrey and Fleming (2014) found life satisfaction levels of residents of Australia's capital cities were positively correlated to the public greenspace.

Most demographic characteristics were not significantly associated with life satisfaction. This finding is consistent with Proctor et al. (2009) who suggested that the relationship between demographic variables and life satisfaction was weak. For example, Huebner (1991) found life satisfaction was not significantly correlated with demographic variables such as age and gender, but correlated with personality characteristics. However, longer commuting time was found to have a negative effect on residential satisfaction and life satisfaction. This finding is consistent with Ma et al. (2018), who found people who spent longer time commuting were less satisfied with their life based on the data collected in Beijing.

As for the fourth research question, the role of social exclusion, we found social exclusion to be influenced by some objective attributes of residential environment, and influence residential/life satisfaction. Our findings provide strong evidence that urban village renters feel more socially excluded than renters in other sub-sectors. For example, urban village renters were significantly less likely to perceive equal citizenship rights than commercial housing renters. This finding is interesting because renters in different sub-sectors should have the same rights by law. Since demographic characteristics have been controlled for in the statistical analysis, a possible explanation might be that commercial housing is always located in an enclosed 'microdistrict' (*xiao qu* in Chinese) where most of the residents are homeowners (Read, 2003; Wallenwein, 2014). In contrast, the vast majority of people living in urban villages are renters and 'outsiders' (Du, et al., 2018). Living with homeowners and locals might help commercial housing renters to build a group identity (Chen & Li, 2009) and alleviate the perceived difference between homeowners and renters. In addition, *xiao qu* acts as a 'club', which provides the residents with 'club goods' such as social, commercial, and recreational services (Hendrikx & Wissink, 2017). This may also contribute to

the sense of equality of commercial housing renters. Furthermore, urban village renters are more likely to perceive discrimination and losing *mianzi* than LTRA renters and commercial housing renters, implying that urban village has been a stigmatized sub-sector at the bottom of the social and housing hierarchy (Po, 2012). In addition, we found receiving more landlord services is positively associated with the perception of equal rights, which leads to higher life satisfaction. This may be because providing more landlord services to the renters could mitigate the imbalanced renter-landlord relationship and make renters feel respected and thus have a sense of equity.

The methodology and findings of the paper have made valuable contributions to the theories of determinants of residential satisfaction and life satisfaction. First of all, while a plethora of studies have confirmed housing tenure as an important determinant of residential satisfaction and life satisfaction (Li, et al., 2019; Zheng, et al., 2020), few studies have examined the effect of the differentiation within the private rental sector on residential/life satisfaction. The findings have shown that renters living in different sub-sectors have significantly different levels of residential/life satisfaction, even after controlling for other objective attributes. Our study highlights the significant impact of heterogeneity within tenure on residential satisfaction and life satisfaction. Second, a limited number of studies examined the relationship between social exclusion and life satisfaction (Arslan, 2019; Lee, 2021), and the relationship between 'social milieu' (e.g., social network and sense of identity) and residential environment (Emami & Sadeghlou, 2021). However, few studies have shed light on the relationship between residential environment, social exclusion, and life satisfaction. Our research has shown that some objective attributes of the residential environment (such as landlord service and sub-sector) have significant effects on social exclusion, which in turn influences residential satisfaction and life satisfaction. This research is valuable for future studies that seek to understand the determinants of life satisfaction.

A limitation of the paper concerns the measurement of life satisfaction. Overall life satisfaction was measured by a single question in this study. Some researchers maintain that multiple-item measures of life satisfaction are more psychometrically established and accurate (Diener, et al., 1985). However, according to Cheung and Lucas (2014), social scientists would get basically identical results to substantive questions regardless of which measure is being used. Another limitation concerns the sample representativeness. As mentioned in Sect. 4.1, the proportions of the three sub-sectors cannot represent the whole private rental sector in Shenzhen. It is due to the particularity of Shenzhen, where urban village housing dominates the private rental sector with a market share above 80%. According to our rough estimation, a sample size of over 2,000 respondents is needed to achieve representativeness. In addition, we have adopted a non-probability sampling method due to the lack of a complete list of private rental units along with contact information. Although a series of measures have been taken to reduce bias such as handing out questionnaires in different locations and on both weekdays and weekends, our sampling method can still cause sample selection bias. Finally, the determinants of life satisfaction might vary among different sub-sectors (Li, et al., 2021). However, due to our inadequate number of cases in the LTRA sub-sector, we were unable to further explore this issue. Based on our reflections, large-scale investigations adopting probability sampling methods are needed in the future to achieve data representativeness and enable path analysis within each sub-sector.

7 Policy recommendations

The results of the paper can be useful for policymakers who are engaged in developing the private rental sector. First of all, it is important to realize that residential satisfaction could contribute substantially to life satisfaction for private renters. Therefore, renters' life satisfaction levels could be increased by improving their residential environment including providing rental housing of bigger size and higher quality. The construction of public facilities near the residential area should be encouraged. More importantly, legislation and regulations should be enacted to clarify the scope of responsibilities and services of landlords. On the other hand, our results suggest that renters' life satisfaction could be improved by promoting 'equal rights between renter and homeowner' and reducing discrimination against renters. Therefore, ongoing attempts of empowering the renters should be encouraged. However, as Chen and Wu (2019) argued, two major challenges in the empowerment of renters are the scarcity of quality public services and the inequality in the spatial distribution of public services. Empowerment of 'a certain degree of rights' such as social insurance and healthcare may be more realistic in the near future. In addition, although we encourage modest upgrading of urban village housing to improve the life satisfaction of the inhabitants, precautions should be taken against rent rise, as most urban village renters are low-middle income households who are sensitive to rent prices. Urban village housing indeed acts as an alternative to social housing for them in terms of affordability. Therefore, transforming urban village housing into public affordable housing can be considered. In a recent policy document issued by the General Office of the State Council (2021), several attempts have been made to transform urban village housing into affordable rental housing. For example, the urban village committee is allowed to build and operate affordable rental housing through self-building or joint ventures, shareholding, etc. Interestingly, a recent government-led initiative in Shenzhen, aimed at transforming Baimang Village into Affordable Rental Housing has faced considerable opposition from the local residents, leading to the suspension of the project (Southern Metropolis Daily, 2023). The opposition from the residents primarily stems from being asked to relocate within a short timeframe and concerns regarding potential rent hikes. In light of these circumstances, it is imperative for the government to increase its investment and ensure that the transformation of urban villages does not exacerbate the residents' burdens, while also ensuring proper relocation for existing residents. Only through the accomplishment of these two key objectives can the transformation and upgrading of urban villages stand a chance of achieving success. Finally, the local government could also consider enacting rent regulation laws to keep the rent at a stable and affordable level, which was shown to contribute to renters' life satisfaction significantly. However, policymakers should also take into account the potential decline in supply (Rugg & Rhodes, 2003) and housing insecurity (Greif, 2018) that rent regulation might bring about.

Declarations

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