

Construction and Application of Psychological Entropy Dissipation Model in Teenagers Resilience

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Abstract: This paper utilizes the psychological entropy dissipative structure theory to study adolescent psychological development from a new perspective, to dissect the dissipative structure of the psychological quality education system, and to study the prevention and treatment mechanism of psychological crisis. Based on the research data of secondary school students in China's second-tier urban areas, this study adopts the psychological entropy and dissipative structure model to compare the differences in the effects of the two quality education modes with and without team practice activities on the cultivation of adolescents' psychological resilience qualities by using the team social practice program as an example, and to form the entropy-reducing program for exploring the improvement of adolescents' psychological resilience in the quality education and cultivation reform program. The results show that the overall level of psychological resilience of the subjects is relatively satisfactory, the traditional education model of students in the training with the knowledge of the problem of the brush, a moderate amount of brush the amount of the problem of the problem can enable students to train a relatively good positive state of mind, the team practice activities of the students through the interpersonal connection, through the interaction of members of the team to obtain mutual support, more flexible response to emergencies and introspection and enhancement. It is suggested that in the process of comprehensive quality education for adolescents, the psychological stress management of adolescents can be realized by increasing the number of students from different schools to form irregular teams to carry out multiple team social practices. This study provides new theoretical perspectives and analytical methods for secondary school students' psychological quality education, and is of positive significance for the promotion of youth's healthy growth and the effective prevention of psychological crisis.

Keywords: Psychological Entropy, Dissipative Structure, Psychological Resistance to Stress, Adolescents, Team Practice Activities.

1. Introduction

1.1. Background of the Study

With the development of quality education to the present day, the issue of students' mental health has received more and more attention. It is impossible for a student to have smooth sailing in his study and life. In the process of reaching his goal, he often encounters all kinds of obstacles and difficulties, and when he is unable to overcome these obstacles and difficulties, he will have a nervous emotional reflection, which is called frustration. Freedom from frustration is undesirable and impossible. Frustration that exceeds tolerance will cause psychological disorders and even psychological diseases, which will lead to depression, demoralization, anorexia, smoking, alcoholism, fights and assaults, running away from home, suicide and other accidents.

Focusing on cultivating the sustainability of adolescent growth is inextricably linked to mental health resilience. From time to time, there are news reports that some young people are depressed, or by the reality of the blow deviated from the original growth trajectory, how to avoid deviating from the track of healthy growth, has become a question mark in my mind. When participating in various social internships and participating in various holiday activities, the mutual learning among team members, as well as the occasional teacher said that the learning process is a kind of interaction between energy absorption and energy release, which made me develop the principle of entropy dissipation, through the entropy weighting method to construct mathematical models

for the exploration of the factors affecting the psychological resilience of adolescents.

1.2. Scope of Conceptualization

Taking students enrolled in public secondary schools in second-tier cities in Southwest China as the target group, and using the difference in whether they have participated in team social practice as the classification criterion, we attempted to compare the difference in the level of resilience of secondary school students in team social practice activities under the psychological entropy dissipative structure, and explore the mechanism of using the psychological entropy dissipative structure model to assess the impact of comprehensive quality education activities on the adolescents' resilience to adversity.

1.3. Significance of the Study

Modern society is in a period of transition, and there are more factors that induce mental illnesses, such as the accelerated pace of life leading to general psychological tension in the society, confusion or even disintegration of values leading to a general sense of insecurity, psychological imbalance caused by serious social division, and the increase in the discrepancy between people's expectations and actuality, etc. (Kraut R., 1998). In the current situation, in the growth of young people, it is necessary not only to have a healthy body and a wise mind but also a healthy and positive mind. Develop positive resilience and learn to cope with various situations in life. This paper applies the dissipative structure theory to the psychological development of adolescents for the dissipative structure characteristic

analysis and entropy flow analysis, which researches the adolescent psychology and its development and evolution law, and provides a new perspective for understanding the psychological development of adolescents (Guofeng Jiang, 2014). The thesis intends to construct a psychological entropy dissipative structure model and explore it with the example of social practice programs, and then conclude that the entropy dissipative adolescent psychological resilience factor analysis can be promoted for wider application in the field of selection of comprehensive quality education programs for adolescents that consider mental health, and promote the sustainability of healthy growth.

