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Identification of factors that assure quality of residential environments, using environmental assessment indices: a comparative study of Two of Tehran's neighborhoods (Zafaranieh &Khaniabad)

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Abstract

Living in satisfying urban environments is important for an individual's well-being. In order to create such environments, planners, designers, and policy makers need to understand the structures that cause residents to feel satisfied with their environments. This paper focuses on the perceived quality of urban residential environments: dwellings and neighborhoods. First, literature review was conducted to extract a list of relevant attributes of environmental quality (EQ), which in turn became the theoretical basis for the rest of this work. Next, the general research methodology, the multi-attribute evaluation of perceived quality of urban residential environments, was presented. Hierarchical multiple regression was used for data analysis. Using written questionnaire, residents in two neighborhoods of Tehran, Zafaranieh and Khaniabad were asked to evaluate their present residential situation on the various residential attributes. Due to the presence of north-south dichotomy in Tehran, researcher tried to compare perceptions of the residents of these two neighborhoods. Regressing the general satisfaction evaluations on the specific evaluations revealed a model fit which appeared to be relatively high (49%). It was concluded that next to physical attributes, psycho-social attributes and attributes of built environments are relevant attributes, and EQ may best be seen as a hierarchical multi-attribute concept. Subjective evaluations varied across two neighborhoods and results showed that older people were somewhat more satisfied with their residential environments than younger people.

Keywords: Urban environmental quality, Urban neighborhood, Residential Satisfaction, Tehran

1. Introduction

This paper is concerned with the relationship between inhabitants and their neighborhood of residence in an urban environment. This is a typical research issue in Environmental Psychology (EP) [1]. that has focused on the relationship between people and their residential environment on different levels (home, neighborhood and city).It is imperative to understand environmental quality for urban living from the perspective of the residents in terms which will provide suggestions for it simprovement. From this description of residential environmental quality, a standard can be established for using in environmental impact research and in assessing programs of intervention aimed at improving the urban environment[2]. A more realistic approach to environmental quality management, therefore, would be one which is based upon an understanding of what public seeks in the environment, how it trades one set of values with another, and how it can be motivated to make choices about environmental changes before a crisis occurs. Research in behavioral sciences, therefore, could provide a critical input into public policy in this field [3].Specific aspects of the environment have emerged as the key elements related to individual quality of life,this encompasses many factors including social relationships, education, financial security, health, and environmental quality [4].

The meaning of the phrase quality of life differs a good deal because of its various uses, but in general, it is intended to

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refer to either the conditions of the environment in which people live,(air and water pollution, or poor housing, for example), or to some attribute of people themselves (such as health or educational achievement) [5].

Central to this developing interest in quality of life is research into the relationship between people and their everyday urban environments. Seeking to understand the nature of the person-environment relationship is the quintessential geographical question that lies at the core of the sub-discipline of social geography. In the specific context of the built environment, this can be interpreted as a concern with the degree of congruence or dissonance between city dwellers and their urban surroundings [6].

Environmental quality is at the heart of the objectives of planning and designs, since all planning and design aim to create a better environment in the interest of safety, health, aesthetics, comfort and general welfare [7]. The quality of urban environment directly influences the social and economic development of the city. Good urban environment can bring social-economic benefits to the city; whereas, bad urban environmental quality will obstruct urban economic development. Urban environment planning and management is the major channel to control those human activities that pollute urban environment and perform the managing measures to improve the bad environmental quality. Environmental quality is an indicator used to measure the degree to which the environment is suitable for a human being to subsist. Environmental quality has multidimensional characteristic [8].

Teasing apart the environmental issues perceived to be important for environmental quality and quality of life is complex, as environmental quality involves both objective and subjective concepts [4].

Urban planning is a complicated process which involves physical, social and technical aspects. It is also a process of decision making. Evaluation can rationalize planning and decision making problems by systematically structuring all relevant aspects of policy choices [9].

As an important step in decision-making, evaluation activity is involved in the entire process of urban planning. Urban environment planning and management, as a subset of urban planning also employ evaluation activities. Environmental quality evaluation is one of the evaluation activities to get the information on environmental condition and in support of the policy making and selection during environment planning and management. It can help to identify the major issues and priority area. Effective planning is based on completely and precisely understanding the environmental quality condition, namely, precise evaluation on environmental quality in an urban area [8].

Over the years, various methods have been developed to deal with the representation, analysis, and evaluation of environmental quality. The technique of measurement adopted and the model of the analysis used are widely discussed. For one thing is the difference between objective and subjective socio-psychological approaches to the interpretation of environmental quality. The concept of environmental quality can be interpreted either objectively or more subjectively in socio-psychological term [10], which also brings the evaluation to both objective and subjective aspects.

A basic distinction is made between environmental conditions which can be measured objectively and environmental quality which must be measured subjectively.

In 1978, Milbrath, made a basic distinction between environmental quality which is measured subjectively and environmental conditions which may be measured objectively [11].The objective approach focuses more on the objective standards and scientific criteria for the measurement of environmental quality, which relies more on the professionals of Environment-associated field who can understand and hold the environmental quality evaluation. Most of these professionals are in control of the information of urban environment and are the experts in these domains [8].Some examples of measures of environmental conditions are: levels of cleanliness of air and water; number of hospital beds per 100,000 residents and etc.

Subjective indices would not be useful for such detective purposes and it is urgently important to develop and use "objective" indicators of the condition of our environment. However, objective indicators are not measures of environmental quality; quality is inherently subjective. If a person believes that his home environment is of high quality, it is only of high quality for him no matter what may be asserted about it by "objective" observers or measures [11].The subjective approach aims to reflect the perception of the common residents or citizens or occupants on environmental quality, most of whom have no channel to attain the understanding of complex mathematical model of evaluation. The subjective evaluation sometimes cannot correspond to the parameters through which decision-makers can control. Objective measures of environmental quality fail to define those aspects that are consistent with the life quality and activities people desire [10].

According to Rapport [7], both aspects of the meaning of the environmental quality concept should be involved in the evaluation of environmental quality. Environmental quality is not a unitary phenomenon, but it also is multidimensional. Because of this multi-dimensional nature of environmental quality,environmental quality evaluation is characterized by the use of wide-ranging methodologies. Therefore,research is still focused on seeking a more integrated approach to interpret the environmental quality. For example, Chokor [12] argued that the professional, objective and subjective socio-psychological conceptions of environmental quality, which places emphasis on specific aspects or attributes of quality, have tended to ignore the multi-dimensional nature of environmental quality in the cities of developing countries and put it into practices in Ibdan(Nigeria). Moreover odermerho and Chokor advanced an aggregate index of environmental quality, which combines both the professional and lay viewpoints and used it in Benin City (Nigeria), which attempted to relieve the conflict about how the quality of an environment can be appropriately assessed.

Research in environmental psychology has increasingly turned towards measuring perceived environmental quality, of which one research objective is to study the congruence between the quality of environments and people's expectations, goals and value systems. Among the methods of

evaluating environmental quality, research instruments for environment quality, at the levels of housing, neighborhoods and communities, have been well developed [13].

These instruments measure perception of the characteristics of residential spaces and the extent of satisfaction and attachment to places expressed by individuals relative to different dimensions of their proximal environment. Researchers seeking answers to this question have recognized the multidimensional nature of residential satisfaction, a concept that includes the qualities attributed to the physical-spatial, social and personal, functional and contextual environment [14].

