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ARTICLE

Residential satisfaction in student housing: an empirical study in Stockholm, Sweden

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Abstract
Despite the widely-recognized importance of student housing in educational settings, the housing experience of university students remains understudied. This study attempts to assess the residential satisfaction in student housing in Stockholm, Sweden and the indicators which predict residential satisfaction in this context. Moreover, it explores whether residential satisfaction varies between different socio-demographic groups. A list of satisfaction indictors was identified through reviewing literature and a number of semi-structured interviews, thereafter data was collected from a questionnaire survey with simple random sampling. The responses were analysed through descriptive analysis, stepwise regression, t-test and analysis of variance. The results show that the current occupants are generally satisfied with the student housing in Stockholm. Seven indicators appear to be predictors of satisfaction, among which the strongest ones are kitchen facilities, cleanliness and accessibility to public transport stations. In terms of socio-demographic characteristics, those with a shorter residential duration are found to be more satisfied. Furthermore, studio residents are more satisfied than corridor-room residents.

Keywords Residential satisfaction · Student housing · Young people · Sweden

1 Introduction

Housing is associated with quality of life as well as physical and psychological well-being (Baiden et al., 2011; Shaw, 2004). Beyond the dwelling unit, housing affects people through various aspects, including the located neighbourhood, the facilities and services, and natural elements. (Coley et al., 1997; Vera-Toscano & Ateca-Amestoy, 2008). In this sense, housing performance has become a concern for researchers, policymakers as well as housing developers and city planners.

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In terms of assessing the performance of housing, the concept of residential satisfaction is often used (Teck-Hong, 2012). Residential satisfaction reflects the degree of contentment regarding one's current housing situation (Mohit et al., 2010). It assesses both the physical attributes of the living environment, such as location and characteristics of design, and the social environment such as social relationships and safety (Amérigo & Aragonés, 1997; Kaya & Erkip, 2001).

Over the past two decades, a special type of housing—student housing—has seen an upward trend in research (Simpeh & Akinlolu, 2021). Student housing is a critical part of educational settings. It is expected to not only serve as a safe and private dwelling but also as a platform for students' social contact (Najib et al., 2011; Toyin Sawyerr & Yusof, 2013). Quality student housing can promote students' academic performance, involvement, school adaptation, openness to diversity as well as personal character development (Blimling, 1999; Choi et al., 2016; Hassanain, 2008; Pike, 2009). On the other hand, unsatisfactory residential environments including noise pollution, crowdedness, and socially overloaded environment can harm students' well-being, such as causing higher levels of stress and poorer exam results (Evans et al., 1996; Valins & Baum, 1973; von Simson & Umblijs, 2021). As such, university administrators have come to realize the potential of student housing as a competitive advantage in attracting and retaining motivated students (McBride, 2017; Pillai et al., 2021).

Despite the importance of student housing, the demand for it has consistently outstripped supply in many countries (Attia et al., 2020). In Sweden, the focus country of this study, the problem of student housing shortage has led to a continuous demand for student housing developments. The number of registered first- and second-cycle students has exceeded 384,000 since 2020 (UKÄ, 2021); however, in 2021 there are only 108,034 student housing units across Sweden (Statistics Sweden, 2022). Cities such as Stockholm, Gothenburg and Lund have the highest number of student housing, yet they experience a particularly severe student housing shortage (SFS, 2022). The ongoing demand for affordable, sustainable and high-quality student housing makes student housing a promising subsector of the real estate market, offering attractive opportunities to real estate developers and investors (French et al., 2018; Mackie, 2016; Pillai et al., 2021).

Confronting such huge demand for student housing development, however, there is a lack of research into student housing living experience. The under-reported housing experience of university students has resulted in many new student housing developments failing to capture the characteristics of student groups and failing to satisfy their needs and preferences (Sotomayor et al., 2022). To promote better student housing developments and thus students' well-being, this study aims to examine residential satisfaction in student housing from the perspective of current occupants in Stockholm, Sweden. The aim of this study is as follows:

(1) To investigate the level of residential satisfaction perceived by current occupants of the student housing in Stockholm;
(2) To determine the key indicators whose improvements can enhance students' residential satisfaction;
(3) To explore the effect of social-demographic characteristics on students' residential satisfaction.

Based on the empirical research, key points for satisfactory student housing are identified and recommendations for future development are made.