2. Relevant Literature Review

2.1. Exploration of Dynamic Monitoring

Criteria based on Psychological Entropy

Intrinsic mood measurement is a practical component of psychological research applications and is generally accomplished through various psychological scales. However, the results of scale measurements can only reflect the static point-in-time state, which is difficult to meet the dynamic monitoring of the uncertain process of psychological change. The psychological state represented by adolescents' psychological resilience is the level of psychological activity at a certain point in time under the joint influence of internal and external environments, which remains stable for a certain period of time when there is no necessary intensity level of motivation, and flows and tends to change under the stimulation of external objective information and the stress of internal subjective information - this process is realized through the transmission and confluence of information. This process is realized through the transmission and intersection of information, so the entropy weight principle can be used to construct the entropy flow system of emotion measurement, i.e. the psychological entropy dissipation structure system.

2.2. Mental Entropy Systems and Dissipation Modeling

The German physicist Clausius proposed the second law of thermodynamics in 1850: in an isolated system, heat always shifts from a high-temperature object to a low-temperature object. Essentially, the second law of thermodynamics describes the direction of energy transformation in a closed system: in a closed system, energy can only be transformed irreversibly in the direction of decay, thus exhibiting dysfunction, increased disorder, and weakened order. Later, Clausius (1865) proposed a state function - entropy, entropy is used to measure the degree of chaos of the system, that is to say, the closed system will always be in the direction of entropy increase (disorder), the energy are irreversibly transformed from the effective state to the ineffective state, the system eventually reaches a state of complete chaos and disorder (Clausius R., 1870). Therefore, the second law of thermodynamics is also known as the law of entropy increase. Shannon introduced entropy into information theory and proved that the degree of disorder and uncertainty in any complex system can be described by entropy. The second law of thermodynamics (the law of entropy increase) is a law that applies to closed systems, and the way for a system to achieve entropy reduction is to create a dissipative structure of the open system. Dissipative structure theory was founded by Prigogine, a Nobel Prize winner in chemistry, and is known as the "new triad" of systems science, along with synergetism

and mutation theory. He used the non-equilibrium point of view to study the entropy phenomenon in organic, inorganic, and social and economic systems, and proposed the theory that the inflow of negative entropy in an open system can compensate for the increase of entropy in the system (Nichols & Prigogine, 1992). Dissipative structures are characterized by three features: openness, nonequilibrium and nonlinearity. An open system far from equilibrium does not obey the second law of thermodynamics, but rather Darwin's theory of evolution. They generate self-organization under certain conditions by continuously exchanging energy, matter and information with the environment, i.e., they move from disorder to order, from lower order to higher order, and form a new stable structure. Dissipative structure theory suggests that the change of entropy ds of any system is composed of two parts inside and outside the system, i.e., $ds = ds_i + ds_e$, where ds_i is the entropy flow generated spontaneously inside the system; and ds_e is the entropy flow caused by exchanging matter, energy, and information with the external world of the system (Lago-Fernández, L.F., & Corbacho F., 2009). In a closed system, only the degree of chaos generated spontaneously within the system, i.e., $ds_i \geq 0$, results in ds also ≥ 0 due to its inability to intermingle with the external environment, ds_e . In an open system, in order to dissolve the degree of chaos within the system, it is necessary to satisfy the condition of $ds = ds_e + ds_i = 0$, i.e., $ds_e = - ds_i < 0$. At this time, the system continuously exchanges energy with the external environment and absorbs enough negative entropy flow which is favorable to dissipate the chaos in the system, so that the system goes from disorder to order until it tends to a "new dynamic equilibrium", and this new orderly structure is the dissipative structure (Fischer, r This new ordered structure is the dissipative structure (Fischer, r, 1977). The theory of entropy and dissipative structure was thus popularized. In addition to the expansion of the field of physics and chemistry, entropy and dissipative structure theory is now widely used in the quantitative research of nonlinear complex systems in the international arena, such as medicine, financial markets, engineering technology, social and economic management, psychological emotions, cultural history, etc. (e.g., Yang Li et al. 2013; ENSOY A., et al. 2014; SKACHKOY V., et al. 2015; Bailey, K.D., 1990; Kümmel, R., 2011; Mayer, A.L., et al., 2014;).