It is exceptionally challenging to systematize the multi-faceted concepts of environment and human environment interactions in urban settings. This is because cities offer a rich stew of neighborhoods, each containing a web of complex relationships. Neighborhoods have been described in multiple ways, such as demographic profiles, social networks, physical landscapes, and this may be risk capes. Each of these orientations highlights different aspects of the urban experience, but none offers a complete classification of elements, nor a general theory that relates human identity to the socio-physical environment. There are, however, some points of agreement about human - environment relationships. First, people are active agents in constructing perceptions of their environments and their perceptions are influenced by individual characteristics and circumstances. Second, people's perceptions of their surroundings are often closely correlated with independently-derived observations of the surroundings, and are often stronger predictors than measured conditions of individuals' place identity as expressed in neighborhood attachment and satisfaction. In short, Maybe more of social constructions rather than geographical constructions, and, therefore, neighborhood characteristics are measured using human perceptions of the setting [15].

Quantifications of neighborhood perceptions have focused either on positive social characteristics, such as control, collective efficacy, stability, informal support, and security, or on negative social characteristics, such as disorder or crime [16]. In this analysis, both positive and negative characteristics are included, because both consistently predict satisfaction and attachment in other studies. It is believed that control and disorder are not entirely symmetrical concepts.

Although many social science studies completely ignore the physical environment, material conditions are also important components of neighborhoods. People's interactions with the physical place, their modifications of it, and the symbolic meanings they attribute to it are means of developing attachment [17],[18]. When the physical environment is considered, there is much variation in how it is parameterized. It has been represented by built features with symbolic or practical value, such as architectural style, landscape, and historical significance [17], the amount of open space [19], the condition of streets and buildings [16], the noise level [20]. Others select biophysical features that are products of local natural resources- for example, the "amenities" indexcombining respondents' ratings of natural beauty, climate, and availability of leisure activities [21], or an "environment" index combining aesthetic qualities, land features, ecological variables, and pollution [22].

Over time, several researches have been conducted onthe relationship between urban residents and their environment. Bonaiuto et al. [17] studied the relationship between inhabitants and their neighborhoods of residence in the urban environment of Rome from the environmental psychological view, and proposed two distinctive instruments. These instruments consisted of 11 scales for measuring the perceived environmental qualities of the urban neighborhoods, with one scale measuring neighborhood attachment. This new version of perceived residential environment quality andneighborhood attachment largely improved internal consistency with respect to earlier studies. Pacione [25]addressed urban environmental quality and human wellbeing from a social geographical perspective, and presented a five-dimensional model for study of the quality of life, and examined the major theoretical and methodological issues confronting quality of life research.

In order to measure perceived environmental annoyances in urban settings, Robin et al. [14] Conducted a study among Parisians. at the end, Seven principal dimensions, that were inclusive of potentially aversive situations encountered in the daily lives of city-dwellers, emerged: feelings of insecurity, inconveniences associated with using public transport, environmental annoyances and concerns for global ecology, lack of control over time related to using cars, in civilities associated with sharing of the public spaces between different users, lack of efficiency resulting from the density of the population, and an insecure and run-down living environment. The contribution of the social environment to the residential satisfaction of individuals and households is significant. The social environment comprises the relationships, interactions, and social activities that an individual or household participates in, as well as those that surround them in the immediate neighborhood. Social ties bind people to a neighborhood, providing social interaction, activity, and support [23]. Social relationships can compensate for poor physical conditions, especially in disadvantaged areas

(Hourihan, 1984). Many writers (for example Tognoli, [24]; Amerigo and aragones, [25]) believe that social relationships are more important to residential satisfaction than the physical environment of the house and neighborhood. Within the Theory of Place in EP (e.g. Canter, [26]), inhabitants' residential satisfaction (RS) has been defined as the experience of pleasure or gratification deriving from living in a specific place. Tongoli [24] found that friendship ties were also highly important to residential satisfaction; in addition, neighbor relationships are important local social ties [18] The relationship with neighbors is especially important to those with reduced mobility, such as older people [27].

In addition to the way that an individual perceives his/her environment, basic demographic and social characteristics of the individual and his/her household affect the formation of residential satisfaction. Not all individuals are predisposed in the same way to residential satisfaction. Though older people tend to be more likely to be satisfied [28], satisfaction itself is not necessarily higher in older people [27].

There is a polar argument within the literature on the role of income in residential satisfaction. Higher income leads to higher satisfaction in the studies by Lu[30] and Tognoli

[24],and lower satisfaction in Loo[28] and Hourihan[29]. Research on the physical environment has certainly confirmed the relationship between social class and the environmental quality of living environments[5]. Working at the neighborhood level, certain environmental psychology researchers have developed the concept of "high-stress neighborhood," a source of vulnerability and pathogeny, independent of age, sex or ethnicity .In these disadvantaged neighborhoods, a number of characteristics co-vary (e.g.,noise, crowding, pollution, housing and neighborhood quality, physical in civilities, criminality)[14].

In general, the higher socio-economic groups are more likely to experience residential satisfaction. This is directly related to the sharp linear increase in residential quality with increasing social position [18], and the mobility and choice available in residential environments.

Repeatedly, the literature cites home owner ship as a key indicator of residential satisfaction. Without exception, each investigation reveals residential satisfaction to be much higher for owners than renters [30], [28], home owners are almost always more satisfied with their homes and neighborhoods [30]. The most likely explanation for this is that renters have less control over their residential environment, and in general have a lower housing quality [28].

The older population tends to perceive their neighborhood more positively, compared to younger city-dwellers, with the exception of the dimension of security [31].

In this study, it has been tried to cover the socioeconomic attributes, so that a thorough understanding could be achieved. In the following sentences the main objective and the related hypotheses are presented.

2. Objective and hypotheses

The main objective of this research is to define, analyze and model the concept of environmental quality with special emphasis on urban residential environments.

The research hypotheses are as follows:

-The perceived quality of the urban residential environment can be usefully considered to be a hierarchical multi-attribute concept.

- Urban environmental quality does not only depend on physical environmental attributes (e.g., noise, malodor, air pollution) but also on various other types of environmental attributes, e.g., psycho-social attributes and attributes of the built environment.

3. Delimitation and characterization of two study neighborhoods

The case study areas are located in Tehran, capital of Iran. Throughout the last century, Tehran has experienced a considerable growth. Today, excluding the city's suburbs, about 7 million people live in an area A little larger than 600km2. The concentration of most forms of economic activities and also other forms of concentrations in Tehran have caused major problems for the city. Due to this centralization, it is expected that this trend to continue in coming years. Today Tehran is suffering from major economical, social, and environmental problems. The city of Tehran is essentially a Modern city, mainly created during the last 50 years. The urban transformation from the nineteenth century has radically changed the image of the city from a traditional, Middle Eastern city into a modern one, a transformation which can be observed through patterns of land use, street pattern and building form [32]. Hall [33] discusses that as a consequence of rapid urbanization, cities are becoming polarized and we can find an escalating degree of social and cultural segregation between privileged and deprived areas. It is notable that in many cities there is a preferred axis or sector of development, quite often the high-quality and high-rent residential sector, which attracts commercial activities. Older analysts use the term "Zone of assimilation" for this area. Conversely, there is what these analysts called a "zone of discard": an area which was traditionally given over to manufacturing industry and other goods-handling activities, which was residentially unattractive due to pollution and low social status.