2 Literature review

2.1 Theoretical foundation of residential satisfaction

Residential satisfaction is an interdisciplinary topic arising within fields such as sociology, psychology, geography, marketing, architecture and planning (Festinger, 1954; Galster, 1985; Lu, 1999; Morris & Winter, 1975; Oliver, 1980; Riemer, 1943). It not only reflects the feelings towards the physical residential environment but also in relation to the non-physical aspects such as the inhabitants' social networks (Amérigo & Aragonés, 1997; Biswas et al., 2021; Galster, 1985). The concept of residential satisfaction has attracted the attention of policymakers and housing developers alike, as it can be used to assess housing developments, understand residents' perception of the residential environment, and predict residential mobility and housing demands (Galster, 1985; Morris et al., 1976; Speare, 1974).

Three theories are believed to provide a foundation for residential satisfaction research (Biswas et al., 2021; Mohit & Al, 2014). In the 'Housing Needs Theory', Rossi claims that the 'lack of fit' between residents' current and desired housing needs will lead to dissatisfaction, which will subsequently increase residential mobility as residents tend to adjust this lack of fit (Rossi, 1955). While in Rossi's work the influence of physical and social environments on housing needs seems more implicit, Morris et al. (1976) develop the 'Housing Deficit Theory', explicitly viewing housing needs as cultural housing norms. If the housing fails to fit with the normatively derived needs, a housing deficit is said to exist. This deficit leads to a high dissatisfaction level and thus an intention to reduce it, possibly through residential mobility, residential adaptation and family adaptation (Morris & Winter, 1975; Morris et al., 1976). The process of how satisfaction or dissatisfaction is manifested is also indicated in Galster's 'Psychological Construct Theory' (Galster, 1985). In Galster's view, residents judge their residential situation based on a 'reference' condition that is cognitively constructed by themselves. If the current situation meets or surpasses the reference condition, the residents are believed to be satisfied. On the contrary, an over-threshold deficiency would lead to two possible consequences: adaptation, such as reducing aspirations; or dissatisfaction, which would further lead to behaviours to reduce the dissatisfaction, such as moving away.

These three theories present a similar process: if a negative discrepancy is perceived by the residents, dissatisfaction can arise, which in turn may lead to residential mobility so as to reduce this discrepancy. The ideas of these theories have been used in many empirical studies on residential satisfaction (Emami & Sadeghlou, 2021; Mohit & Al, 2014).

2.2 Student housing residential satisfaction

Residential satisfaction is one of the main fields of student housing research (Simpeh & Akinlolu, 2021). A sufficient number of relevant studies have been conducted in some parts of the world, especially Nigeria, Saudi Arabia, China and Malaysia, where on-campus shared rooms are common. For example, Hassanain (2008) evaluated the performance of existing student housing facilities in Saudi Arabia, with a focus on the technical performance elements such as thermal comfort and indoor air quality, and the functional performance elements such as room layout and furniture quality. In Nigeria, a study by Amole (2009) focused on Nigerian university students satisfaction towards student housing, and

revealed that students were generally dissatisfied with the housing condition. In Iran, Nazarpour and Norouzian-Maleki (2021) conducted their research from a comparative perspective. They found that compared with high-rise student housing, mid-rise housing was more favorable in a number of aspects, including access to open space, indoor noise pollution, cooling system, etc. However, there is a limited number of research that looks into the student housing living experience within Europe.

In terms of specific indicators regarding residential characteristics, previous researchers often classify them into groups. For example, Ning and Chen (2016) identified five technical aspects and five social aspects in their post-occupancy evaluation framework. Sanni-Anibire and Hassanain (2016) also employed post-occupancy evaluation but adopted three categories including design quality, indoor environmental quality and quality of building support services.

These frameworks vary considerably (Ning & Chen, 2016), while the specific indicators are overlapped. Frequently adopted indicators of residential satisfaction are related to the indoor living condition, such as room size, interior finish, storage and ventilation, as well as those related to the neighbourhood condition, such as distance to academic facilities and city centre, recreation places, landscape and open space (Amole, 2009; Nazarpour & Norouzian-Maleki, 2021; Ning & Chen, 2016; Thomsen & Eikemo, 2010). Moreover, as a psychological state, 'satisfaction' does not only rely on the physical residential environment (Galster, 1985), socio-psychological aspects such as social relations, privacy and place attachment have also been shown to be associated with student housing residential satisfaction (Choi et al., 2016; Emami & Sadeghlou, 2021; Ning & Chen, 2016).

When it comes to residential satisfaction in student housing, it is important to note that the experiences of broader residential satisfaction research might not be fully applicable. For one thing, some characteristics of this type of housing, such as property ownership, community services, shared facilities, etc., could be different from the common residential buildings (Amole, 2009; Ning & Chen, 2016). For another, university students constitute a group of occupants with special demographic backgrounds, and thus certain demographic factors such as occupation, income level and the number of family members may not be applicable in this context (Amole, 2009; Ning & Chen, 2016). Consequently, most researchers develop their own questionnaires with selected indicators. In this sense, more attention should be paid to the rationale for the indicator selection and questionnaire design. As Adriaanse (2007) and Smrke et al. (2018) stated, some residential satisfaction studies seem to have adopted a list of 'arbitrarily' defined factors by the researchers and with limited reporting on the rationale of the questionnaire development, leading to questions about the rationality of the decisions.