Among the applications of entropy theory in psychological disciplines, Albert C., et al. (2013) used the theory of complex systems science to describe the causes of brain system deficits in mental illnesses and discussed the relationship between explicit behaviors and micropsychological changes within the framework of quantitative research (ALBERT C., 2013). Chunhao Wang, et al. (2014) used a multidimensional entropy analysis to detect how exercise acts on the brain mechanisms of a senior group and monitored the multilevel effects of complex brain signals affected by exercise. Chris Westbury, et al. (2015) used information entropy theory to explore the intrinsic psychological mechanisms and modes of action that make people laugh. Some scholars have applied entropy theory to abstract dynamic studies such as psychological ambiguity measurement, emotional stability assessment, and psychological well-being measurement (Xueyun Ruan & Hu Kun, 2011; Ma Chao, 1981;] Zhongyong Chen & Jianjun Zhong, 2009;), and more specifically, including studies on youth prevention of psychological crisis

qualitative analysis (Jun Cheng, 2007), entrepreneurial innovation behavior system evolution (Zhiqiang Li&Chunmei Liu, 2009), and emotional entropy emotional psychological model game analysis (Bin Song, 2014). In this study, we will try to introduce this concept into the exploration of psychological resilience modeling in adolescents.

2.3. Entropy Theory and Psychological Resilience

2.3.1. Background of the Psychological Resilience Modeling Study

Psychological resilience is the ability of an individual to maintain a relatively stable level of physiological functioning and psychological health during the stress coping process, and to rebound and recover from setbacks (Dongxia Luo, et al., 2010), and it is a special manifestation of competency traits in the context of non-routine emergencies. Recent studies have explored the relationship between psychological resilience and early warning of psychological crises in adolescents, as well as discussing the causal influence of psychological resilience on individuals of different ages from a life-cycle perspective. However, most of the studies are limited to the psychological discipline level, and their applicability in the field of adolescent mental health assessment is weak (Duhong Liang, et al., 2014; Haiming Zhou, et al., 2014; Shuai Hao, et al., 2013; Kan Shi, et al., 2008). The psychological trait of psychological resilience is a multidimensional and interconnected system structure, which is a continuous state of psychological functioning of an individual, and its assessment and measurement need to be carried out in a dynamic process. In this study, we innovate the way of measuring psychological indicators and use quantitative models to comparatively analyze the assessment of stress resistance level of adolescents in the process of adolescent psychological growth, aiming at enriching the application of psychological entropy dissipative structure theory to the practice of adolescent psychological growth program management, and providing quantitative assessment tools that can be dynamically monitored and controlled by the educational management and researchers.

2.3.2. Feasibility of Entropy in the Exploration of Psychological Resilience Modeling

Human psychological characteristics are also a kind of energy movement system, and this energy can be understood as mental energy of thoughts and emotions. The original setting of individual psychology is a relatively closed system, and the complex process of psychological operation is influenced by individual perception, emotion, thinking, etc., and the psychological characteristics and external behavior are closely linked and interact with each other; the external environment and various events as a carrier to the individual to affect the operation of the internal psychological system. In this process, psychological positive entropy represents negative mental pollutants, such as negative knowledge information, emotions, ideas, knowledge systems, etc.; psychological negative entropy represents positive active mental energy as opposed to entropy. Psychological activities under such a mechanism are full of uncertainty, and since the system itself does not have the ability to improve, the psychological positive entropy increases under long-term evolution, which is manifested in the process of exhaustion from order to disorder. Adolescents are psychologically immature and have a low level of cognition. Weak will, lack

of sharpening, lack of determination to do things to the end. Adolescents' negative emotions are difficult to vent, the psychological switch is difficult to open, the contrast between theories and reality, the teacher is unfair, friction between classmates, and parents can not communicate with the obstacles encountered in learning, etc., these pressures from various aspects, is the adolescents in the stage of growth must cope with the scenario.

