

# HUMANISTIC NEEDS AND SATISFACTION STUDY OF MULTI-USERS IN HISTORIC DISTRICTS BASED ON COGNITIVE PSYCHOLOGY

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## SUMMARY

**Background:** Taking cognitive psychology as a starting point and study perspective, this paper analyzes the internal connection between the cognition and the needs of humanity, to study users' humanistic needs in the renovated Chinese Baroque Historic District.

**Subjects and methods:** Users in historic district are classified by age, type, and frequency of use. Using psychological research methods such as questionnaires and interviews, it investigates the users' cognitive psychology of the historic district firstly, and then researches the user's needs attention from four aspects: functional needs, social needs, artistic needs, and spiritual needs. Based on this, the paper builds the satisfaction evaluation index system of the humanistic needs in historic district, which is analyzed and quantified using SD scale, analytic hierarchy process to obtain the scores of each index.

**Results:** By investigating the user's cognition and analyzing their humanistic needs, the urban design for renovation of historic districts can be more reasonable and user-friendly, which plays a key role in the implementation of people-oriented urban design.

**Conclusions:** This provides an important humanistic basis for the urban design of the subsequent Chinese Baroque Historic District Renovation Project.

**Key words:** humanistic needs - cognitive psychology - satisfaction - historic district - urban design

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## INTRODUCTION

As China's urbanization is improved by leaps and bounds, the historic districts in modern cities are facing great threats and challenges. As modern people have higher and higher spiritual and cultural needs, their expectations and requirements for historic districts design not only lie in the improvement of physical environment, but also the revival of spirit, the continuation of the historical context, the increase of economic vitality and the guarantee of social justice. In the previous renovation of historic districts, designs are made for the material space, while people physical and psychological needs are ignored. Psychology research methods are introduced into human technology of urban design for interdisciplinary research in the protection of historic districts. The qualitative and quantitative results from the analysis of cognitive and needs can make the urban design being more scientific and humane in the process of design and implementation.

## THEORETICAL REVIEW

### Basic concepts of cognitive psychology

#### *The connotation of cognitive psychology*

Cognitive psychology can be traced back to the book *Perception and Communication* by British psychologist Donald Broadbent in the mid-1950s, which is the originator of cognitive psychology. In

1967, the publication of *Cognitive Psychology* by Neisser known as "the Father of Cognitive Philosophy" marked that cognitive psychology became an independent system. The book defined "cognition" as the process by which the sensory information received is renovated, reduced, elaborated, stored, recovered, and used (Neisser 2014).

At the very heart of modern cognitive psychology is the idea of seeing people as a processor of information. It essentially uses symbols to represent things of external environment as well as its own operation process. This idea sheds light on modern cognitive psychology which seeks to understand the nature of human intelligence. It studies the mental process by which peoples obtain, process, store, and use information in the environment with the purpose of gaining a deeper understanding of peoples' activities from perception to memory to thinking. At the beginning, cognitive psychology estimates people's inner work. With the rapid growth of science and technology, cognitive psychology is gradually evolving from the stage of exploring human recognition behavior through experiments, simulations, and records into a stage of focusing on the entire process of how people obtain and store information and exploring how the knowledge system in human brain guides human recognition behavior (Sun 2016).

#### *Basic elements of cognitive psychology*

In light of relevant theory of psychology, plenty of

external stimuli act on peoples' various receptors. All of them are processed in our body to produce a variety of sensations, such as seeing certain color, boundary, line segment, hearing certain sound, smelling a certain smell, and so on. Meanwhile, people can also perceive the stimuli inside the body, such as perceiving their posture and movement, sensing the working condition of internal organs—comfort and pain etc. This is the starting point of the entire mental process. The perception afterwards is a mental process by which people transform the information from their sensory organs into meaningful substance. In this process, people organize and interpret the information from the sensory organs with the aid of previous experience. Evidently, this indicates that perception, composed of sensation and perception, is a complex system. On top of this, the deep-level mental processes such as consciousness and memory are created.

Attention is the process of directing cognitive resources towards certain aspects of the environment. It is inseparable from and manifests itself through the activities such as cognition, emotion and will. As one of its two characteristics, directivity means people can select the objects of their cognitive activities, that is, they selectively direct their mental activities towards certain objects while tuning out other objects at every moment. Concentricity, as another characteristic, means people concentrate themselves on something. It not only selectively directs towards something, but also ignores anything that has no concern with the objects of attention, suppresses outside interference and concentrates all energy on obtaining a bright and clear reflection of the objects.

Memory is the reflection of previous experience or of what has happened previously in human brain. It can be things people have perceived, questions people have thought about, and emotions people have experienced in daily life, work, or social practice. The reason why human brain has the function of reflecting previous experience is because the stimulation of objects will leave traces of the excitation process on the cerebral cortex when it acts on human brain. These traces will be "activated" again under certain conditions in the future and the image of the disappeared stimulus will reappear in human brain. As it were, memory is one function of human brain. Physiologically, it is a process of the establishment and consolidation of a certain trace by nerve center in human brain (Li 2007; Smith et al. 2017; Zhou 2005).

