

# INFLUENCING FACTOR EXTRACTION OF HEALING ENVIRONMENT IDENTIFIABILITY BASED ON ENVIRONMENTAL PSYCHOANALYSIS

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## SUMMARY

**Background:** In the environmental psychology, “environmental recognition” is considered as the process of people’s cognition, understanding, acceptance and transformation of the structure, characteristics, spatial relationship and other factors of the environment to obtain meaning and illustration. As a type of space environment for treatment and recovery, healing environment can further strengthen users’ environmental psychological suggestion during the environmental identification process, so as to stimulate their self-healing ability physiologically and psychologically. Environmental healing method is an effective psychological suggestion method. The purpose of studying the environmental identifiability of the healing space is to arouse people’s health awareness from the perspective of environmental psychology and improve the efficiency of health recovery mentally and physically.

**Subjects and methods:** From the perspective of doctor-patient psychology and environmental needs, this study analyzes users’ cognitive process of the healing environment. Combined with the structural form and connotation characteristics of the space environment, it also sorts out the identifiable characteristics of healing environment. On the basis of the formation of the above characteristics of the healing environment, the influencing factors of the healing environment identifiability are further extracted, so as to form an index system of the identifiability of healing environment.

**Results:** This research adopts the target hierarchy method, taking the identifiability of healing environment as the goal, classifies the selected identifiability indicators, and establishes the corresponding element layer and factor layer. Finally, 17 indicators were screened out. Among them, there are 3 area indicators, 3 path indicators, 2 boundary indicators, 6 nodes indicators, and 3 markers indicators. The identifiability index system of the healing environment is formed. Establishment of the weight of indicators for the identifiability of healing environment

**Conclusions:** This study takes healing environment as the research object and uses the relevant principles of environmental psychology to study the identifiability characteristics of spatial environment. Through the theoretical analysis of the environmental cognition process and the identifiability of environment, five identification element categories including areas, paths, boundaries, nodes, and markers with the characteristics of healing environment are analyzed. The research results are expected to provide reference for the construction of healing environment in medical institutions or urban spaces.

**Key words:** environmental psychology - healing environment - identifiability - spatial cognition

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## INTRODUCTION

In the environmental psychology, “environmental recognition” is considered as the process of people’s cognition, understanding, acceptance and transformation of the structure, characteristics, spatial relationship and other factors of the environment to obtain meaning and illustration (Joseph & Wood 2010). Healing environment, as a type of space environment for treatment and rehabilitation, can further strengthen the user’s environmental psychological suggestion by means of the user’s environmental identification process, so as to stimulate the physiological and psychological self-healing ability. Environmental healing method is an effective psychological suggestion method (Adam et al. 2021). At the same time, the healing environment, as a space demand carrier of medical technology, can bring clear environmental cognition to doctors and patients. It can also be used as a carrier of treatment and rehabilitation, so that patients can arouse their own health

“consciousness” and “value” in the identification of the environment. It is helpful to realize the effective health recovery of patients from a psychological point of view (Bamberg et al. 2015).

The components of the healing environment, the organizational form of the space and the trend of the form, etc., all have strong environmental identification characteristics. The purpose of studying the environmental identifiability of the healing space is to find a universal vocabulary or symbol, so that people in the medical treatment space can understand and recognize the space, and then generate emotional resonance for the healing environment. It also aims to arouse people’s health awareness from the perspective of environmental psychology and improve the efficiency of health recovery mentally and physically (Simon & Klandermans 2001)