The location of Tehran on the southern slopes of the Alburz Mountains has influenced some of its main spatial qualities. The growth of the urban fabric has been constrained by the mountains from the north and east and by the desert in the south, only leaving the west for the growing city's expansion. The northernmost part of the city is some 640 m higher than the southernmost parts which borders the central deserts of Iran. This dramatic difference in height has had major implications for the physical and social characteristics of the city. In a hot, arid climate, the northern foothills enjoy a more moderate climate, with more rainfall and cooler summers, and therefore, have been colonized by the better off, leaving the harsher climate of the south to the poor. The origin of the north-south dichotomy in Tehran goes back to the nineteenth century, especially to the first major transformation of the city in the 1860s and 1870s. This was a time when the city was expanded from all sides, developing modern, upper class neighborhoods in the north of the traditional city, creating the foundations for a socio-spatial divide. Later transformations of the city, including the1930s demolition of the city walls and the imposition of a network of roads, opened up the urban space to free movement of goods and people. But space was becoming increasingly fragmented and commodified. The city’s new landscape was shaping along access to resources, producing a north- south divide, a feature that it has kept to this day. The north has higher and larger buildings, higher land prices, lower densities, smaller households and higher rates of literacy and employment. Whilst it is mostly residential, it accommodates higher concentrations of modern facilities and amenities. On the contrary, the south is poorer, with smaller buildings, lower land prices, higher densities, larger households, lower rates of literacy and employment, and a concentration of workplaces and traditional institutions [32]. Because of the presence of this north-south dichotomy, one of the neighborhoods was selected from the north and the other was selected from the south. The main goal for this selection was to compare the perceptions of their residents; neighborhoods were delimited according to the criteria of urban and social typology, physical lack of continuity, infrastructures and services, economic status, and other

establishments. Applying these criteria, two neighborhoods were selected: one is Zafaranieh in the north and the other is Khaniabad in the south. As can be expected from what has been said in the above paragraphs, Zafaranieh is a new, affluent neighborhood with high social-economic status and highquality houses. The majority of the residents of Zafaranieh are from the high class of the society. Conversely, Khaniabadis is an old, poor neighborhood with low social-economic status and low-quality houses. The majority of the residents of Khaniabad are from the middle and the low class of the society. Low class of society. In figure 1 the position of these two neighborhoods in Tehran and with respect to each other is shown.

4. Method

This study was designed on the basis of multiple hierarchical regression approach. Multiple regression analysis is a statistical technique to analyze the relationship between a single criterion or dependent variable (i.e., higher-level attribute) and two or more predictor or independent variables (i.e., lower-level attributes). Multiple regression analysis may be used for prediction. Normally, it is used to assess the extent to which the observed variance in the dependent variable is explained by the observed variance in the independent variables, also referred to as the 'model fit'. It is also used to assess the so called 'standardized regression weights' (β's). In the present study, this is a very important property, since the 'β -coefficient' may be used to indicate the relative importance of a lower-level attribute. These specific properties of multi pleregression analysis, estimation of the 'regression weights' and assessing the 'model fit' are used for the analysis of the concept of environmental quality [34].

Three specific steps can be recognized in Hierarchical multiple regression approach, these three steps are:

1. Identification and structuring of attributes. In this study value-relevant attributes were selected from a theoretical model used by van poll [34] ,to ensure that these were comprehensive model in a preliminary study we first asked 40 respondents to name attributes that they think are important for their residential satisfaction. Only some trivial changes were made in the model in order to conform it with people's perceptions of important residential attributes and the dominant conditions of the case study areas. This model starts with the top-level attribute environmental quality represented by residential satisfaction. The top-level attribute branches out into more specific, lower-level attributes, in this case satisfaction with the dwelling, the neighborhood, and the neighbors, respectively. In turn, some of these attributes branch out further in to even lower-level attributes, this continues until the end-level attributes are reached, that is, attributes on which the object may be validly measured.

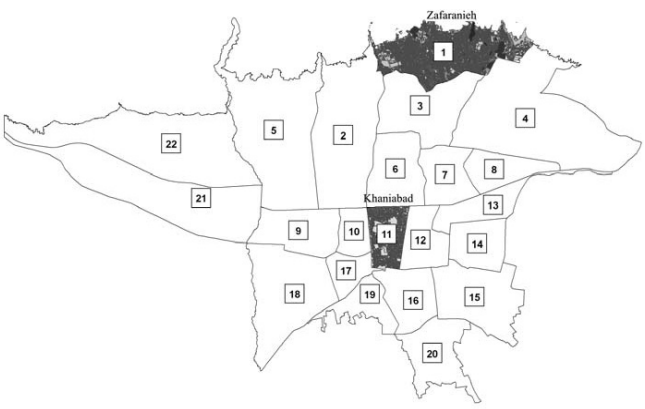

Fig. 1. The location of two neighborhoods with respect to each other in Tehran (numbers correspond to Tehran's zones)

2. Evaluation of objects on each attribute. Actual residential environments are evaluated on the attributes in the theoretical model given in figure 2. Furthermore, this is done by residents living in a particular residential environment. They are asked to express the extent to which they are satisfied with or annoyed by their present residential situation on each attribute. Respondents evaluate their residential situation on all of the attributes in the model.

3. Assessment of attribute weights. After the data is collected and entered into the computer, several multiple regression analyses are performed. The analyses should reveal the relative importance of the residential attributes. For this purpose, the standardized regression weights are calculated. In regression analysis, the independent variables are weighed, that is, their relative contributions to the dependent variable are estimated. For each independent variable this is done by estimating the influence of the particular variable on the dependent variable while the influence of other independent variables is held constant. These numerical values are called 'regression weights' or 'coefficients'. After standardization into so called 'beta-coefficients', the relative importance of the predictor variables may be compared [35]. In this way, relative weights are assessed indirectly. Regression weights are calculated using the method of 'ordinary least squares.In the September of 2008 a questionnaire study was conducted in the two aforementioned neighborhoods in the city of Tehran. As mentioned before the criteria for selecting the two neighborhoods were their socio-economic status. One of them was in the northern affluent division and the other was in the southern poor division of the city. Socio-economic status was determined according to variables such as profession, income, education, ownership of dwelling, age of dwelling, and population density. These were extracted from the formal census distributed by the Statistical Center of Iran. A questionnaire was sent to 480 people. The questionnaire Were mailed with an introduction letter in which the people were asked to fill out and return the questionnaire. After one week, a reminder was sent to those who had not responded yet.