## **Theory of needs and its application in historic district**

### ***Basic theory of needs***

Abraham Maslow's hierarchy of needs is the most widely used theory of needs from micro-level. He proposed five levels of needs that are universal in human needs in his 1943 paper *A Theory of Human Motivation* and subdivided the self-actualization needs

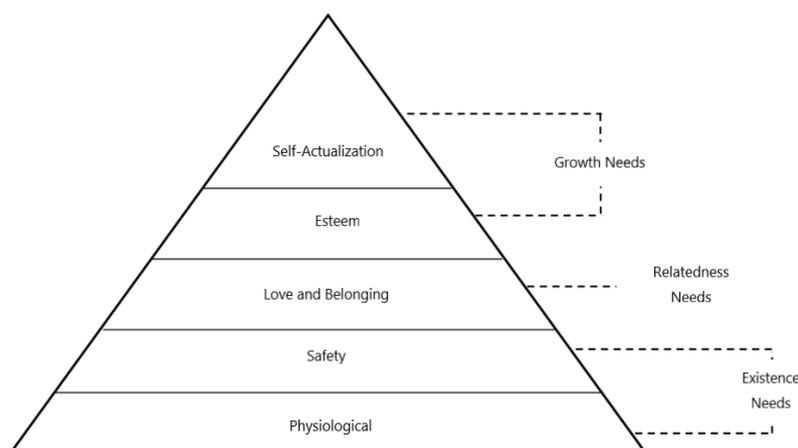
into cognitive, aesthetic and self-actualization in 1976. With the two levels of cognitive and aesthetic, the hierarchy of needs has increased to seven (Maslow 1943). The traditional five-level of needs not only shows the order of needs as "motivation", but also presents the hierarchical sequence of human needs from biological to social. The generation sequence of "motivation" follows a rigid sequence from physiological needs to self-actualization needs, while low-level needs can be developed to high-level needs. In the five-level of needs, the "physiological" and "safety" needs are people's basic needs, "love and belonging" and "esteem" needs are the "intermediate" needs, and "self-actualization" are the highest needs. In the seven-level of needs, the "basic" and "intermediate" needs in the five-level of needs are known as "deficiency needs", and the "cognitive", "aesthetic" and "self-actualization" are regards as "growth needs" (Decenzo & Robbins 1988; Steers & Porter 1991). The sequential and hierarchical characteristics of hierarchy of needs supports its theoretical view that "higher-level needs are generated sequentially only when lower-level needs are being met." (Hall & Nougaim 1968; Korman et al. 1997; Lawler & Suttle 1972).

The ERG theory was proposed by Clayton Alderfer in the 1960s to seek to overcome the limitations in Maslow's theory by combining the hierarchy of needs theory with empirical research. Alderfer simplified the human needs into existence needs, relatedness needs and growth needs (Alderfer 1969). As an extension of Maslow's hierarchy of needs, ERG theory has a close relationship with the former (Figure 1).

### ***Users' humanistic needs of historic district***

The object of this study is specific users in historic district, including the residents in the district, street merchants, the surrounding residents, city residents and non-local tourists. Historic districts are different from general urban space because they are districts with a certain amount of history relics, complete historic features, and continued social and functional structures. In addition to the residential function, it also includes business, tourism, etc. In terms of the environment characteristics, humanistic feathers, and historic atmosphere of historic districts, users' needs are divided into functional needs, social needs, artistic needs, and spiritual needs from the basic theory of needs and the perspective of humanistic.

Functional needs correspond to the low-level of needs, including basic needs of life, safety needs, etc. They are daily needs of historic district, including the needs of life-related activities and leisure activities carried out by residents in district. Social needs are intermediate level needs, which are users' needs to build or promote social relationship. Generally, they refer to social activities, cultural activities, etc., including gatherings, folk activities, and all kinds of interaction between users in district.



**Figure 1.** The relationship between hierarchy of needs theory and ERG theory

Artistic needs are users' needs for historic culture and artistic atmosphere, including historic buildings, featured landscape, and the material and immaterial that can show the cultural and artistic characteristics of historic district. Spiritual needs are higher-level needs of users, including the sense of experience of belonging, identity, and regional spirit that historic district brings to people.

***Inner connection between humanistic needs and cognitive elements***

From the perspective of cognitive psychology, needs are defined as a mental state in which individuals strive to satisfy the balance and selective tendencies generated inside due to their perception of the absence of certain conditions for their existence and development. Balance aims to eliminate the absence, and it is the purpose of selection. Together with the tendency of balance, the selection externalizes the subjective internal state of "absence" and "balance" into specific and actual objective needs.

In cognitive psychology, functional needs are needs at material level, such as the function and quality of buildings, street paving, greening, landscaping, and convenience of transportation and parking in historic district. As the most obvious characteristics of historic district's environment, these material elements are perceived by users who enters the district. People walking in the street space recognize the easily perceptible details such as its interface, scale, color, and landmark nodes firstly and then memorize them with the help of these easy-to-impress features. These features build a larger level of morphological cognition. The cognition of features is how users fast identify the features of historic district through the analysis of features, the understanding of feature structure, and the sorting out of the perception process. When users have the first perception of the objective material environment, their attention will give priority to the perception of the space with specific characteristics in the complex

district space and the perception is risen to logical perception. Logic perception focuses on the description of people's logical thinking and the process of information processing. Cognition of street features is built first when users are in historic district, and then all cognition of features is connected in series, which are upgraded to rational logical thinking. The intermediate-level needs such as social needs, artistic needs, etc. are generated accordingly.

Historic district contains memories related to the past and the present of the city, which best reflects the city's history. The city memories bring people the sense of identify and belonging to the city. The spiritual needs are transferred into human's cognition through memorizing, retaining, recalling and reappearing. Among them, memorizing is to obtain a deep impression of objective things by repeated sensations and perceptions, which is commonly referred to as "memorization", retaining is to consolidate the knowledge and experience that have been memorized, so that the materials remembered can be bearing in mind for a long time; recalling is to restore previous experience under different circumstances, that is, the things that have been reflected in the past are not in front of your eyes, but the reflection to them can re-present, reappearing is the reappearance of the things that have been perceived in the past, and people can feel they have heard, seen or experienced them. Memorizing and retaining are the basis of recalling and reappearing. Recalling and reappearing are not only the result of memorizing and retaining, but also a catalyst to consolidate and strengthen memorizing and retaining (Ma 2013).