2.3 Measurements of overall residential satisfaction

In terms of the measurements of the overall residential satisfaction, there are generally two ways. The first method is to use a single question on overall satisfaction, for example, '*Are you satisfied with your housing?*' (Moore et al., 2019; Nazarpour & Norouzian-Maleki, 2021; Thomsen & Eikemo, 2010). Another way is to use an index of several highly correlated items on overall satisfaction. The four-item index of residential satisfaction developed by Francescato et al. (1989) is a highly recognized example:

(a1) How satisfied are you with living here?
(a2) How long do you want to live in this housing development?

(a3) If you move again, would you like to live in another place like this?
(a4) Would you recommend this place to one of your friends if they were looking for a place to live?

Two reasons are mentioned for using this four-item index, namely, higher reliability of the criterion compared with using a single question, and integrating the cognitive, affective and conative aspects (Carvalho et al., 1997; Francescato et al., 1989). Following Francescato's work, Amole (2009) modifies these questions to develop an index that is more suitable to the student housing context. The index is based on three questions:

(b1) How satisfied are you with living here in general?
(b2) Do you intend to move to another accommodation in the near future?
(b3) How would you rate your present bedroom for the activities of:
(i) sleeping (ii) studying (iii) entertaining friends (iv) relaxing

A Likert scale is adopted to quantify the respondents' attitudes towards these questions. The index is computed as the mean of the respondent's total scores on these questions.

3 Methodology

3.1 Student housing in the study area

In Sweden, the number of enrolled students in Swedish higher education has experienced a substantial increase with fluctuations since the last decade of the last century. A large increase appeared during the last few years. According to Swedish Higher Education Authority, the number of registered first- and second-cycle-students increased from 343,210 in 2016 to 384,500 in 2020. Of the 384,500 registered students, 73% (282,000) attended only on-campus study. Besides, there were around 17,000 doctoral students in higher education.

However, the student housing provided is not sufficient to accommodate such number of students. According to Statistics Sweden, in 2021 there were 108,034 student housing all together, with an average room size of 28 square meters. Most of these student housing is located in the major university towns, such as Uppsala, Stockholm, Göteborg and Lund, while these areas experience a particular serious student housing shortage. Specifically, in Stockholm, th efocus area of this study, the approximate number of campus students is 74,000 while the provided number of student dwellings is around 12,387 (Statistics Sweden, 2022).

The problem of student housing shortage has raised concerns and is being alleviated by building more. According to Studentbostadsföretagen, the industry organization focusing on student housing, an additional 5,400 student housing units are expected to be ready by 2024 in Stockholm. However, it is criticized that there is a lack of governmental incentives for increased construction of student housing (SFS, 2022).

The most common types of student accommodation are corridor-rooms, studios and apartments. A corridor-room is a room with a private bedroom, but one or more of the kitchen, shower and toilet are shared with other students in the same corridor. Students living in corridor-rooms are expected to take responsibility for taking care of the common areas in the corridor. A studio is a one-room student apartment with a private kitchen and

bathroom. An apartment refers to a multi-room residence. Students living in an apartment have their own bedroom while sharing the living room, kitchen and bathroom. The allocation of student housing is commonly based on the rank order determined by the number of credit days.

The NKI, nöjd-kund-index (satisfied customer index), is widely-adopted by student housing companies in Sweden to assess customer satisfaction. The NKI is based on the following three items:

(c1) How satisfied the customers are with the business as a whole
(c2) How well the business meets customers' expectations
(c3) How the business is compared to an ideal one

3.2 Research design

To alleviate the potential problem of justifying the selection of indicators (Adriaanse, 2007; Smrke et al., 2018), this study adopted a combination of qualitative interviews and questionnaire surveys, with the former aiming at selecting indicators for the latter.

Ten face-to-face semi-structured interviews were conducted in April 2022, with 5 female and 5 male students. Firstly, interviewees were asked to give opinions on the indicator list which included 54 indicators summarized from previous literature. For each indicator, they were asked if they believed it had a large impact on their residential satisfaction. Secondly, questions regarding the interviewees' previous housing experience were asked. The specific questions asked differed depending on the answers provided, but generally, information regarding the characteristics of their previous room as well as the satisfactory and unsatisfactory aspects was gathered. Based on the interview results, 24 indicators (Table 1) that were considered by most interviewees to have a great impact on residential satisfaction were selected, and thereafter investigated in the questionnaire.