### Human’s cognitive process of space environment

People’s perception of things is mainly divided into

two aspects: feeling and perception. In psychology, from accepting external stimuli to making corresponding responses, individuals need to go through two stages: physiological and psychological (Van der Werff et al. 2013). Physiologically obtained experience is feeling, while psychologically obtained is perception. Feeling is the basis of perception (Berman et al. 2014). For the healing environment, a large amount of information has been collected through the initial five senses of sight, hearing, smell, taste and touch, so that people have an initial judgment on the surrounding living environment (Berto 2005). From the perspective of people's cognition of environment, the cognition of the healing environment will also vary due to the individual's psychological needs and the use of space environment. American psychologist Abraham Maslow proposed the Hierarchy of Needs Theory, which mentioned that people's behavioral motivation is guided by psychological needs. Human needs are divided into seven layers from low-level to high-level needs: the first four basic needs include: physiological needs, safety needs, love and belonging needs, and esteem needs. The last three layers of growth needs include: cognitive needs, aesthetic needs, and self-actualization needs. Only when the low-level needs are satisfied, the high-level needs will appear, and finally the ideal needs will be achieved. In the healing process of the environment for the users, it is first necessary to start from the psychological needs of the users to realize the basic needs, that is, the healing environment needs to meet the needs of the users' physiology, safety, affiliation and love. As a result, a psychologically stable state is formed in the users' mind. The second is to consider the healing and recovery capabilities of the healing environment to meet the users' psychological growth needs (Bratman et al. 2015). From the perspective of the healing environment itself, the patients' behavior will be changed by the environment. From cognition to recognition, it is a process of deepening the recognition of the healing environment. According to the characteristics of the users' cognitive process of the healing environment, a reasonable design mode is adopted to reduce the influence of ineffective factors on the spatial cognition of the healing environment and to improve the recognition of the healing environment. It is the main purpose of this study to explore the identifiability of the healing environment so that users can better recover from psychological and physical trauma in the process of environmental healing.

### **Discussion on the identifiability of healing environment**

In the identification research of the healing environment, through the intervention of environmental psychology and the analysis of environmental behavior, people's cognitive process of the space environment can be identified by the shape and structure of the space, and relying on different behavior subjects' environmental awareness to achieve. Among them, the theory of environment-behavior studies mainly discusses the interaction between people's behavior and their environment. The focus is mainly on people and the

environment. The ultimate purpose is to study the interaction between the key elements that affect the physical environment and their effects on human behavior (Cupchik 2002). In the identification of the healing environment, there is an interaction behavior with the environment and the activities of the crowd, that is, under the stimulation and guidance of the healing environment, the crowd will perform specific restorative-related behaviors in this space. On the contrary, the related activities of the crowd will have a certain effect on the healing space. In previous studies, researchers have drawn research results on the relationship between the environment, human behavior and psychology based on the physiological or psychological effects of environment on people. Among them, "Environmental Emergency Theory" is the most representative.

Environmental emergency theory states that all behaviors and activities of people are constrained by the physical environment in which they live. Some specific behaviors occur in people under the stimulation and guidance of environment (Jiang et al. 2016). According to the individual differences of people in psychology and physiology under the premise of different environments, researchers have obtained many research results on the relationship between environment and behavior, and the most influential one is "Environmental Emergency Theory". That is, the external stimuli that the environment gives people, make people appear psychological or physiological stress response. With the help of this theory, it is possible to stimulate the users' resilience from psychological or physiological perception and improve the healing ability by creating an environmental atmosphere with healing characteristics and using the shape, level, structure and other characteristic elements of the healing space.

### **Feature extraction of the identification elements of healing environment**

The identification of healing environment focuses on identifying the characteristics of the healing environment, and then forming the users' psychological environmental impression, thereby improving the identification (Zmudzinska-Nowak 2003). Kevin Lynch once put forward the concept of "urban image" and summarized five recognizable elements of environmental impression, namely region, path, boundary, sign and node (Wohl 2017). Applying these five types of elements to the identification of healing environment space can help people to form a clear environmental guidance direction, a higher awareness and a clear image of healing environment (Mondschein & Moga 2018). In the targeted application to the regional level application of the healing space, the environmental recognizability of the healing space can be improved (Filomena et al. 2019). At the same time, the discussion on the recognizable characteristics of healing environment is to limit the space environment. While satisfying the users' habit of identifying the environment as a whole, it also considers the impact of specific environments such as treatment and

rehabilitation, and the special space on the users' psychology (Corner 2020).

(1) Area. In Kevin Lynch's Five Elements of Urban Imagery, "areas" are interpreted as spatial extents with certain common characteristics (Ghaleh & Ramezani 2018). In healing environment, the concept of area can be distinguished by different spatial functions, different attributes of users, doctors and patients (Ji & Park 2020). There are clean areas, semi-contaminated areas, and polluted areas that need to be clearly distinguished by clean and polluted areas. There are also areas with no clear boundaries, such as indoor and outdoor rehabilitation and rest spaces. In the identification of such regional spaces, the distinction is mainly based on the function of the space and the categories of users or medical technical requirements (Sun 2018).