The theoretical model of environmental quality was used to design a questionnaire in which respondents were asked to evaluate their present residential situation with regard to each attribute in the model(see figure 2) In the questionnaire, the attributes were described as follows. Residential satisfaction (level 1) was measured by asking the respondents to what extent they would regret leaving their present neighborhood if they had to move (response format: 'not at all - very much'). All answers were elicited on a 0-5 Likert scale. Satisfaction with the neighborhood, the dwelling, the neighbors (all at level 2) and the dwelling features (level 3) were asked in a direct

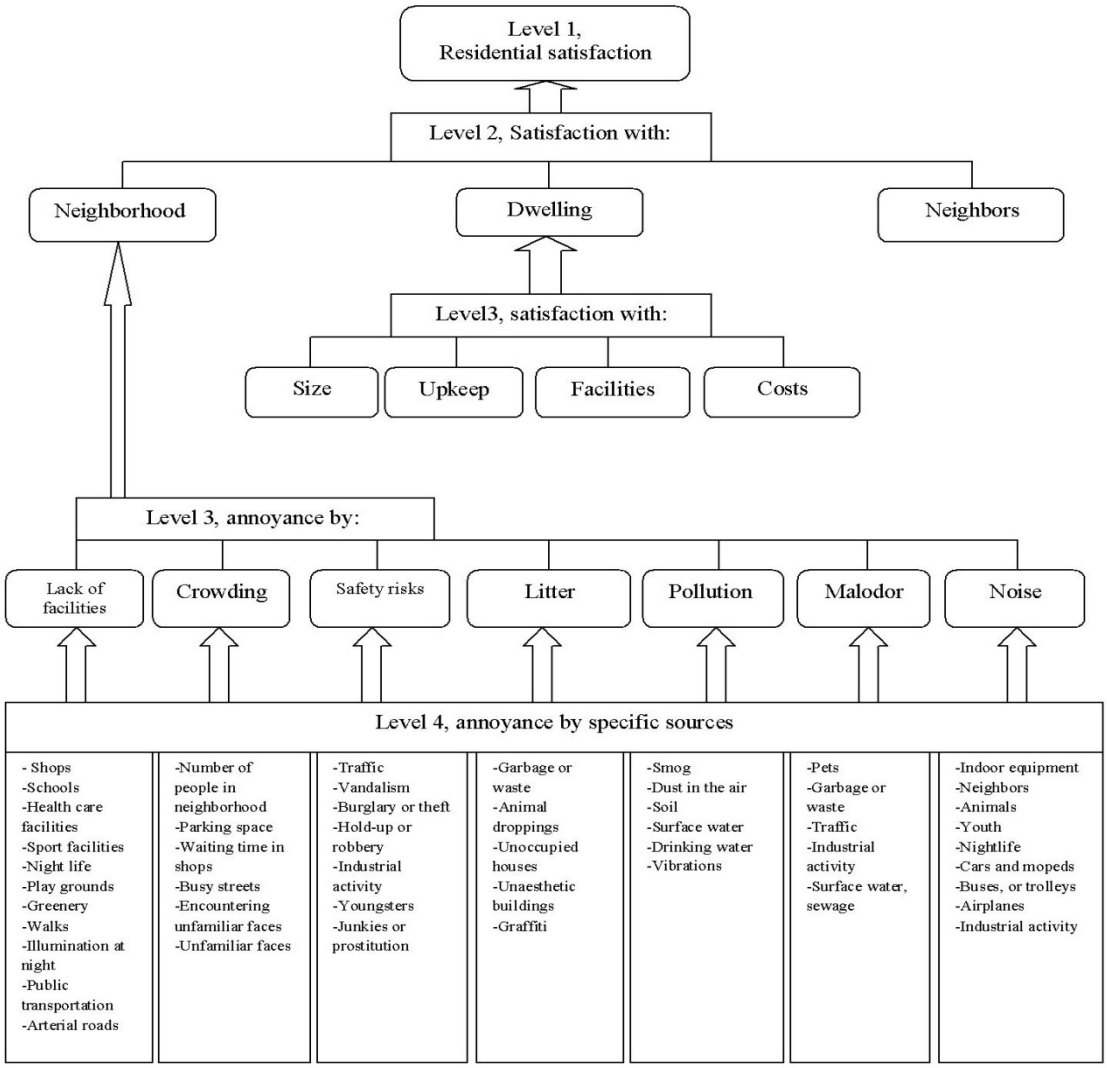

Fig. 2. Theoretical model of attributes contributing to residential satisfaction[34]

manner ('How satisfied are you with ...'; 'not at all verymuch'); (dis)satisfaction with the neighborhood attributes(level 3) and with specific sources of annoyance (level 4), on the other hand, were measured by asking respondents to what extent they were annoyed by these attributes/specific sources 2 ('not at all - very much').

After finishing the relevant sections, respondents were asked to name and evaluate sources of annoyance that were not stated in the specific sections of the questionnaire. Each section finished with the question to state the most annoying source. Chi-square tests were used for comparisons of the distributions of categorical variables (e.g., response rates across neighborhoods and some personal and household characteristics).

Mean scores and standard deviations (s.d.) were calculated for dissatisfaction and annoyance scores on various neighborhood attributes. To assess the overall model fit and the relative importance of the residential attributes, hierarchical regression analyses were conducted on these data. These analyses should reveal how well general, more abstract quality judgments (e.g., 'residential satisfaction') were postdicted by lower-level, more specific judgments (e.g.,'satisfaction with the dwelling' and 'satisfaction with the neighborhood'). Because no assumptions were made on the magnitude of the influence of specific lower-level attributes (independent variables) on the higher-level attribute (dependent variable), all variables were entered in the analysis at one time. As a measure of goodness of fit the squared multiple correlation coefficients (R2) was used. An additive model was assumed with the F-statistic serving as the testcriterion. The data were analyzed using the SPSS 15.0 statistical package. Due to missing data, not all tests could be performed on the same number of respondents.

5. Results

Here the results of the response rate, the personal and household characteristics, and the evaluation of the perceived urban environmental quality for attributes of each model's levels are presented.

Three weeks after the initial mailing of 480 questionnaires, 320 questionnaires were returned. Because of the existence of significant amount of missing data, 20 questionnaires were discarded. Thus 300 questionnaires were included in the

analyses which are reported below. Therefore, the overall response rate was 62.5%, which is reasonably high.

Personal and household characteristics studied were age, gender, household monthly income, and home ownership, number of household members, number of living rooms, and number of sleeping rooms. In table 1 the means and/or percentages of the personal characteristics of the respondents for the total sample and for each neighborhood are separately presented.

As it could be seen, there are some slight differences between the characteristics of respondents to the questionnaire. Among the characteristics, there is a significant difference between two neighborhoods with respect to the monthly income, marital status, and number of the sleeping rooms.

5.1. Residential satisfaction

The respondents evaluated their residential situation by expressing their (dis) satisfaction with various residential attributes on a likert scale. Based on these evaluations, in order to assess the model fit several multiple regression analyses were conducted. In addition the influence of personal and household characteristics on residential satisfaction was assessed. The result of annoyance scores on the various sources are presented in table 3.

In table 2, the mean scores and standard deviations of the level 1, 2 and 3 attributes for the total sample and each neighborhood are presented. These data indicate the degree of dissatisfaction with the various residential attributes. For convenience of presentation, all 5-point scales were re scaled so that higher scores indicate more dissatisfaction or more annoyance and lower scores indicate more satisfaction or less annoyance. Large,significant difference was found to exist with regard to 'residential dissatisfaction' between two neighborhoods ($F(1,298):100.92$, $P<0.001$). Analysis of variance revealed that residents in Khaniabad are more dissatisfied than Zafaranieh residents.

The level-2 attributes satisfaction with the dwelling and satisfaction with the neighborhood and satisfaction with neighbors differed significantly across neighborhoods (($F_{(1,298)}:206.94.$, $P<0.001$), ($F_{(1,298)}:40.15$, $P<0.001$), ($F_{(1,298)}:5.66$, $P<0.05$) respectively). Again respondents in Khaniabad indicated higher levels of dissatisfaction.

With regard to the four dwelling attributes studied (level 3) it was found that, on average, the respondents were most dissatisfied the size and costs of their dwelling. Only satisfaction with upkeep differed significantly among two neighborhoods. In all attributes except satisfaction with dwelling cost, the dissatisfaction was higher among Khaniabad residents.