The questionnaire survey was employed to quantify the students' residential satisfaction level. The questionnaire included 36 questions altogether: 8 questions on demographic features of the respondents, 3 questions on overall residential satisfaction level, 24 questions on the indicators, and 1 optional open-ended question regarding comments on the residences. Overall residential satisfaction was measured by the following three questions rather than one single question, so as to increase the reliability of the criterion:

(1) How satisfied are you with living here in general?
(2) If you move again, would you like to live in another place like this?
(3) How well does your current room meet your expectations?

These three questions were selected based on three references introduced earlier: the four-item index developed by Francescato et al. (1989), the three-question index developed by Amole (2009), and the NKI used by the student housing industry in Sweden. They were measured on a scale from 0 to 10, with a higher score representing a higher level of satisfaction or agreement. The overall residential satisfaction index was calculated for each respondent as the average of their scores on these questions. Satisfaction towards the 24 indicators was investigated by a 7-point Likert scale, with the score 1, 2, 3, 4, 5, 6, 7 representing 'very dissatisfied', 'moderately dissatisfied', 'slightly dissatisfied', 'neutral', 'slightly satisfied', 'moderately satisfied', 'very satisfied' respectively.

Table 1 Indicators used in the questionnaire survey

	Indicator	Explanation
1	University	Closeness to the university
2	PT stations	Accessibility to public transport stations
3	Shops	Quantity and variety of shops nearby
4	Green area	Availability and closeness to green spaces and natural elements
5	Electricity	Electricity installations (e.g. number of electrical sockets, stability of power supply)
6	Water supply	E.g. water temperature, water flow
7	Internet	Internet service inside the room
8	Security	Quality of security system to the private spaces (e.g. gates, doors)
9	Fire safety	E.g. smoke alarms, escape route
10	Soundproofing	E.g. noise from neighbours, vehicle noise
11	Air quality	Indoor air quality (e.g. humidity, smell, dust)
12	Size	Size of the residence
13	Orientation	Room orientation (i.e. north/south/west/east facing)
14	Bathroom facilities	Quality of bathroom facilities (e.g. shower head, flush toilet, mirror, water-tap)
15	Kitchen facilities	Quality of kitchen facilities (e.g. stove, refrigerator, sink, oven, microwave)
16	Laundry	Use of laundry (e.g. distance to the laundry, availability of washing/drying machines)
17	Lifts/stairs	Availability, location and quality of lifts/stairs in the building
18	Rent	Rent paid to the landlord
19	Cleanliness	Cleanliness in the building and the room
20	Garbage disposal	E.g. ease of garbage disposal, waste recycling
21	Insects	Activities of insects, pests, and rodents in the accommodation
22	Safety	Personal safety perception in the residential area
23	Privacy	Sense of privacy in the room
24	Friendship	Existence of friends nearby

A pilot survey was conducted with 6 students to pre-test the questionnaire. The aim was firstly to check whether there was any ambiguous expression, and secondly to ensure the font size, layout and length of the questionnaire were reasonable. A few questions were modified according to the feedback from the pilot survey.

3.3 Data collection

Simple random sampling with the incentive of charitable donations was adopted. Questionnaires were both posted online and distributed on-site: the link to the questionnaire was posted on the Facebook groups of Stockholm's student housing areas; hard copies of the survey introduction and questionnaire QR code were distributed in universities' libraries and study halls as well as put on the unoccupied tables. In order to increase the response rate, the indirect incentive was used that for each response received, 5 Swedish Krona would be donated to a charitable foundation.

In total 223 students entered the survey, of which 183 responses were fully completed and considered valid for further analysis. This sample size has met the minimum sample

size suggested by Bartlett et al. (2001) that for each indicator, there should be at least 5 responses.

3.4 Data analysis

The data analysis in this study included four steps. First of all, the demographic features of the respondents were analysed using descriptive statistics. Secondly, a descriptive analysis was performed on overall residential satisfaction and the 24 indicators. As the premise of the descriptive analysis, a reliability analysis was conducted for the three items on overall residential satisfaction, and hereafter the overall residential satisfaction index was computed as the mean score on these three items. In the third step, a stepwise multiple linear regression was applied to identify which of the indicators were predictors of the dependent variable (overall residential satisfaction index). Lastly, the independent sample t-test and analysis of variance were used to compare the means of overall residential satisfaction in different socio-demographic groups.