In the process of exploring the anti-stress model, we can try to explain it by psychological dissipation: how the anti-stress psychological system can produce the regulation of emotional ups and downs and functional states through the constant exchange of information with the external environment, and the increase of psychological entropy can lead to the orderly evolution and the formation of orderly structure by continuous updating (BLOCK J., et al., 1996). To summarize, most of the current research findings only describe the possibility of applying the concept of psychological entropy qualitatively from the theoretical point of view, while the quantitative research stays at the establishment of a theoretical model of psychological entropy to explain the phenomenon, which may only be limited to the natural extension of entropy methodology in the exploration of psychological characteristics, and it is necessary to quantitatively test the validity of such theoretical assumptions in detecting the relationship between the psychological development and educational activities of adolescents and young people by means of empirical research. development and the implementation of educational activities. Therefore, this study empirically constructs a model of the dissipative structure of psychological entropy in adolescents' resistance to stress.

3. Material and Methods

3.1. Data Sources and Samples

With the help of questionnaires, this study selected adolescents in middle schools in China as the target sample group for empirical analysis. A psychological census was conducted from the seventh grade to the third year of high school. 483 questionnaires were distributed in this study, and a total of 480 valid data were obtained, of which: 271 boys and 209 girls; 251 junior high school students and 229 senior high school students (see Table 1). The validity rate of the questionnaire was 99.37%.

Table 1. Distribution of grade levels of the study population unit: persons

grade		number of people
junior high student	seventh grade	106
	eighth grade	92
	ninth grade	53
senior high school student	senior year	113
	sophomore	71
	senior class	45

The overall Cronbach's alpha coefficient was 0.971, indicating good scale reliability. We used SPSS to conduct a validated factor analysis, and the four-factor structural model was significantly better than the other models for each fit index, with a KMO value of 0.928, a Bartlett's spherical value of 2080.109, and a df of 190.000 indicating that the scale has good validity.

3.2. Methodological Models

3.2.1. Theoretical Analysis of the Dissipative Structure of Adolescent Development

Curiosity and inquisitiveness present the adolescent psyche as an open system and in a state far from equilibrium. Adolescent psychology is also a complex dynamic system. Individuals not only input material, energy and information from the outside world and accept the transformation of the environment, but also continuously release material, energy and information to the outside world to develop themselves and influence others. This kind of openness makes adolescents break the boundaries of the self, absorb the personality of others, enter the "world" of others, and achieve the integration of the self and others, so that they have a clear social nature. From this, we can see that adolescent psychology is developed in the process of exchanging material, energy and information with the outside world, which is an open system. According to the theory of dissipative structure, the psychological development of adolescents must constantly exchange entropy with the outside world in order to maintain the vigor and vitality of the heart. Negative entropy promotes the healthy development of adolescent psychology, while positive entropy hinders adolescent psychological development. With the improvement of adolescents' cognitive level and the increase of their ability to discriminate external environmental stimuli, the purposefulness and selectivity of adolescents' psychological intake of external information will continue to increase, so as to ensure that the negative entropy from the outside world is sufficient to counteract the positive entropy generated by the internal entropy and the positive entropy, and to promote the adolescents' psychological development from the low-order state to the high-order state independently, so as to make the psychological maturity more mature.

Qualitative leaps in psychological development are realized when they are far from equilibrium. The theory of dissipative structures shows that when open systems are in equilibrium and near-equilibrium, the system does not produce any new structures and organizations, and only when the system is in a state far from equilibrium can it produce new orderly organizational structures. Adolescent psychology originates in the actions of the subject, and the essence of such actions is the subject's adaptation to the object. The individual achieves equilibrium between the organism and the environment through two forms of assimilation and conformity. If the organism and the environment are out of balance, a change in behavior is required to reestablish the balance. This process of equilibrium-disequilibrium-equilibrium is the process of adaptation, which is the cause of psychological development.