Of the seven neighborhood attributes studied (level 3), litter, lack of neighborhood facilities, pollution, noise, malodor, and

Table 1. Personal and household characteristics for the total group and for each neighborhood separately

Item	Zafaranieh	Khaniabad	Total
Age(mean)	38.7	40.5	39.6
Gender(% female)	60	44	52
Marital status(% married)	52	72	62
Mean household monthly income(Rials)	17700000	7600000	12650000
Home ownership status(% owners)	76	72	74
Number of household members(mean)	3.9	4	3.98
Number of sleeping rooms(mean)	2.3	1.1	1.7
Number of living rooms(mean)	1.3	1	1.16

Table 2. Mean scores (s.d.) of the model attributes (levels 1 through 3) for the total sample and for each neighborhood separately.

Item	Total	Zafaranieh	Khaniabad
Residential dissatisfaction	3.18(1.33)	2.60	3.76
Dissatisfaction with:			
Neighborhood	3.04(0.95)	2.44	3.64
Dwelling	2.76(0.94)	2.44	3.08
Neighbors	2.88(0.75)	2.64	3.12
Dissatisfaction with:			
Dwelling costs	2.96(0.81)	3.04	2.88
Dwelling facilities	2.56(0.73)	2.48	2.64
Dwelling upkeep	2.64(0.66)	2.48	2.80
Dwelling size	3.12(1.02)	2.92	3.22
Annoyance by:			
Neighborhood noise	3.30(0.97)	3.00	3.60
Neighborhood malodor	3.24(1.36)	2.20	4.28
Neighborhood pollution	3.36(0.94)	2.92	3.80
Neighborhood litter	3.42(0.93)	2.76	4.08
Neighborhood safety risks	2.98(1.00)	2.60	3.36
Neighborhood crowding	3.04(1.03)	3.04	3.04
Neighborhood lack of facilities	3.40(1.05)	3	3.80

Table 3. Frequency distribution (and percentage) of respondents indicating a specific attribute to be the most annoying

Neighborhood attribute	Frequency	Percent
Litter	61	20.3
Malodor	53	17.7
Lack of facilities	52	17.3
Safety risks	47	15.7
Pollution	32	10.7
Crowding	31	10.3
Noise	24	8
Total	300	100

finally safety risks were found to result in the highest level of annoyance. Except for the attribute, annoyance by crowding, the annoyance levels of the neighborhood attributes all differed significantly across neighborhoods (p-values < .001). From Table 2, it can be noted that - once again - annoyance levels tend to be higher in Khaniabad.

In addition to the evaluation of the level-3 neighborhood attributes, respondents were asked to state the most annoying neighborhood attribute. From table 3 it can be noted that to most of the respondents (30.3%) litter is the most annoying neighborhood attribute, followed by malodor and lack of facilities (17.7% and 19.4%, respectively).

5.2. Model fit

In figure 3 the main results of the hierarchical regression analyses on the individual data are shown. These analyses reveal which underlying attributes affect residential satisfaction most or least strongly.

Forty nine percent of the variance in the assessments of urban residential satisfaction (level 1) could be explained by the three level-2 attributes. Satisfaction with the dwelling and with the neighborhood contributed significantly to the explained variance in residential satisfaction.

Satisfaction with the neighborhood appeared to be more important than satisfaction with the dwelling (β's: 0.47 and 0.30,respectively). The third attribute, satisfaction with the neighbors, did not appear to affect residential satisfaction to a large extent.

Dwelling attributes (level 3) explained 57% of the variance in satisfaction with the dwelling. Three of the four attributes (satisfaction with size, facilities, and upkeep) were found to contribute significantly to the explained variance in satisfaction with the dwelling. Inspection of the β-coefficients

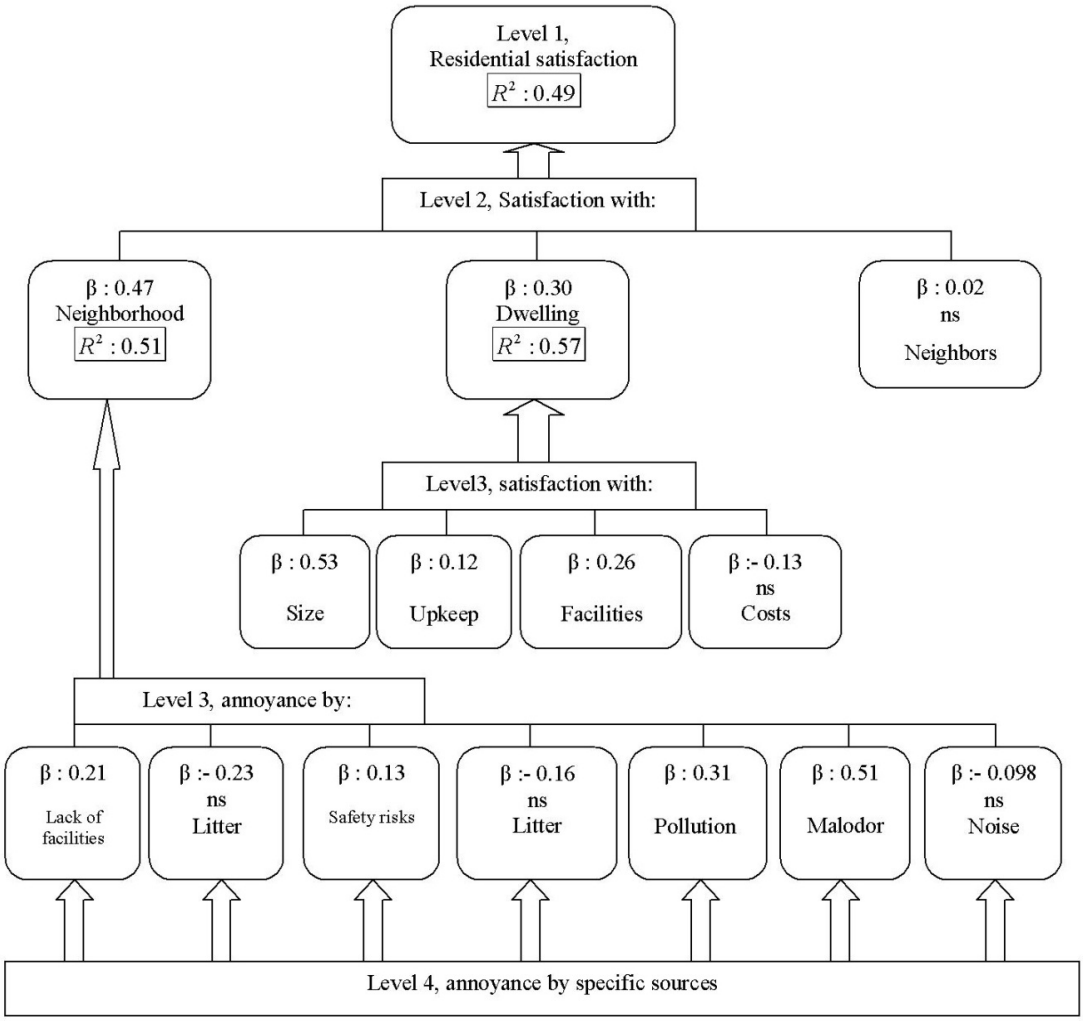

Fig. 3. Results of the hierarchical regression analyses

revealed that the dwelling 'size' appears to be more important than the other attributes.