4 Results and discussion

4.1 Socio-demographic features of the respondents

The 183 respondents' profile is presented in Table 2. Respondents come from more than 30 countries, a testament to Stockholm's diversity. The number of female respondents is almost 1.5 times that of male respondents, corresponding to the statistic that women accounted for 61% of first- or second-cycle enrolled students in the 2020 autumn semester (UKÄ, 2021). Surprisingly, a large percentage of the respondents is master students (58.5%) in terms of level of study, and international students (45.9%) in terms of enrolment status. This may be explained by an observation when conducting the interview that many local bachelor students do not live in student housing.

4.2 Descriptive analysis of residential satisfaction

A reliability test is conducted for the three items on overall residential satisfaction. The results show a high level of internal consistency (Cronbach's alpha = 0.859), indicating that these items are homogeneous and measure the same concept. Hereafter, the overall residential satisfaction (ORS) index is computed for each respondent as the average of their scores on the three items. The results (Table 3) show that the majority of respondents (60%) are satisfied or very satisfied with their current residence. The 'satisfied' respondents constitute the largest percentage, followed by the 'neutral' respondents, which may explain why the mean value of the ORS index (6.57) is just above the lower limit of the 'satisfied' level.

The three-item overall residential satisfaction index used in this study appears to be highly reliable in measuring student housing residential satisfaction. In the case of Stockholm, it seems better to avoid questions about residential duration or mobility, such as '*Do you intend to move to another accommodation in the near future?'* adopted by Amole (2009). For one thing, residential duration and mobility in student housing could be largely influenced by students' education, such as graduation and change of study place. For another, residential mobility may be much limited under the situation of student housing shortage and credit-day allocation rules in Stockholm, as one respondent mentioned,

Table 2 Respondents' profile

Individual characteristics	Frequency	Percentage
What is your age?		
≤ 24	94	51.4
25–29	72	39.3
≥ 30	17	9.3
What is your gender?		
Female	107	58.5
Male	75	41.0
X	1	0.5
What is your level of study?		
Bachelor's level	56	30.6
Master's level	107	58.5
Doctoral level	20	10.9
What is your enrolment status?		
Local student	84	45.9
International student	99	54.1
What is your nationality?		
Swedish	66	36.1
Chinese	24	13.1
Indian	17	9.3
Spanish	9	4.9
Other (30 countries)	67	36.6
What type of student housing do you live in currently?		
Corridor room	84	45.9
Apartment	51	27.9
Studio	42	23.5
Other	5	2.7
How long have you lived in your current accommodation?		
< 1 year	92	50.3
≥ 1 year, < 2 years	75	41.0
≥ 2 years	16	8.7
How many times have you moved in student housing in Stockholm?		
0	84	45.9
1	69	37.7
≥ 2	30	16.4

Table 3 Overall residential satisfaction amongst respondents

Satisfaction level	ORS index range	Frequency	Percentage
Very dissatisfied	0 ≤ ORS index ≤ 2	8	4.37
Dissatisfied	2 < ORS index ≤ 4	22	12.02
Neutral	4 < ORS index ≤ 6	43	23.50
Satisfied	6 < ORS index ≤ 8	68	37.16
Very satisfied	8 < ORS index ≤ 10	42	22.95

'*needed to wait 4 years to get enough days for the apartment*'. As such, these questions are not appropriate measurements of residential satisfaction in student housing. On the other hand, the question adapted from the NKI items, '*How well does your current room meets your expectations?'*, seems to be effective. This question expresses a similar idea as the 'Psychological Construct Theory' that residential satisfaction depends on the gap between the current housing situation and the residents' psychological 'reference condition' established by their needs and aspirations (Galster, 1985). The remark from one respondent supports this relationship:

> I am satisfied with my accommodation based on my low expectations. I am a student in an expensive city hence I am happy to live in a big enough room, near enough to the city centre and university.

The descriptive statistics of the 24 indicators are presented in Table 4. The indicator with the highest mean value is *PT stations* (6.27), followed by *green area* (6.04). Interestingly, these two items both reflect locational characteristics. None of the indicators are classified as 'dissatisfied' based on the means. However, exactly half of the indicators are classified