(2) Path. It is the channel that connects the destination (Hospersab 2010). Due to the influence of the requirements of clean technology and medical safety in the medical environment, the path in healing environment is relatively fixed and highly limited. This is also an aspect of the clearly recognizable characteristics of healing environment relative to other environments (Grahn & Stigsdotter 2010). For example, the distinction between clean flow lines and dirty flow lines, the distinction between doctor routes and patient routes, etc., need to be considered in the site environment. In terms of the shape of the path, it is also necessary to fully consider the efficiency of medical needs, shorten the route between functional areas as much as possible, and improve the efficiency of treatment (Dijkstra et al. 2010). However, in some leisure rehabilitation spaces, such as the outdoor rehabilitation gardens in the hospital campus, landscape paths can be set up in the paths to relax the body and mind of doctors and patients, but it is necessary to consider setting up emergency rescue passages and passage paths for barrier-free facilities (Aarts et al. 2015).

(3) Boundary. It is the boundary between the two areas. A typical feature of boundary in a healing environment is that it has both virtual and real forms. In healing environment, some borders are forbidden to pass, and even completely closed areas are required for the purpose of preventing and controlling infectious diseases. Others use penetrable space interfaces such as colonnade to form the boundary, which is convenient for users to walk through (Devlin & Arneill 2003). At the same time, in healing environment, in order to respond to public health emergencies, many spaces need to be temporarily converted in the emergency state (Lawson 2010). For example, an infectious ward that is temporarily changed from a general ward will temporarily seal the area. When the emergency state is changed to the normal use state, the boundary will be lifted.

(4) Nodes. It is some typical areas in the healing environment. The nodes are highly recognizable in the environment. The nodes are connected in different ways to form the structural framework of the healing environment (Norton-Westwood et al. 2011). Therefore, nodes are functional and can allow users to quickly recognize the meaning of the existence of the

environment and understand the purpose of the environment (Etikan et al. 2016).

(5) Markers. It is some elements that stand out in the environment. In the form of structures or reference objects, the environment can be quickly recognized by users (Gesler & Curtis 2016). In a healing environment, these structures can be functional, such as some emergency rescue facilities, which can help patients with emergency rescue, or they can be spiritual (Mark et al. 2014). For example, some artistic sculptures with spiritual significance in some environments encourage and awaken people's psychology and generate recovery beliefs.

Through the analysis of the above five elements, the environmental form of the healing space has a high degree of recognition. In addition, Japanese scholars have also proposed the 20 most perceptive image theme elements of the image perception system and perception elements. For example, the highest point that can be viewed, walkable passages, important landmarks, historical relics related to the area, water features, community sketches, characteristic road signs and street scenes, artworks, facades, plazas, fun, street corners, lighting, boulevards and advertisements, etc. These are relatively specific, and can also provide reference and basis for the extraction of identifying factors in the healing environment.

## SUBJECTS AND METHODS

### Study setting

#### *Influencing factor extraction of healing environment identifiability*

On the basis of the formation of the above characteristics of the healing environment, the influencing factors of the healing environment identifiability are further extracted, so as to form an index system of the identifiability of healing environment.

#### *Preliminary extraction of indicators*

The extraction of the influencing factors of the identifiability of the healing environment first needs to clarify the extraction direction. There are many factors that influence the identifiability of healing environment. These factors continue to act on the healing space, making the healing space develop in different directions (Be & Carlsson 2014). Based on the above induction on the identification features of healing environment, in the aspect of factor screening, firstly, the identification features of healing environment are combined into classification and induction, and the closeness of each influencing factor and the identification of the healing environment is considered (Marcus 2007). The extraction method is determined through data research and expert inquiries. Firstly, the identifying factors of healing environment are extracted from the past practice cases of healing environment. The initially extracted identifying factors of healing environment are classified and sorted through the induction of feature types and the method of

layer-by-layer stripping.

Second, focus group discussions and expert interviews were used. First of all, by establishing a focus group, the preliminary extraction of the influencing factors of healing environment identifiability is provided to the group members. The main purpose of the discussion by the host is to carry out the secondary extraction of influencing factors from the level of the identifiability research of healing environment. Members are invited to consider whether to add other necessary factors while discussing these initially listed identifiability factors. The focus group members included architects engaged in hospital architectural design, landscape engineers, scholars in the field of public environmental research, students in urban environment-related disciplines, hospital nurses, and residents who had been hospitalized for more than one week. A total of 16 people were randomly divided into two groups to discuss. The duration of the meeting is 2 hours, during which the recorder will record. Afterwards, the influencing factors discussed in the focus group were sorted out in the form of an Excel table.