Combined, the seven neighborhood attributes which were studied (level 3) explained 51% of the variance in neighborhood satisfaction (level 2). Inspection of the coefficients reveals that only four attributes contributed significantly to the proportion of the explained variance; these are annoyance by malodor, pollution, lack of neighborhood facilities, and safety risks. The first two attributes appear to be somewhat more important than the last two.

For the model to be correct the Standardized residuals should arise from a standard normal distribution [36]; figure 4 shows that histograms of the residuals are consistent with the assumption of normality.

5.3. Adding personal and household characteristics

Entering personal and household characteristics into the regression analyses generally resulted in an increase of the overall percentage of the proportion of the explained variance.

The overall percentage of the explained variance in residential satisfaction (level 1) increased from 49% to 56%. Of the personal and household characteristics studied, only age was found to contribute significantly to the proportion of the explained variance in residential satisfaction. Similar to many earlier studies in other countries, older people were more satisfied with their residential situation than younger people. Detailed inspection of the results indicates that people who are in age category of 26-35, have the most amount of dissatisfaction, and the most amount of satisfaction can be seen in age category of 56-65. The overall trend shows that satisfaction has a direct relation with the increase in the age of the residents.

The overall percentage of the explained variance in neighborhood satisfaction increased from 51% to 61% by entering personal and household characteristics. Of the personal and household characteristics studied, only homeownership was found to contribute significantly to the proportion of the explained variance in residential satisfaction. Homeowners were more satisfied with their residential situation than the tenants. The overall percentage of the explained variance in satisfaction with the dwelling increased significantly, from 57% to 67%, again the contributing variable wereage and the results confirmed that older residents are more satisfied than the younger ones.

With regard to the differences between satisfaction in males and females, these results were drawn: Women appeared to be slightly more satisfied with their dwelling than men. However the differences in satisfaction with the dwelling and

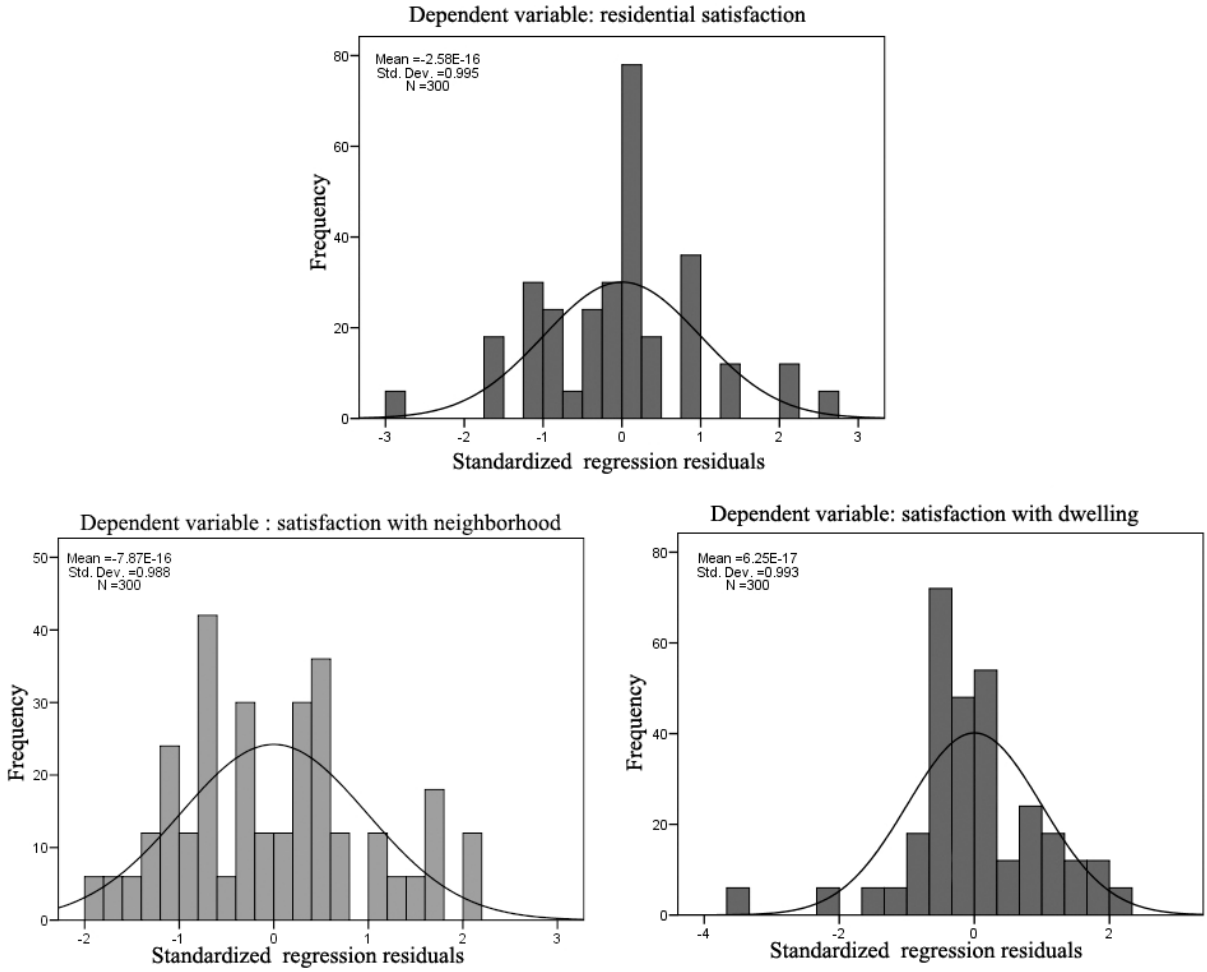

Fig. 4. Histogram of standardized regression residuals

neighborhood between men and women were not statistically significant. Detailed inspection of the effect of gender on the annoyance by neighborhood revealed interesting results, men were more annoyed by malodor and litter than women; however, in remaining attributes this was not the case and women were more annoyed.

5.4. Specific sources of annoyance in the residential environment

As was already mentioned, respondents evaluated forty nine specific sources, grouped together in seven neighborhood attributes. These attributes were: annoyance by noise, malodor, pollution, litter, safety risks, crowding, and lack of neighborhood facilities. For each of these sources, respondents assessed the amount of annoyance. In addition to these questions, every section on a specific neighborhood attribute in the questionnaire ended with two questions: which of the aforementioned sources is considered most annoying? Is there any other source of annoyance not already mentioned in this section?

In table 5, the results of the questions asked about the most annoying source of annoyance for the total sample and for each of the neighborhoods separately are presented. For every neighborhood attribute separately, results will be presented on (a) the evaluation of the specific sources, (b) the model fit, (c) the most annoying source, and (d) relevant additional sources. In Table 4, the mean evaluation scores for each source are presented. Furthermore the results of the model fit are presented. With reference to the results of analysis of the variance, it can be seen that with regard to some attributes, there are some differences between two neighborhoods. Here, the results related to each of the annoyance sources are presented. Regarding annoyance by airplanes, there is a significant difference between two neighborhoods. In fact residents of Khaniabad are much more annoyed by the noise of the airplanes($F(1,298)=261.20$, $P<0.001$), also there is a significant difference between two neighborhoods, with regard to annoyance by buses and trolleys, Cars and mopeds. In all other cases,although residents of Khaniabad are more annoyed, but there is no significance difference between the perceptions of the two neighborhood's residents.