Table 4 Descriptive statistics of the indicators

Items	N	Mean	SD	Satisfaction level
PT stations	183	6.27	1.006	VS
Green_area	183	6.04	1.292	VS
Water_supply	183	5.87	1.502	MS
University	183	5.68	1.569	MS
Safety	183	5.68	1.429	MS
Privacy	183	5.54	1.440	MS
Electricity	183	5.37	1.570	MS
Internet	183	5.26	1.702	MS
Insects	183	5.11	1.591	MS
Friendship	183	5.10	1.612	MS
Bathroom	183	5.09	1.675	MS
Fire_safety	183	5.02	1.389	MS
Garbage_disposal	183	4.99	1.844	SS
Lifts_stairs	183	4.92	1.579	SS
Cleanliness	183	4.90	1.628	SS
Rent	183	4.78	1.719	SS
Laundry	183	4.72	1.743	SS
Size	183	4.69	1.581	SS
Orientation	183	4.69	1.599	SS
Shops	183	4.68	1.637	SS
Air_quality	183	4.66	1.609	SS
Kitchen_facilities	183	4.61	1.657	SS
Security	183	4.60	1.703	SS
Soundproofing	183	4.16	1.701	SS

VS = very satisfied (mean ≥ 6), MS = moderately satisfied (mean ≥ 5), SS = slightly satisfied (mean ≥ 4)

as 'slightly satisfied' while only 2 indicators are classified as 'very satisfied', indicating there is room for improvement.

4.3 Predictors of overall residential satisfaction

Stepwise regression is adopted to determine the best linear combination of the 24 indicators in predicting the overall residential satisfaction. The linear regression model (Table 5) explains 54.5% of the variance in overall residential satisfaction, in which all the seven predictor variables have a positive relationship with overall residential satisfaction. The low variance inflation factors (VIF) indicate the absence of multicollinearity problems in the model. Among all the predictor variables, satisfaction with kitchen facilities contributes most to predicting overall residential satisfaction, followed by cleanliness and public transport stations.

The finding that *kitchen facilities* is an important predictor of overall residential satisfaction corresponds to previous research (Amole, 2009; Najib et al., 2011). Learnt from the interviews, in some countries where shared on-campus dormitories are common, such as India and China, there are usually large-capacity canteens to ensure students' daily meals and thus dormitories are usually not equipped with kitchens. In Stockholm, however, it is common for university students to prepare their own meals. Hence, kitchen facilities become rather important to residential satisfaction.

Cleanliness appears to have a significant positive contribution to residential satisfaction, corresponding to existing studies (Moore et al., 2019). Interestingly, remarks from the respondents suggest that satisfaction towards cleanliness seems to rely heavily on the co-residents:

> As I live in the corridor type of residence, my satisfaction is pretty much varied by the tenants. I used to live with clean people so my experience using the kitchen with them was so great, but when they move out and new tenants were dirty, I really hated using the common area.

Indeed, such variety in housing-sharing experiences caused by co-tenants is not only manifested in conflicts over shared space use but also social relationships. As Bricocoli and Sabatinelli (2016) find, young co-tenants may be in 'warm' relations where they take

Table 5 Stepwise regression

Variable	B	SE	Beta	t value	*p* value	VIF
(Intercept)	−2.869	0.828		−3.466	0.000***	
Kitchen facilities	0.330	0.080	0.256	4.115	0.000***	1.492
Cleanliness	0.304	0.084	0.232	3.598	0.000***	1.596
PT Stations	0.422	0.111	0.199	3.793	0.000***	1.057
Lifts/stairs	0.205	0.071	0.152	2.874	0.005**	1.075
Orientation	0.200	0.073	0.150	2.734	0.007**	1.153
Size	0.232	0.086	0.172	2.678	0.008**	1.578
Rent	0.157	0.079	0.127	1.987	0.048*	1.562

Dependent variable = overall residential satisfaction index. Residual standard error = 1.468, df = 175, R = 0.738, $R^2 = 0.545$, F = 29.98, $p < 2.2e{-}16$

the initiative to organize social activities, or 'cold' relations with little social exchange or emotional connection, eliciting contrasting types of experience.

Accessibility to public transport stations is also found to have a significant positive effect on students' residential satisfaction, in line with previous studies (Delbosc, 2012; Xu et al., 2020). This is not surprising as the transport system provides easy access to various facilities elsewhere. Surprisingly, however, *closeness to university* is not a predictor of overall residential satisfaction, contrary to the study by Thomsen and Eikemo (2010) which shows a significant positive effect. One explanation is that virtual learning has grown in popularity even among students that live within commuting distance to campus (McBride, 2017), and COVID-19 has accelerated this transformation towards online education (Adedoyin & Soykan, 2020), leading students to put less emphasis on the proximity to universities. Another possibility is that the importance of location relative to the university is more likely to show in terms of 'accessibility' rather than 'distance' to the university. This argument is inspired by relevant research which shows that perceived accessibility, rather than the actual distance between the residence and transport system, is associated with residential satisfaction (Hamersma et al., 2014; Olfindo, 2021). As *accessibility to public transport stations* is the only predictor relevant to locational characteristics, it seems in Stockholm, satisfactory student housing does not necessarily need to be located beside universities, shops, etc., as long as they are easily accessible.