### Selection of indicators

This research adopts the target hierarchy method, taking the identifiability of healing environment as the goal, classifies the selected identifiability indicators, and establishes the corresponding element layer and factor layer. Supplemented by the importance-level questionnaire, SPSS software was used for statistical analysis of the data, and the final identifiability index of the healing environment was obtained.

### Design of the questionnaire

The index selection of the identifiability of healing environment adopts the form of an importance-level questionnaire. Combined with the influence of the indicators on the identifiability of healing environment,

the questionnaire is divided into four levels: unimportant, generally important, important, and very important. And assign values to 4 grades, which are 1, 2, 3, and 4 in turn, so as to facilitate the sorting of index data after the questionnaire. At the same time, after the selection of the established indicators, there is also a link that allows respondents to add or modify indicators that affect the identifiability of healing environment according to their own wishes, and further expand and improve the indicators.

## RESULTS

It is estimated that 80 questionnaires will be distributed, and 34 expert questionnaires and 38 social questionnaires are included in the actual recovered valid questionnaires. The results of the questionnaire were counted and sorted, and the data obtained from the questionnaire was analyzed by SPSS24 software. First, import the excel data tables obtained from the expert questionnaire and the social questionnaire into the software, select each indicator data column in turn, click [Analyze]-[Compare Average]-[Average], and add the indicator data to the list of dependent variables. Then the mean and standard deviation of the indicator are shown in the Statistical Results window. Next, the coefficient of variation of the index is calculated through the mean and standard deviation of the index. The higher the average, the higher the adoption of the indicator; the lower the coefficient of variation, the higher the consensus of the indicator.

$$C_v = P_i / Q_i \quad (1)$$

Among them,  $P_i$  is the standard deviation of the indicator scores, and  $Q_i$  is the average value of the indicator scores. The corresponding numerical table of the obtained medical facility spatial balance index is shown in Table 1.

**Table 1.** List of averages, standard deviations and coefficients of variation of the spatial balance indicators of medical facilities

Feature layer	Factor layer	Mean	Standard deviation	Coefficient of variation
Area	Treatment area	5.38	0.7441	0.1383
	Emergency area	2.82	0.4151	0.1472
	Healing site	3.27	0.5566	0.1702
	Research office area	1.42	0.2361	0.1663
	Logistics support area	0.62	0.0915	0.1476
	Clean and dirty partition	1.28	0.1802	0.1408
Path	Path distance	3.24	0.4811	0.1485
	Diversion of people and vehicles	1.29	0.2366	0.1834
	Doctor-patient triage	3.08	0.5036	0.1635
Boundary	Accessible design	3.22	0.5345	0.1660
	Spatial scale	0.87	0.1313	0.1509
	Convenient indoor and outdoor access	1.65	0.3122	0.1892

	Line of sight penetration	2.28	0.3940	0.1728
	Clean and dirty partition	3.43	0.5426	0.1582
	Healing garden	3.85	0.6252	0.1624
	Water system	3.26	0.5604	0.1719
Nodes	Campus entrance	2.23	0.3173	0.1423
	On-site parking space	2.67	0.3781	0.1416
	Hospital street	2.49	0.3944	0.1584
	Nursing Unit	3.27	0.5726	0.1751
	First aid facility	2.53	0.3636	0.1437
Markers	Marker shape	1.13	0.1700	0.1505
	Marker hue	1.38	0.2521	0.1827
	Plants for resilience	3.14	0.4971	0.1583
	Medical-themed sculpture	2.94	0.5016	0.1706

The value range and data screening process of the arithmetic mean  $Q_i$  and the coefficient of variation  $C_v$  are shown in Table 2.