**SURVEY DESIGN OF HUMANISTIC NEEDS AND SATISFACTION OF THE CHINESE BAROQUE HISTORIC DISTRICT**

**Overview of historic district**

The Chinese Baroque Historic District in Daowai District of Harbin is one of the Harbin's most important historical and cultural heritages. The Chinese Baroque architectures, traditional courtyards, and the spatial pattern of streets in the historic district are quite distinctive, and the historic features are relatively complete. It is a typical residential and commercial historic district. There were many problems before the renovation. In respect to architectures, the traditional commercial buildings along the street are in disrepair; buildings within the courtyards are built without approval and in disorder; many dilapidated houses have the risk of collapse; and the facilities are quite inadequate. In terms of transportation, there are no sidewalks and parking spaces due to narrow roads and vehicles are often parked illegally on both sides of the road, which causes traffic jam. As for landscape environment, there is almost no public greening in the district due to the high building density, and the green coverage rate is very low. The public space in the courtyard is full of sundries, lacking a good living environment space and social contact space (Gao & Bi 2020)

In 2007, the renovation of the Chinese Baroque Historic District started. The renovation project lasts nine-year in three-phase. With this project, the historic district is gradually transformed from a district with residential and commercial function to that with pure commercial function. During this period, the business condition of the district was far from satisfactory. For the time being, the planning layout of the Chinese Baroque Historic District is divided into 4 major special functional areas. With the six elements of "catering, accommodation, travel, sightseeing, shopping, and entertainment", a diversified commercial area integrating entertainment and leisure is developed. However, with the operation of the district, there are many outstanding problems, such as the absence of traditional lifestyle owing to the relocation of indigenous residents and merchants, the contradiction between the traditional space and the existing function after its function switch, and the lack of market appeal caused by the unclear function of the operators.

### **Questionnaire design and survey implementation**

Based on the cognitive psychology of users, the questionnaire is designed to investigate the humanistic needs of different users and their satisfaction of the renovated district. There are four parts in the questionnaire: 1. Users' basic information, including age, the regions where they are from, levels of education, etc. 2. The overall cognition of the historic district users, including cognition of overall images of historic district, cognition of focus, cognition of emotional experience, etc. 3. Users' attention to humanistic needs, including functional, social, artistic and emotional needs. 4. A set of evaluation factors

built on the types of needs to research the satisfaction of relevant factors such as historic buildings, environmental facilities, transportation convenience, street space, folk activities, historic atmosphere, etc. (Tang et al. 2009).

The survey lasted two months. A total of 300 questionnaires were distributed with all returned. The effective rate is 94% with 282 valid questionnaires. Random interviews were made when distributing the questionnaires to have a deep understanding of users' cognition, needs, and satisfaction of the Chinese Baroque Historic District. The questionnaires were aggregated, and the data was statistically analyzed.

## **ANALYSIS ON HUMANISTIC NEEDS AND SATISFACTION OF THE CHINESE BAROQUE HISTORIC DISTRICT**

### **Users**

In terms of the regions where they are from, the data show that users of the historic district are the residents in the district and the surrounding residents, followed by city residents, non-local tourists, and staff in the district. It indicates that the Chinese Baroque Historic District, as a tourist attraction of Harbin, is not well-known (Table 1), because users are mainly local residents with less non-local tourists. With regards to age, users under the age of 18, aged 18-30, aged 31-45, aged 46-60, and aged above 60-year-old accounts for 12.4%, 27.7%, 25.1%, 19.5%, and 15.2% of the total survey population respectively. The large proportion is young and middle-aged users from 18 to 45-year-old, followed by middle-aged and elderly users over 45-year-old and young users under 18-year-old in the district (Table 2). Regarding levels of education, the users with degree of middle school and below, high school, university, postgraduate and above accounts for 12.7%, 24.5%, 40.8%, and 22.0% respectively, of which tourists with degree of university and above are overwhelming with 62.8% (Table 3). Concerning the frequency of use, users who frequently visit the historic district account for 33.7%, followed by occasionally, rarely, and other with 30.9%, 26.6%, and 8.9% respectively (Table 4). As is shown from cross-tabulation analysis of users' type, residents living in the Chinese Baroque Historic District use it the most, followed by staff in the district, the surrounding residents, city residents, and non-local tourists (Figure 2). The young people aged 18-30 uses the district more frequently, followed by middle-aged and elderly people aged 31-60, and adolescents under 18 (Figure 3). The residents in historic district are largely aged 18-45 and above 60-year-old, the surrounding and city residents largely aged 18-30, non-local tourists largely aged 18-60, and staff largely aged 46-60 (Figure 4).

**Table 1.** Analysis of where users come from

Category of users	Number of users (person)	Percentage (%)
Residents in historic district	78	27.7
The surrounding residents	66	23.4
City residents	52	18.4
Non-local tourists	47	16.7
Staff in district	39	13.8

**Table 2.** Analysis of age of users

Category of users	Number of users (person)	Percentage (%)
Under the age of 18	35	12.4
Aged 18-30	78	27.7
Aged 31-45	71	25.1
Aged 46-60	55	19.5
Aged above 60-year-old	43	15.2