Unexpectedly, overall residential satisfaction seems to largely depend on the most fundamental attributes of housing, while none of the social-aspect indicators, such as *safety*, *privacy* and *friendship*, appear to be predictors. Theoretically, both the physical aspects including equipment and services and the social aspects are believed to be associated with residential satisfaction (Biswas et al., 2021). Empirical findings also suggest social attributes, such as social density and privacy, have a significant influence on student housing satisfaction (Amole, 2009). In this regard, the results in this study should not be interpreted as social aspects mean nothing to students' residential satisfaction. They may only suggest in Stockholm's student housing, the aspects reflecting the basic necessities of life—a clean, affordable, easy-commuting and adequately spacious shelter with available kitchen facilities—are essential to students' residential satisfaction. The influence of social environment on students' residential satisfaction may be worthwhile to be further explored.

4.4 Difference in residential satisfaction with respect to sociodemographic variables

In order to examine whether the students' overall residential satisfaction varies between different socio-demographic groups, the independent sample t-test and analysis of variance (ANOVA) are employed. The seven characteristics included in the analysis are *age, gender, level of education, enrolment status, type of housing, residential duration* and *move experience*, with *type of housing* categorized into three groups and all the other characteristics categorized into two groups. Extreme small groups, such as gender 'X' and type 'Other', are excluded from the analysis.

Before testing the differences among means, the associations between the seven nominal variables are examined based on Cramer's V. All pairs of variables are weakly associated except for two pairs: *enrolment status* and *level of education* (Cramer's $V = 0.464$), and *enrolment status* and *type of housing* (Cramer's $V = 0.475$). Therefore, three-way ANOVA is performed to test the effect of *level of education, enrolment status, type of housing* jointly

Table 6 t-test for means of ORS with respect to demographic characteristics

Variable	Group	N	Mean	SD	t	*p*
Age	≤ 24	88	6.75	1.968	0.767	0.444
	≥ 25	89	6.51	2.202		
Gender	Female	105	6.71	1.989	0.646	0.519
	Male	72	6.50	2.229		
Residential duration	< 1 year	87	6.96	1.987	2.108	0.036*
	≥ 1 year	90	6.30	2.140		
Move experience	No	79	6.58	2.039	− 0.271	0.787
	Yes	98	6.66	2.134		

in case any potential interaction effect, whilst t-test is used for *age, gender, residential duration* and *move experience*.

The results of the t-test (Table 6) show that the mean of ORS of those who have lived in their current accommodation for less than 1 year is significantly higher than those who have lived for more than 1 year (p = 0.036). Such finding that satisfaction appears to be lower among students who have longer stay (more than 1 year) in their current accommodation is in line with the findings by Fang (2006) and Dekker et al. (2011). One possible reason is that the longer the students stay, the more problems they may encounter; meanwhile, residential mobility in student housing is greatly restricted due to the credit-day rule. In this situation, residential mobility as a way to reduce dissatisfaction (Morris & Winter, 1975) is blocked, and dissatisfaction builds up over time. However, this does not necessarily mean satisfaction will decrease with the length of stay all the time—the relationship between them seems to be complex, as some previous evidence also indicates a positive relationship (Amole, 2009). Nonetheless, this study only suggests a negative relationship between residential duration and satisfaction.

The results of ANOVA (Table 7) show that *type of housing* has a significant main effect, while none of the interaction effects are significant. Tukey's post-hoc test for *type of housing* reveals that students living in corridor-rooms (mean = 6.20) have a significantly lower level of ORS compared to those living in studios (mean = 7.22, $p = 0.026$). This finding is not surprising. For one thing, studios may differ from corridor-rooms in physical

Table 7 Three-way ANOVA on ORS with respect to demographic variables

	F	*p*
Status	3.859	0.051
Type	7.329	< 0.001***
Edu	0.078	0.780
Status: type	0.239	0.788
Status: edu	0.047	0.828
Type: edu	0.900	0.409
Status: type: edu	0.845	0.432

Status = enrollment status, categorized as 'local student' and 'international student'. Type = type of housing, categorized as 'corridor room', 'apartment' and 'studio'. Edu = level of education, categorized as 'undergraduate' and 'postgraduate'

attributes such as room size and kitchen facilities, and correspondingly social aspects such as privacy and cleanliness in the common areas. Compared with studio residents, students living in corridor rooms are more likely to be affected by their neighbours, as one respondent complained, '*some people don't clean the kitchen or throw the garbage*'. For another, living in a studio seems to be more of an active choice because of the high credit days required. For example, the average credit days needed for a studio in the largest student housing area in Stockholm, Lappkärrsberget, is 704 days; while for a corridor-room, it is 215 days (SSSB, n.d.). This means when students are capable to choose studios, they can also choose corridor-rooms, in which case they choose the one that best meets their expectations. Explain with the idea from 'Housing Needs Theory' (Rossi, 1955), choosing to live in a studio seems to be a voluntary behaviour that reduces the 'lack of fit' between the current and desired housing need, and therefore studio residents are likely to be more satisfied compared with corridor-room residents.