There is a significant difference between the levels of annoyance by malodor among the residents of two neighborhoods. Except annoyance by malodor of animals, levels of annoyance by all other sources differ significantly across the two neighborhoods. The highest difference can be seen in malodor originating garbage or waste ($F(1,298)=97.31$, $P<0.001$). There is a significant difference between two neighborhoods with regard to annoyance by pollution. Most of the difference is related to annoyance by surface water and Sewage ($F(1,298)=90.40$, $P<0.001$). Again, Khaniabad residents are more annoyed. Also, the difference between two neighborhoods with regard to smog is significant. The other sources of pollution annoyance did not result in a significant difference. Most of the difference in annoyance by safety risks is related to annoyance by safety risks due to junkies and prostitution ($F(1,298)=171.32$, $P<0.001$)The other significant differences are related to annoyance by safety risks due to burglary & theft, hold-up & robbery, and industrial activities.

Regarding neighborhood facilities, there is a significant difference between two neighborhoods. Most of the differences are related to annoyance by greenery ($F(1,298)=105.49$, $P<0.001$), illumination at night, and health care facilities. With regard to annoyance by litter, there is a significant difference between two neighborhoods. The most important difference is related to annoyance by garbage or waste ($F(1,298)=19.78$, $P<0.01$), unoccupied buildings, and unaesthetic buildings. Again, Khaniabad residents are more annoyed by these sources. Most of the difference in annoyance by crowding is related to annoyance by the number of people in the neighborhood($F(1,298)=26.72$, $P<0.01$), Also there is a significant difference between annoyances by waiting time in shops. As it can be expected, again, residents in Khaniabad are more annoyed.

6. Discussion and conclusion

One general objective of this study was to assess the relevant features of dwellings and neighborhoods and the relative amounts of annoyance or dissatisfaction due to different attributes of people's residential situation. The other main objective of this study was to compare the perceptions of two of Tehran's neighborhoods which have different social-economic status. From the results, it may be concluded that residents in general are fairly satisfied with their residential situation. However,with regard to residential satisfaction, there is a significant difference between two neighborhoods ($F(1,298)=100.92$, $P<0.001$). In fact, Khaniabad residents are fairly dissatisfied with their residential situation. The overall perceived quality of the dwelling, the neighborhood and satisfaction with the neighbors is reasonably high. However, when studying the neighborhoods separately, some interesting results attract the attention. On average, Zafaranieh's residents are fairly satisfied with their dwelling and neighborhood, but

Khaniabad residents are dissatisfied with their neighborhood. It also may be concluded that next to physical attributes of the residential environment, psychosocial attributes and attributes of the built environment are relevant attributes of perceived environmental quality.

Respondents were somewhat more satisfied with the specific, lower-level, attributes (neighborhood, dwelling, and neighbors; level 2) than with their residential situation in general. Marked differences were observed across two neighborhoods with respect to satisfaction with the neighborhood and the dwelling. In general, respondents in Khaniabad showed the highest levels of dissatisfaction; whereas, respondents in Zafaranieh seemed to be much more satisfied. Satisfaction with the neighbors, on the other hand, was fairly stable across two neighborhoods. Satisfaction with the dwelling was thought to depend on four dwelling attributes: cost, facilities, upkeep, and size. It was found that respondents were - on average - most strongly dissatisfied with the size of their present dwelling, while with regard to costs, facilities and upkeep, there was relative satisfaction among the residents of two neighborhoods. i Interestingly, Zafaranieh's residents were more dissatisfied with the costs of their dwellings. Overall, residents in Khaniab adappeared to be more dissatisfied with their dwelling than

Table 4. Mean annoyance scores, the model fit (R), and standardized regression coefficients (?) for the level-4 sources

Neighborhood facilities	mean	β:	noise	mean	β:
$R^2 : 0.60, F$ Fl 1,288f : 39.88					
Annoyance by lack of neighborhood facilities:			Noise annoyance by:		
Shops	2.60	0.24	Indoor equipment	1.66	-0.015
Schools	2.90	-0.016	Neighbors	2.8	0.25
Health care facilities	3.14	0.49	Animals	1.64	-0.008
Sport facilities	3.86	0.12	Youth	3.16	0.13
Night life	3.46	0.11	Nightlife	2.62	0.23
Play grounds	4.24	0.25	Cars and mopeds	3.40	-0.03
Greenery	3.84	0.08	buses, or trolleys	2.14	0.33
walks	3.86	-.032	Airplanes	2.22	-0.23
Illumination at night	3.28	0.29	Industrial activity	1.38	0.12
Public transportation	3.00	-0.02			
Arterial roads	2.86	-0.07			
Litter			Malodor		
$R^2 : 0.36, F$ F5,294f : 33.62			$R^2 : 0.62, F$ F5,294f : 95.63		
Litter by:			Malodor annoyance by:		
Garbage or waste	3.30	0.58	Pets	1.74	0.23
Animal droppings	1.92	-0.21	Garbage or waste	3.18	0.40
Unoccupied houses	2.80	0.31	Traffic	3.42	0.025
unaesthetic buildings	2.98	-0.22	Industrial activity	1.62	0.04
graffiti	3.20	0.17	Surface water, sewage	3.24	0.30
Crowding			Pollution		
$R^2 : 0.49, F$ F6,293f : 47.11			$R^2 : 0.49, F$ F6,293f : 47.43		
Crowding by:			Pollution by:		
Number of people in neighborhood	2.52	0.17	Smog	2.70	0.36
Parking space	3.06	0.06	Dust in the air	2.64	0.16
Waiting time in shops	2.42	0.41	Soil	2.08	-0.05
Busy streets	3.54	0.14	Surface water	2.32	0.13
Encountering unfamiliar faces	2.80	0.13	Drinking water	1.72	-0.07
Unfamiliar faces	2.70	0.04	vibrations	2.42	0.30
Safety risks			: p *value* t 0.01, : p *value* t 0.001		
$R^2 : 0.25, F(7,292) : 23.24^*$					
Safety risks by:					
Traffic	3.14	0.13			
Vandalism	2.66	-0.07			
Burglary or theft	3.40	0.15			
Hold up or robbery	2.36	-0.14			
Industrial activity	1.80	-0.05			
Youngsters	2.78	0. 36			
Junkies or prostitution	3.44	0.36			

Table 5. Most annoying sources for the total sample and for each neighborhood separately

Sourceof annoyance	Sources resulting in highest level of annoyance	Most annoying sources selected by residents	Most annoying sources selected by Zafaranieh residents	Most annoying sources selected By Khaniabad residents
Neighborhood facilities	- Lack of playgrounds - Lack of sport facilities	-Not asked	-Not asked	-Not asked
Litter	- Garbage or waste - Graffiti	- Garbage or waste - Graffiti	- Garbage or waste - Graffiti	- Garbage or waste - Unoccupied houses
Crowding	- Busy streets - Parking space	- Busy streets - Parking space	- Busy streets - Parking space	- Busy streets - Parking space
Safety risks	- Burglary & theft - Junkies & prostitution	- Burglary & theft - Junkies & prostitution	- Burglary & theft - Traffic	- Junkies & prostitution - Burglary & theft
Noise	- Cars & mopeds - Youth	- Youth - Cars & mopeds	- Youth - Cars and mopeds	- Airplanes - Cars and mopeds
Malodor	- Traffic - Surface water, sewage	- Surface water, sewage - Traffic	- Traffic - Surface water, sewage	- Surface water, sewage - Garbage or waste
Pollution	- Smog - Dust in the air	- Smog - Surface water	- Smog - Drinking water	- Smog - Surface water

respondents in Zafaranieh. On the whole, regarding the four aforementioned dwelling attributes, there was no a significant difference between two neighborhoods.