**Table 3.** Analysis of users' level of education

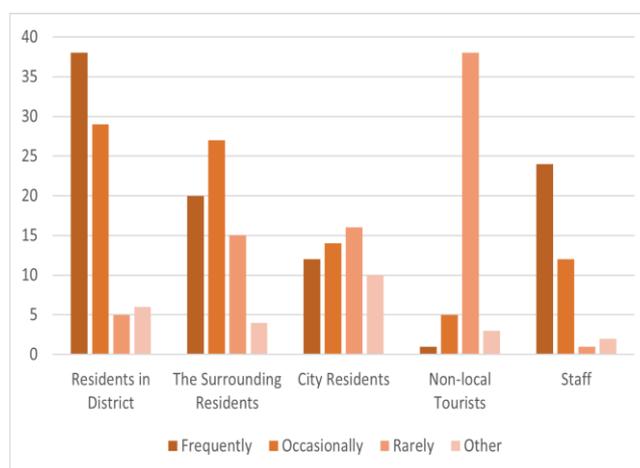
Category of users	Number of users (person)	Percentage (%)
Middle school and below	36	12.7
High school	69	24.5
University	115	40.8
Postgraduate and above	62	22.0

**Table 4.** Analysis of users' frequency of use

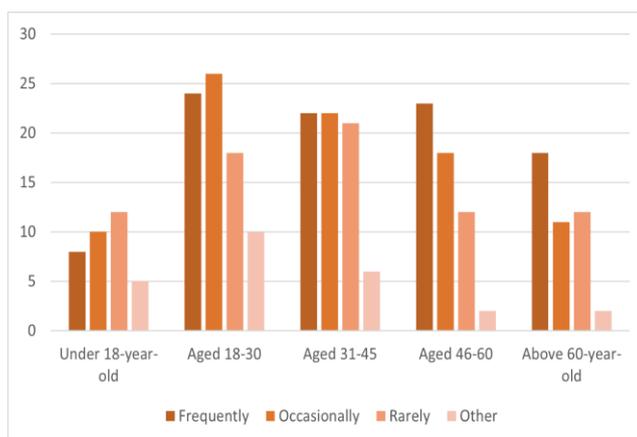
Category of users	Number of users (person)	Percentage (%)
Frequently	95	33.7
Occasionally	87	30.9
Rarely	75	26.6
Other	25	8.9

Except the staff, most other users have the degree of university, and more residents in district have the degree of middle and high school since most of them

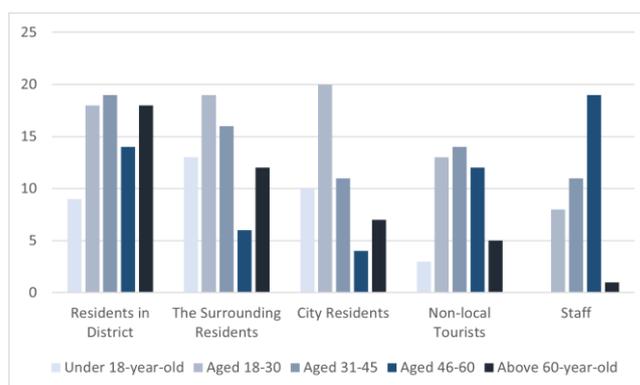
are middle-aged and elderly and when they were young, the education was undeveloped (Figure 5).



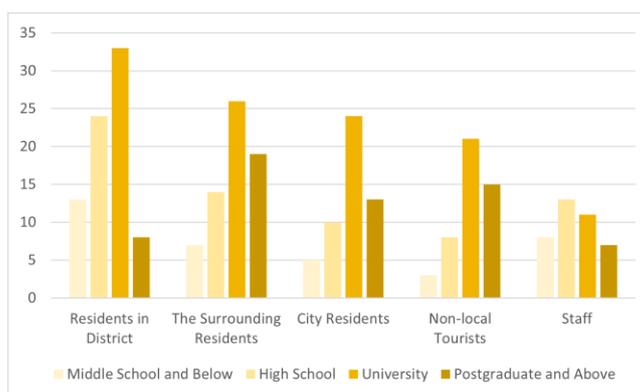
**Figure 2.** Crosstab of the place users coming from and the frequency of use



**Figure 3.** Crosstab of the users' age and the frequency of use



**Figure 4.** Crosstab of the place users' coming from and the age



**Figure 5.** Crosstab of the place users' coming from and levels of education

### ***Analysis of users' cognition of historic district***

Cognition of overall images. The cognition of the overall image of the Chinese Baroque Historic District includes users' position and perception of the overall image. Users perceive the historic district based on the existing cognitive pattern in their brain. When processing the cognition of historic district, users will compare and match it with their previous experience patterns. They perceive the historic district from a certain impression which may be the image characteristics or humanities history.

As per the statistical results, 48.4% of the respondents believe that the Chinese Baroque Historic District is a traditional and old district. And from the

view of nearly half of the users, the historic district is just a traditional area with traditional food provided. It indicates that users have formed a certain knowledge on the Chinese Baroque Historic District's image in their mind. Furthermore, this knowledge, to a certain extent, affects users' perception on the district's image. In the sight of 27.7% respondents, the historic district gives priority to the functions of catering and entertainment, implying that the renovated historic district has transferred from a comprehensive traditional commercial and residential district to commercial district. It is a new stimulus to users, and users forms a new perception. 15.3% respondents think that the historic district is mainly a place for

people to experience certain folk cultures. It shows that for a small part of users, their perception of historic district contains the experience of folk cultures. With regards to users' cognition of historic district's positioning as a tourist attraction, the cognition of "I know it well", "I fairly know it", "I moderately know it", and "I do not know it" is 8.9%, 37.2%, 39.8%, and 14.1% respectively. It explains that the publicity of historic district as a tourist attraction is inadequate and there are lots of work to do on image positioning and marketing.