4.5 Implication and limitation

The results from the interview and questionnaire of this study reveal several noteworthy points to ensure a better living experience for university students. Firstly, to guarantee satisfactory student housing, attention needs to be paid to the seven predictors in the regression model, namely, kitchen facilities, cleanliness, public transport stations, room size, lifts/stairs, room orientation and rent. Strategies such as building new student housing near public transport, ensuring kitchen facilities are adequate and working properly, and arranging more frequent cleaning services for the common areas may be of great help.

Secondly, this study calls for greater attention to students' voices and a deeper understanding of their needs. In this study, a longer residential duration is found to relate with a lower satisfaction level, which may indicate that the problems arose during the students' period of stay are not effectively solved. Comments from the respondents also suggest that students' priorities are sometimes overlooked—newly built facilities may not be considered very useful, '*they built a padel court that nobody asked for and removed green space for it*'; while in the meantime, the existing facilities are not properly maintained: '(in the laundry) *the machines break down constantly and the drying cabinets never dry things properly*', or operated: '*the common room sauna is not available for use and there's no information why*'. As suggested by Sotomayor et al. (2022), students should be involved in the planning process of student housing, and more broadly in affordable housing plans as well as discussions at the regional levels.

The results also imply the importance of collective responsibility among students, as some aspects, such as cleanliness and noise, seem to be largely influenced by neighbours. In this respect, students are supposed to take the initiative to create a better living environment, such as by avoiding making noise late at night and taking care of the common area. Authorities can also contribute by introducing stricter rules, random inspection, and conducting thorough introduction of the rules to new residents.

Some limitations of this study should also be noted. Firstly, selection bias could exist, since those who were dissatisfied with their accommodation might be more willing to fill in the questionnaire so as to report their problems. The indirect incentive of donation used in this study might alleviate this problem as it encouraged students to complete the survey, while it is difficult to totally avoid such a problem.

Additionally, this study tries to shed light on which aspects of the student housing setting may help create a better living experience for university students, and is thus conducted from more of an objective perspective, such as using indicators relating with the location, design, amenities of the residence, while overlooks the influence of individuals' living experience itself. On the other hand, some researchers have underscore a psychological perspective of the housing environment which takes into account the inter-individual variation. Indeed, Oswald et al. (2006) argue that housing satisfaction is one of the domains of perceived housing, and it should be considered simultaneously with the other three domains, namely, the meaning of home, the usability in the home, and housing-related control beliefs. Such perceived aspects of housing is later found to be related with healthy aging (Oswald et al., 2007). Future research may consider involving individual-specific subjective experience from living in the home to enable a more comprehensive understanding of how students perceive their housing, especially for research that pays attention to the impact of residential satisfaction on individuals' psychological wellbeing.

5 Conclusion

The importance of student housing has come to recognize by researchers, university administrators, housing developers as well as investors, due to its influence on student wellbeing and its potential for development. However, university students' housing experience has been overlooked in academic research and public debate, hindering the development of quality student housing. This study tries to understand students' housing experience by investigating residential satisfaction in student housing in Stockholm.

The results show that the current residents in Stockholm's student housing are generally satisfied with their accommodation, while there is still room for improvement. Aspects including kitchen facilities, cleanliness, public transport stations, room size, lifts/stairs, room orientation and rent are found to be predictors of overall residential satisfaction. As such, these aspects should be regarded as priorities when planning new student housing developments or renovating existing units. Furthermore, studio residents are found more satisfied than corridor-room residents, and those with a shorter residential duration are more satisfied compared with those with a longer stay in their current accommodation. The empirical findings also reveal the importance of collective responsibility among students, and thus rules and regulations that help foster better collaboration between students may be desirable.

The study fills a gap in research on residential satisfaction in the context of student housing in Sweden. The three questions adopted to measure the overall residential satisfaction could also serve as references for future research in student housing. The empirical findings provide insights into what constitute satisfactory student housing from the perspective of current occupants, which may be beneficial to universities and housing developers. For future research, the influence of social environment and individuals' subjective living experience on students' residential satisfaction could be further explored.

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Declarations

Conflict of interest The authors have no competing interests to declare that are relevant to the content of this article.

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