Residents evaluated seven neighborhood attributes with respect to annoyance. Litter and lack of facilities appeared to result in relatively high annoyance levels. The amounts of annoyance associated with the various neighborhood attributesall differed across the town's neighborhoods, except for crowding annoyance. In general, residents in Khaniabad expressed higher levels of annoyance than respondents in the Zafaranieh.

For each of the seven neighborhood attributes, respondents assessed the amount of annoyance associated to a number of specific sources. Of the noise sources studied, noise by cars and mopeds and youth turned out to be the most annoying noise sources. Of the malodor sources studied, annoyance by malodor due to traffic, and surface water appeared to be the most aversive one. Smog and dust in the air were the most annoying sources with respect to the neighborhood attribute pollution. Garbage or waste and graffiti were the domin atingsources with respect to annoyance due to littering. Highly annoying safety risk sources were burglary or theft and junkies and prostitution. Busy streets and Lack of parking space were the most annoying sources of the neighborhood attribute 'crowding'. Finally, with respect to neighborhood facilities respondents appeared to be the most dissatisfied with lack of playgrounds, and lack of sport facilities. Here, the observed differences between two neighborhoods with respect to satisfaction or annoyance with the various residential attributes will be discussed in more detail. As mentioned earlier profound differences were found to exist between two neighborhoods. These differences refer to both residential satisfactions in general, and to the amount of dissatisfaction with the lower-level attributes. In general, the level of dissatisfaction and/or annoyance was higher in Khaniabad. A plausible explanation for these differences is that they reflect differences in exposure to adverse environmental conditions. A positive relationship exists between exposure to specific stress factors and the resulting annoyance levels [34]. In other words, differences in residential satisfaction may reflect differences in actual housing and living conditions in the neighborhoods studied.

However, an alternative explanation for the observed differences is that they reflect differences in the appraisal of(similar) exposure levels, rather than differences in the exposure levels themselves. The extent to which an individual perceives adverse environmental conditions as annoying does not only depend on the exposure level, but also on personal factors[34].

Individual differences in, e.g., attitudes towards the annoyance source, or the level of perceived personal control may strongly affect people's reactions towards specific stressors [37]. Consequently, it is conceivable that the observed differences in residential satisfaction across neighborhoods reflect differences among residents with regard to relevant personal aspects, rather than differences in the actual exposure levels.

As mentioned in the introduction to case study areas, these two neighborhoods are located in two different contexts, and there are many social and cultural differences between their residents. However it seems that the main reason for this profound difference is due to exposure levels. Parkes et al. [38], stated that Satisfaction depends more on social factors linked to an individual respondent's length of residence, the stability of the neighborhood in terms of low turnover of residents, the presence of relatives and the amount of social interaction. The result of the present study indicates that although the length of residence of Khaniabad's residents is more, they are more dissatisfied with their residential situation. There are some possible reasons for this higher level of dissatisfaction, it may be due to the high amount of exposure to environmental conditions prevailing in Khaniabad, the inability of residents to establish good social networks and social interactions over time. However, it seems that the key factor may be an individual's financial resources, which give the individual the power to choose or control the type of neighborhood environment inhabited.

6.1. Fitting the model

One of the main goals of the study was to assess the extent of the fit of the model of urban residential satisfaction, presented in Figure 1, and to assess the relative importance of different model attributes. This was done by means of several regression analyses. The reasonably high model fit indicates that the hierarchical multi-attribute approach used in the present study offers a promising and valuable theoretical framework for modeling perceived environmental quality.

In comparison with the study conducted by [34], in this study, the predictive value of the model of environmental quality was reasonably high, 49%. However, as [34], a state, in this model a serious problem is related to the assessment of the relative importance (weight) of the residential attributes.

Multi colinearity causes difficulties in disentangling the separate effects of the various in dependent variables on the dependent variable. If two sources are correlated, the first one entered in the analysis might account for much of the explained variance in the respective higher-level criterion variable. Entering the second source, then, may lead to a less higher predictive power, due to its co-variate, hence, its contribution could become insignificant. This phenomenon may well explain the relatively low importance (beta-weights) of the physical attributes of the residential environment such as litter or safety risks. On the other hand, the respondents' general evaluations revealed that the physical attributes resulted in relatively low levels of annoyance. It may be concluded that due to the extent of multicolinearity among independent variables the assessed attribute weights should be handled with care.

6.2. Personal and household characteristics

An additional goal of the present study was to assess the influence of personal and household characteristics on residential satisfaction. It can be concluded that the in fluence of the personal and household characteristics studied on perceived

environmental quality is relatively high. Entering personal and household characteristics into the regression analyses, resulted, in general, in an increase of the proportion of explained variance in the relevant dependent variables. Personal and household characteristics added 7% to the explained variance in residential satisfaction (from 49 to 56%), 10% to the explained variance in neighborhood satisfaction (from 51 to 61%), and 10% to the explained variance in satisfaction with the dwelling (from 57 to 67%). Of the personal and household characteristics studied, age, gender, socio-economic status, and homeownership were found to affect the perceived quality of the residential environment. In general, it was found that older people were more satisfied than younger people; residents In high SES were more satisfied than residents In low SES, women were slightly more satisfied than men, and, finally, homeowners appeared to be more satisfied than the tenants. However, as it can be seen, in comparison with the effect of dwelling and neighborhood attributes, the influence of these variables is modest. These findings are in agreement with a study by [34].Also, this study corroborates the study conducted by Fine Davis [39]In his study, in eight European countries, evaluating respondents' satisfaction with neighbors, dwelling and the neighborhood, he also found demographic variables to be less powerful predictors of satisfaction compared to the dwelling and neighborhood attributes studied.

Careful scrutiny of the residents' responses revealed that, next to physical attributes other attributes like psycho-social attributes are (also) important for the quality of the urbanresidential environment. This calls foran integrated environmental policy for the local area. Therefore, it is important that, next to physical attributes psychosocial attributes such as social safety risks and community attributes, attributes of the built environment such as facilities and aesthetic attributes should be considered in environmental policy plans for the residential environment. to sum it up, environmental policy for the local area should be an integrated policy in which next to physical attributes also psycho-social attributes and attributes of the built environment should be considered.

It is also apparent that the satisfaction patterns of residents with underlying dwelling and neighborhood attributes in two different neighborhoods were totally different. This indicates that environmental policy at the local level should be differentiated, that is, assessments of environmental quality should be made at least at a neighborhood level.

Therefore, it can be said that the neighborhood level is a valid aggregation level for the assessment of perceived environmental quality. Due to top-down nature of most of the plans in Iran, it is important that this issue be taken into account in revising these plans. Besides the advantages are numerous for this kind of planning. It is obvious that it'll facilitate the participation of people and local communities in the process of planning. on the whole, it can be said that assessments of residents' quality evaluations of residential environments should be made (a) on the various different important residential attributes as identified before and (b) that these evaluations should be analyzed and interpreted at a neighborhood level, not at the level of the city or village.

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