**Cognition of focus.** The study on users' cognition of focus in the historic district is a study on the "attention" element in cognitive psychology. From users' point of view, the most eye-catching focus in historic district is historic architecture with percentage of 43.5%, followed by catering 38.7%, humanistic environment 25.4%, entertainment 19.2% and folk culture 15.5% (it is multiple-choice.). The historic architecture remains the factor drawing the most attention of users. As far as catering concerned, the main users are city residents, which explains that the traditional food in historic district is the main factor of attracting users far away the district. It can help us understand how the historic district draws users' attention to investigate the cognitive objects users focus on. And it is of great guiding significance for the renovation design and image publicity of the historic district to study the basic elements of drawing users' attention. The various featured elements in historic district attract user's repeated attention in different ways, by which the cognition is gradually formed in their brain. Therefore, it is an important part to position and shape the image of historic district to study different things' attraction to users in historic district.

**Cognition of emotional experience.** Using emotional vocabularies to describe district is helpful to understand users' personal sensation and emotional experience of the district and confirm the overall atmosphere of the district. As per user's description of their overall sensory experience of the Chinese Baroque Historic District, the top three key words with high frequency of occurrence are relaxing, pleasant and interesting. Except these three positive words, there are a minor of negative words such as quiet and dull. 46.3% respondents have the view that the overall image characteristic of the Chinese Baroque Historic District is distinct (really like), followed by little distinction (nothing) 31.9%, no distinction (dislike) 10.6%, and indistinction (unclear) 11.2%, illustrating that there is still room for improvement of the overall image characteristics of the historic district.

### **Different users' attention to humanistic needs of historic district**

Users' humanistic needs of historic district have been classified in the previous section. In the research of different users' humanistic needs, as the evaluation

standard, the attention to different needs=the number of a specific type of users who focus on a specific need/the total number of this specific type of users\*100%.

The main findings of the research are: (1) Overall, users with different region pay the most attention to the functional needs of historic district, followed by social needs, artistic needs, and spiritual needs. The surrounding residents, city residents and the staff focus more on social needs. Although the non-local tourists pay more attention to artistic needs than other users, their attention to functional needs is lower. The spiritual needs are more important to residents in the district, the surrounding residents, and the non-local tourists than the staff and city residents (Figure 6). (2) On the whole, users at different ages pay the most attention to functional needs. Users under 18-year-old and above 60-year-old care more about social needs. The users aged above 46-year-old pay more attention to spiritual needs. Users aged 18-45 are concerned the most about artistic needs, but users aged more than 60-year-old are the opposite (Figure 7). (3) With the decrease of usage frequency, users' attention to functional needs is reduced. Users with higher frequency and users with other situation of frequency are concerned more about spiritual needs. Social needs and artistic needs are more concerned by users with lower frequency of use (Figure 8). (4) In regard to levels of education, functional needs are very important to the overall users, while users' attention to social needs is relatively average. Comparing with users with other levels of education, users with university degree significantly pay much attention to artistic needs. (Figure 9)

According to the comprehensive analysis, users in historic district pay the most attention to functional needs, which indicates functional needs for life, environment and safety are the most important to users. The social needs come in second. It also finds the surrounding residents and city residents have more requirements on social needs, which explains that these two kinds of users regard the historic district as daily public space for entertainment. From the perspective of cognitive psychology, individuals' cognitive process is mainly developed in linear. Users who live near the historic district use the district frequently, therefore their cognition of the district has been upgraded to memory and deep thinking from the initial perception and attention. For users aged under 18-year-old and above 60-year-old, they have more needs on social contact than users at other age. The users who need more artistic are non-local tourists and the young and middle-aged with higher level of education. Non-local tourists' overall cognition of historic district is influenced by the objective factors such as the tourism image brand and publicity slogans, and the components of tourist resource of the historic district before the tour. They will compare the cognitive images in their imagination and memory

with the actual one during their tour. As a result, they will pay more attention to the artist visual experience and the historical and cultural atmosphere of the historic district. Users with the most concern about spiritual needs are the middle-aged and elderly people

living in the district and surrounding. Because they live in the district for the longest time with high frequency of use, they have more emotional needs such as identity and belonging of the district than other users.