**Table 2.** Index screening principles

Scoring standard	Situation overview
$Q_i \geq 2.8$	A highly recognized indicator. It is believed that this indicator has a great influence on the identifiability of the healing environment, and has a high reference value for the construction of the healing environment.
$1.6 \leq Q_i < 2.8$ and low $C_v$	It has a certain degree of recognition. It is believed that this indicator has a certain influence on the identifiability of the healing environment.
$Q_i < 1.6$	The selected indicators need to be considered. The indicators themselves have little impact on the identifiability of the healing environment, but it cannot be ruled out that the combined consideration of other indicators will have an impact on the healing environment.

**Table 3.** Healing environment identifiability index system

Target layer	Influencing factors	Influencing factors
Identifiability of healing environment G	Area B1	Rescue area b11
		Emergency area b12
		Healing area b13
	Path B2	Path distance b21
		Doctor-patient triage b22
		Accessible design b23
	Boundary B3	Line of sight penetration b31
		Clean and dirty partition b32
		Healing garden b41
	Node B4	Water system b42
		Campus entrance b43
		On-site parking space b44
	Marker B5	Hospital street b45
		Nursing unit b46
		First aid facility b51
		Plants for Resilience b52
		Medical-themed sculpture b53

Finally, 17 indicators were screened out by collecting 72 expert and social questionnaires. Among them, there

are 3 area indicators, 3 path indicators, 2 boundary indicators, 6 nodes indicators, and 3 markers indicators.

After the above-mentioned process of screening, combined with the opinions of experts and social surveys on the increase, decrease and modification of indicators in the questionnaire. Finally, the identifiability index system of the healing environment is formed, as shown in Table 3.

### Establishment of the weight of indicators for the identifiability of healing environment

The study adopts a nine-level scale method to

determine the importance of the factors affecting the identifiability of healing environment. The levels of each degree are described in Table 5-1, and the YAAHP software is used to establish an analytic hierarchy process. In the questionnaire on the index weights of influencing factors of healing environment identifiability, the respondents mainly selected 40 scholars and engineers in the field of medical architecture and environmental landscape design. For more information, use YAAHP software to combine index factors to establish a weight model of the identifiability index of healing environment.

**Table 4.** Nine-level scaling method and scaling explanation

Scale	Scale interpretation (comparison of pairwise elements or factors)
1	Equally important
3	The former is slightly more important than the latter
5	The former is clearly more important than the latter
7	The former is strongly more important than the latter
9	The former is extremely important to the latter
2、4、6、8	The middle value of the above adjacent scales, representing the middle value of the adjacent importance If important, factor a/factor b=gab
Reciprocal	Then the importance, factor b/factor a = $GBA = \frac{1}{g_{ab}}$

The research uses the arithmetic mean method to obtain the expert scores of each factor, and conducts the consistency test through the judgment matrix. Its calculation function is as follows:

$$DI = (\lambda_{max} - n) / (n - 1) \quad (2)$$

The calculation formula of the consistency index DI of matrix judgment:

The formula for calculating the random consistency ratio DR:DR=DI / RI  
See Table 5 for the final weight of the recognizability index of healing environment.

**Table 5.** The weight results of the index factor of the identifiability of healing environment

Target layer	Influencing factor	Weight	Influencing factor	Weight
Identifiability of healing environment G	Area B1	0.2159	Rescue area b11	0.0782
			Emergency area b12	0.0591
			Healing area b13	0.0786
	Path B2	0.1575	Path distance b21	0.0375
			Doctor-patient triage b22	0.0427
			Accessible design b23	0.0773
	Boundary B3	0.1496	Line of sight penetration b31	0.0679
			Clean and dirty partition b32	0.0817
			Healing garden b41	0.0875
			Water system b42	0.0856
	Node B4	0.3519	Campus entrance b43	0.0380
			On-site parking space b44	0.0375
			Hospital street b45	0.0471
			Nursing unit b46	0.0562
	Marker B5	0.1251	First aid facility b51	0.0443
			Plants for Resilience b52	0.0384
Medical-themed sculpture b53			0.0424	

## CONCLUSIONS

As the carrier of treatment and recovery, healing environment utilizes the interaction between users' psychology and the environment, so that patients can arouse their own health "consciousness" and "value" during the environment cognition process. It contributes to the effective recovery of patients from a psychological point of view. This study takes healing environment as the research object and uses the relevant principles of environmental psychology to study the identifiability characteristics of spatial environment. Through the theoretical analysis of the environmental cognition process and the identifiability of environment, five identification element categories including areas, paths, boundaries, nodes, and markers with the characteristics of healing environment are analyzed. The influencing factors of healing environment identifiability under the five categories are extracted by the way of questionnaires and interviews. Further, the weights of the influencing factors are established to explore new ideas for the design of healing environment in the future.