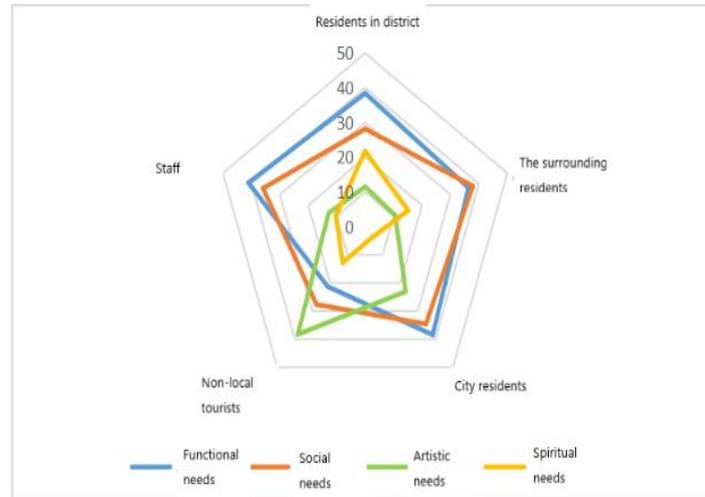


Figure 6. The needs of users from different regions

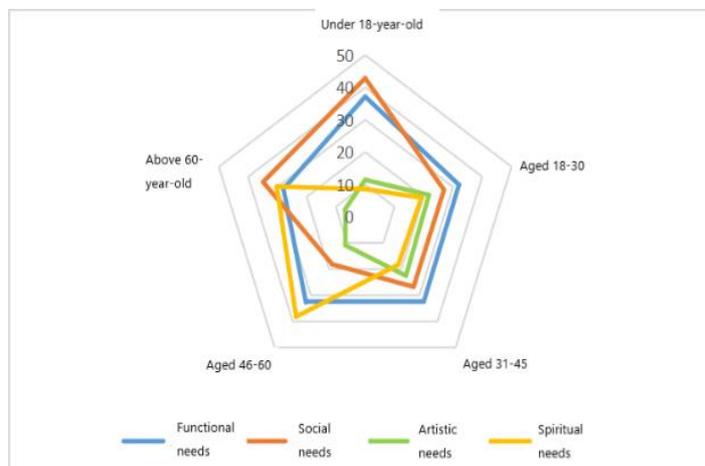


Figure 7. The needs of users at different age

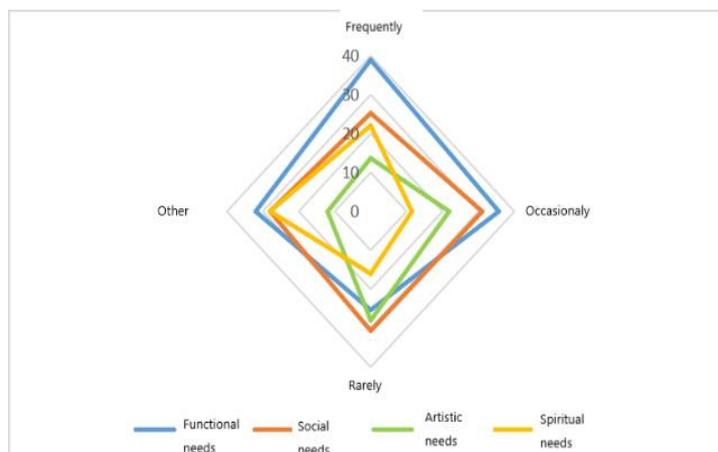
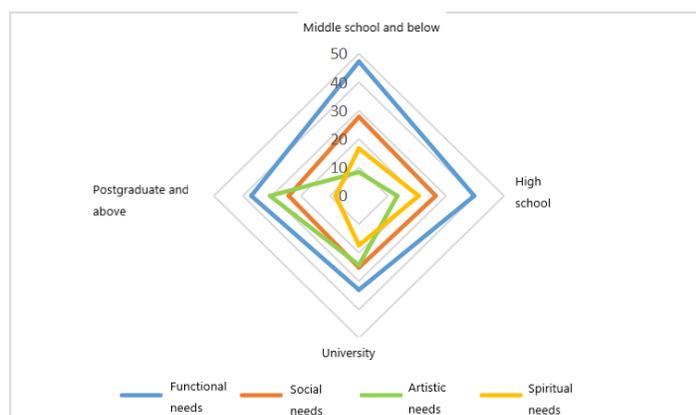


Figure 8. The needs of users with different frequency of use



**Figure 9.** The needs of users with different level of education

### Humanistic needs satisfaction evaluation in historic district

The Chinese Baroque Historic District is a renovated historic district. The renovation is carried out with protecting by the method of urban design. Urban design was born in response to a series of social problems caused by rationalism and functionalism. The perspective of this study is consistent with the “humanism” thought with people-oriented raised by urban design. Combining the humanistic needs with the research dimensions of urban design, humanistic needs are specified in all levels of urban design before the implementation of the humanistic needs’ satisfaction survey. The functional needs correspond to the physical environment level, including architecture, environment, transportation. The social needs correspond to social contact and space level, including social activities and social contact space. The artistic needs correspond to the level of art design, including vision art and cultural perception. The spiritual needs correspond to cultural and emotional experience level, including context thinking and personal emotions. These elements constitute the set of satisfaction evaluation factors for humanistic needs of historic district, which includes 4 first-level evaluation factors, 9 second-level evaluation factors and 19 evaluation factors. The factors of the same level are compared in pairs based on the previous level, and then the weights of factors of each level are calculated. The score of each evaluation factor can be obtained following the below processes (Zhao 2004): 1. In the questionnaire, the evaluation factors of each level are ranked according to their importance. The ranking and professional analysis are the basis; 2. Evaluation factors are quantified using SD Rating Scale; 3. The analytic hierarchy process is applied in the matrix calculation with 100 as the full score; 4. Evaluation factors of each level are distributed according to their respective weight ratios. Based on these, the humanistic needs satisfaction evaluation index system of the Chinese Baroque Historic District is built (Table 5).

The questionnaire is designed in scale method

based on factors in the set of humanistic needs evaluation factors. It uses several extreme adjectives with opposite semantics to investigate the respondents’ impressions and attitudes towards the specific sub-factors of each humanistic need of the historical district. There are five options for each factor with the scores +2, +1, 0, -1, -2. The conversion factor value after calculation is [1, -1], and the statistical result is shown in Figure 10.

Among the 19 factor values, 18 are positive with 1 negative. Users’ evaluation of the overall satisfaction of the renovated Chinese Baroque Historic District is positive. 6 out of 7 factor values of functional needs are positive. The factor value of “building quality is good-poor” is 0.24, the factor value of “building function is perfect-imperfect” is 0.28, the factor of “street scale is comfortable-uncomfortable” is 0.18, the factor of “environment is clean-dirty” is 0.19, the factor value of “greening and facilities are adequate-inadequate” is 0.02, the factor value of “transportation is convenient-inconvenient” is 0.08, and the factor value of “parking is convenient-inconvenient” is -0.3. Among the four factors of social needs, the highest score is 0.39 for catering and entertainment. And the highest score is 0.49 for architectural appearance factor of artistic needs. For the four factors of spiritual needs, the regional custom factor has the highest value of 0.21, while the sense of belonging factor has the lowest value of 0.05. According to the SD factor value obtained, the humanistic needs satisfaction evaluation index system can be quantitatively analyzed, and the SD factor value can be processed with below formula.

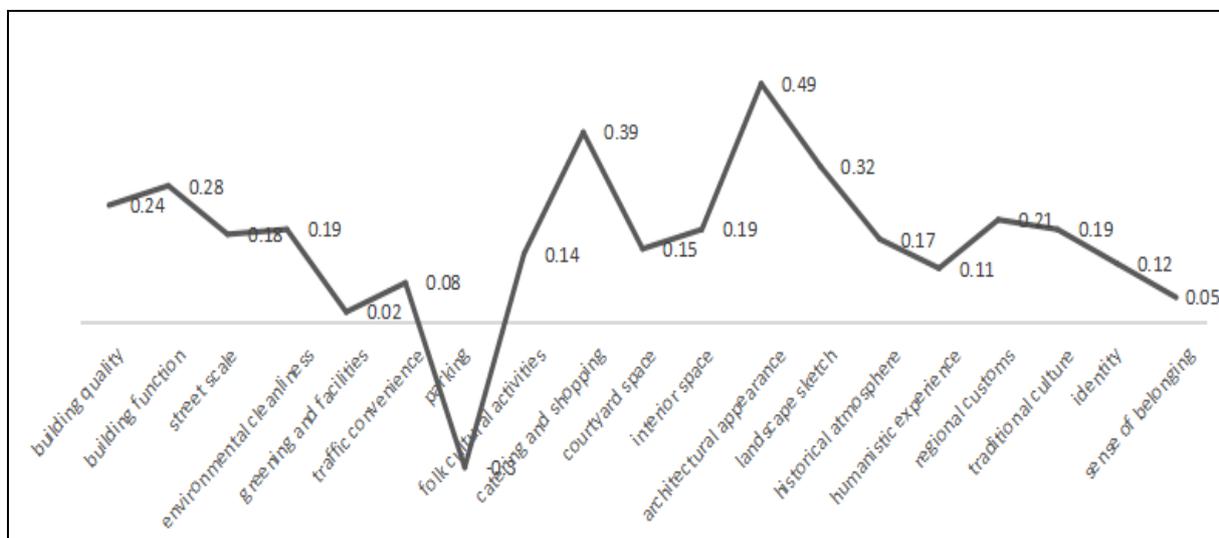
$$T_i = (SD_i + 2) * 20 + 30$$

In the formula,  $SD_i$ —the average value of one SD factor;

$i$ —The serial number of the evaluation index. The obtained  $T_i$  is the score of the factor value in evaluation index. Multiplying the score by this factor’s weight value, the score of each evaluation factor can be obtained. By adding up all factor values of each-level, the upper-level evaluation index value can be obtained. The classification of evaluation scores is shown in Table 6.

**Table 5.** Humanistic needs satisfaction evaluation index system of the Chinese baroque historic district

Evaluation Factor Level	First-Level Evaluation Factors	Weight score	Second-Level Evaluation Factors	Weight score	Evaluation Factor	Weight score	
Humanistic needs satisfaction evaluation index system of the Chinese Baroque historic district	Functional needs	36	Architecture	18	Building quality	10	
					Building function	8	
					Street scale	2.5	
			Environment	8	Environmental cleanliness	2	
					Greening and facilities	3.5	
					Traffic convenience	3	
	Social needs	21	Transportation	10	Parking	7	
					Folk cultural activities	6	
			Social activities	15	Catering and shopping	9	
					Social contact space	6	
			Artistic needs	17	Visual art	10	Courtyard space
	Interior space	2					
	Cultural perception	7			Architectural appearance	7	
					Landscape sketch	3	
					Historical atmosphere	4	
	Spiritual needs	26	Context thinking	11	Humanistic experience	3	
					Regional customs	7	
			Personal emotion	15	Traditional culture	4	
					Identity	7	
						Send of belonging	8



**Figure 10.** The distribution of evaluation factors' SD value

**Table 6.** Suggested classification method of evaluation score

Score	Comments	Grade
≥ 90	Very satisfied	Excellent
80-89	Fairly satisfied	Above average
70-79	Moderately satisfied	Average
60-69	Moderately dissatisfied	Below average
< 60	Very dissatisfied	Very poor

Based on the SD factor value obtained and the calculation method mentioned in previous section, the scores of the second-level evaluation factors are obtained: architecture scored 76, environment scored 71, transportation scored 68, social activities scored 74, social contact space scored 71, vision art scored 75, cultural perception scored 70, context thinking scored 72, personal emotion scored 71. The first-level evaluation factors are scored: functional needs scored 74, social needs scored 71, artistic needs scored 74, spiritual needs scored 70. And the total score of satisfaction is 72, which is in the grade of average.

As can be seen, transportation dissatisfies users the most. The satisfaction of greening is average, and the most satisfied factor is the using function of historic architecture and street. It proves that the building quality is improved after renovation, so do the basic facilities. As for building functions, most respondents agree the district is renovated to a commercial district, only a few residents living in Daowai for a long time think the residential function should be preserved. More users are satisfied with social activities in social needs, including commercial activities such as catering, shopping, and the cultural activities such as Xiangsheng (or crosstalk), Ping Opera, shadow play, and tea art. Users' fairly satisfaction with the social contact space indoor and outdoor shows that the district has good function of the entertainment such as catering, and shopping and is good in the spatial scale. Regards artistic needs, users have the most satisfaction with the historic building appearance in vision art, which proves the image of the renovated historic building is successful. According to the principle of "restore as it was", the building appearance was renovated with preserving the architectural style of the Chinese Baroque to a certain extent. Users can still have the vision experience of the buildings when they are in the district, but their satisfaction of the cultural atmosphere is not high. Users do not have strong context thinking in spiritual needs, and their satisfaction of identity and belonging in personal emotions are low. From the perspective of cognition, when people come to the historic district and perceive the city history and memory it conveys to them, their perception can be upgraded to the advanced cognition process of understanding, learning, and thinking by experiencing the real historic buildings, residents' real-life scenes and the unique local customs. Nowadays, the protected buildings in district do not have the residential function, and the traditional life in the original district no longer

exists. Although the renovated buildings have good-looking appearance and good quality, they are seriously commercialized and lack the flavor of life. Users are confused about their perception of original district and renovated district, which results in an unstable emotional cognition of them.