**Acknowledgements:** None.

**Conflict of interest:** None to declare.

### Contribution of individual authors:

Yi Liu: conception and design of the manuscript and interpretation of data, literature searches and analyses, clinical evaluations, manuscript preparation and writing the paper;

Lulu Chen & Hanzhe Jiang: made substantial contributions to conception and design, literature searches and analyses, participated in revising the article and gave final approval of the version to be submitted.

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# RESEARCH ON THE INFLUENCE OF THE NEW GENERATION STAFF'S WORK STRESS ON JOB BURNOUT-THE REGULATING EFFECT OF NERVOUSNESS AND ACCOUNTABILITY

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## SUMMARY

**Background:** With the changes of the times, the new generation staff have become the main force in the labor market. Their fast-paced and changeable life and work have led to their unsatisfactory career development. As the fierce social competition becomes increasingly fierce, their job burnout has become more obvious.

**Subjects and methods:** Taking the new generation staff as the research object, this paper constructed a theoretical model of work stress, job burnout, nervousness and accountability, collected 308 valid questionnaires, and made an empirical analysis of the collected data.

**Results:** The research shows that the five dimensions of the new generation staff's work stress have positive influence on the three dimensions of job burnout; accountability, as a positive psychological factor, has a negative influence on job burnout, while nervousness, as a negative psychological factor, has a positive influence on job burnout. Nervousness and accountability can regulate the relationship between work stress and job burnout. However, nervousness cannot regulate the relationship between work stress and dehumanization, and accountability cannot regulate the relationship between work stress and emotional exhaustion.

**Conclusions:** To some extent, this study reveals the mechanism of work stress on job burnout of the new generation staff, and provides certain reference for promoting the personal development of the new generation staff.

**Key words:** work stress - new generation staff - job burnout - nervousness - accountability

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## INTRODUCTION

Job burnout was first put forward by Freudenberger in the article *Understanding Burnout* published in 1970s. He described "burnout" as all kinds of negative states produced by individuals at work. Later, the academic circles studied job burnout from different perspectives, such as the impact of job burnout, antecedent variables, etc. At present, job burnout is one of the important problems faced by human resource management. Job burnout will have various negative influences on individuals, enterprises, families and society. It refers to a series of negative psychological symptoms such as physical and mental exhaustion caused by an individual's inability to effectively cope with long-term psychological and physiological stress. Job burnout can also lead to physical and mental diseases, such as depression, headache, insomnia, gastrointestinal dysfunction, etc. For enterprises, job burnout will lead to lower work efficiency, loss of enthusiasm for work, indifference to colleagues, slacking off, and even resignation in severe cases. For family and society, people with a high degree of job burnout tend to reduce social interaction, show indifferent attitude towards their relatives and friends, and sometimes even take extreme actions, such as self-harm and attacking others.

Global economic integration has brought opportunities as well as great challenges to Chinese enterprises. With the rapid growth of China's economy and increasingly fierce market competition, the market

environment is constantly changing, and the employment environment is full of uncertainty. Enterprises are often faced with reorganization, reform and merger, and the reorganization and integration of some enterprises have also led to a large number of laid-off and unemployed workers. With the increasingly fierce social competition, the work stress of staff is gradually increased. They have to complete more tasks in a shorter time. Along with this, the difficulty of work increases and their emotional exhaustion also increases. Based on this, studying job burnout and providing effective solutions have become an important task of human resource management in China.

After the reform and opening up, with the rapid development of economy and the rise of the Internet, the new generation staff were born in such a changing background and grew up in a diversified cultural environment. They generally have strong self-awareness, high academic background, strong personality characteristics and open mind, and pursue for freedom. However, their actual ability to withstand stress, communicate and cooperate, tolerance and other aspects are still lacking. Changes in the external environment may lead to increased dissatisfaction, and even resignation. In recent years, the work stress of the new generation staff has increased significantly. Moreover, the increasingly fierce social competition has aggravated their job burnout to a large extent. The new generation staff has become the main force in the labor market and the main creator of modern wealth. However, few