## CONCLUSIONS

Users' humanistic needs of historic district are studied starting from the cognitive psychology in this paper. The following conclusions are reached from the survey of the Chinese Baroque Historic District: (1) For users, historic district is just an old district in Daowai with historic buildings and traditional food. They do not have enough cognition of the historic district. (2) Regardless of age, regions they are from, levels of education, and frequency of use, all users pay the most attention to functional needs, followed by social needs. Non-local tourists and young and middle-aged users pay the most attention to artistic needs, while middle-aged and elderly residents living in and around the district value spiritual needs the most. (3) The quantitative results of satisfaction evaluation are obtained by building user's satisfaction evaluation index system for the humanistic needs of the historic district, and the deficiencies of the renovated district are identified from the perspective of humanistic needs with a large amount of feedback. This provides an important humanistic basis for the urban design of the subsequent Chinese Baroque Historic District Renovation Project.

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**Contribution of individual authors:**

Dian Zhang: interpreted the data, and participated in project administration including resources, software, validation, visualization, as well as wrote the paper.

Suning Xu: participated in literature search and analyses, evaluations and manuscript preparation, wrote original draft, conceived and designed the manuscript, conceptualization, investigation and methodology.

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# STUDY ON RELIEVING MENTAL STRESS OF QUARANTINED PEOPLE BY INDOOR EXERCISE DURING THE COVID-19 EPIDEMIC

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## SUMMARY

**Background:** During the epidemic, the mental health of quarantined people is seriously affected. Indoor exercise can alleviate peoples' mental problems and promote physical health, making it an excellent choice for quarantined people. In this study, different frequencies, durations and types of indoor exercise have been investigated, to analyze their effectiveness in relieving mental stress of quarantined people, so as to provide a reference on the issue of mental health protection for quarantined people.

**Subjects and methods:** In this study, 500 quarantined people from Hebei province have been selected as subjects. Three experiments have been conducted to analyze the effect of exercise on stress relief for quarantined people. Experiment 1 examined the frequency of exercise; experiment 2 examined the duration of exercise and experiment 3 examined the exercise program. The research tools include the Wenjuanxing (an online questionnaire survey platform), the statistical analysis tool SPSS 27.0, and the Sentiment Self-assessment Scale-21 (DASS-21).

**Results:** The three DASS scores for the isolates, stress and anxiety are the most severe symptoms. In experiment 1, there is no significant difference in relieving mental stress for exercising 3-5 days per week versus 7 days per week. In experiment 2, depression, anxiety and stress decreased significantly before 45-60 min and almost remained unchanged after this period. In experiment 3, the effect of mixed exercise is better than that of a single exercise ( $P > 0.01$ ).

**Conclusions:** Exercise 3-5 times a week is appropriate. The optimal duration of each exercise session is between 45-60 min, with the effect decreasing in sequence for less than 45 min and not increasing significantly for more than 60 min.

**Key words:** COVID-19 epidemic - quarantined people - mental stress - indoor exercise

\* \* \* \* \*

## INTRODUCTION

In December 2019, a novel coronavirus (COVID-19) infection was reported in Wuhan City, Hubei Province, China, followed by the COVID-19 epidemic crisis of varying severity across the country (Kang et al. 2020). During the epidemic, a large number of people are quarantined at home or medical isolated in specified hotels due to the need for prevention and control. Self-isolated at home is necessary for scientific prevention and control, but its negative effects cannot be ignored. Behaviorally, it sets restrictions on movement, expression and daily activities. Physiologically, it can cause physical reactions such as increased heart rate, muscle tension, insomnia, dizziness and headaches (Simpson et al. 2020). In addition to behavioral and physiological effects, the negative psychological impacts of COVID-19 are equally profound (van Vinkers et al. 2020). A national survey shows that quarantined people tend to pay attention to all kinds of information about the epidemic at any time, resulting in tension, anxiety, upset, fear, increased mood ups and downs, etc. Some people also appear irritability, compulsive behavior, loss of interest, inability to concentrate and other conditions (Xiang et al. 2020).

According to a survey conducted by Canadian researchers, there are two types of psychological problems, depression and post-traumatic stress disorder

(PTSD), that are more likely to find in people who are quarantined because of the control of infectious diseases. Depression is a common psychological disorder characterized by a continuous and prolonged depressed mood, ranging from initial malaise to pessimism, anhedonia, negativity, avoidance, and eventually suicidal attempts and behavior, along with symptoms such as somatization pain, chest tightness, and shortness of breath (Chen et al. 2020). There are two main symptoms of PTSD. The first symptom is that, after the end of the traumatic event, there will be "repeated" images of the traumatic event in my mind, with lingering thoughts about the event. For example, there are constant scenes of overcrowded hospitals, with many doctors in protective clothing carrying patients in and out (Shigemura et al. 2020). For some people, the emotional response continues after the event, such as irritability, and chronic depression. Even after a long period of time, the stress does not relieve, and some patients continue to have nightmares related to this time. Secondly, after a traumatic event, some people become hyper-vigilant. They may avoid talking about anyone or anything related to the event. And they are not willing to have further contact with people related to the event and go near the relative place, or even suppress their memories of the event. Besides, they may have difficulty in concentrating and falling asleep or wake up easily after falling asleep.