External impact on the adolescent psyche (microturbulence) are formed ups and downs, whether the ups and downs can form a giant ups and downs, leading to sudden changes and promoting the development of adolescent psyche, depends on the external microturbulence and its formation of ups and downs whether it is relevant to the adolescent psyche system. When the rise and fall formed by external perturbations has no correlation with the adolescent psychology, the rise and fall is ignored and the adolescent psychology remains stable.

When the correlation between the two is very small, the rise and fall formed by the perturbation cannot reach or exceed a certain critical value, and will still be quickly dissipated by the system, returning to the original stable state, and the adolescent's psychology remains stable. At this time, the external perturbation may be incorporated into the original dissipative structure branch, resulting in the expansion and contraction of the adolescent psychology in some capacity, but will not cause qualitative changes. When the two have greater coherence, the rise and fall caused by the perturbation is instantly amplified under the nonlinear interaction of the system, forming a "giant rise and fall", reaching or exceeding a certain critical value, and the adolescent psyche adjusts its own cognitive structure, treats the external information in a new way, produces a new orderly organization, and enters into a new dissipative structure branch, achieving a new, new, and more stable structure. structural branches to reach a new, stable state. Therefore, the development of youth psychology is a continuous process of reaching a new stable state, and maintaining the stable state in a certain time and space.

3.2.2. Assumption Framework of Psychological Entropy Model for Psychological Resilience Indicator System

At present, scholars have carried out extensive research around the connotation of psychological resilience model, and initially formed a variety of mature assessment scales including psychological elasticity, mental toughness, etc. (CONNOR K., & DAVIDSON J., 2003; SMITH B., DALEN J., WIGGINS K., et al. , 2008; HIEMDAL O., FRIBORG O., STILES T., et al., 2006), on the basis of which the present work proposes a hypothetical framework of the indicator system of psychological negative entropy flow of adolescents' psychological resilience that includes 16 factors, as shown in Fig. 1.

Based on the existing research, we propose that the assessment system of psychological entropy flow of adolescents' psychological stress tolerance should include four aspects: (1) whether they can calmly and optimistically resolve stress to adjust their mindset; (2) whether they can correctly assess their own strengths and weaknesses and seek self-improvement and development; (3) whether they can continue to maintain stable interpersonal relationships in order to receive support; and (4) whether they can comfortably cope with the crisis situation and grasp the key of the problem for flexible treatment. Measurement of psychological status requires a clear breakdown of the level of each indicator to accurately quantify and measure individual psychological quality, so this indicator system adopts Likert's seven-point assignment method, using "not at all in line with", "basically not in line with", "Somewhat inconsistent", "Uncertain", "Somewhat consistent", "Basically consistent", "Completely conform" seven responses for each indicator statement to provide a reference standard, respectively, scored 1-7, the results of the psychological interview can only be analyzed qualitatively into quantifiable numerical data for the subsequent use of the psychological entropy dissipation model to lay the foundation for comparative analysis.

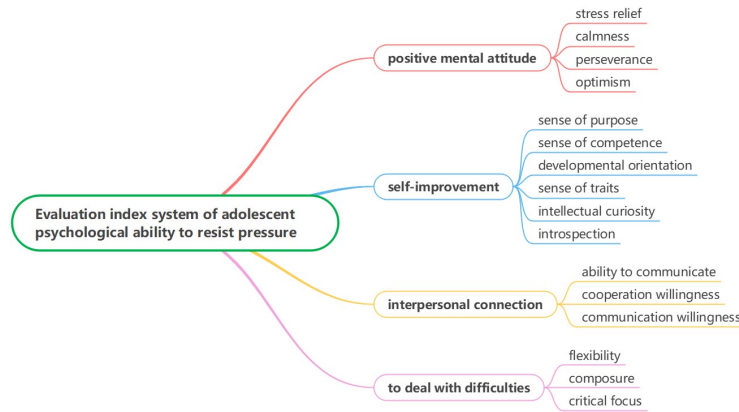


Fig. 1 Evaluation index system of adolescents' psychological resilience to stress

3.3. Construction of the Psychological Entropy Dissipation Model

The concept of psychological entropy derived from the information entropy theoretical system reflects the emotional energy state and the degree of order of energy changes in the operation of an individual psychological system assumed to be relatively closed, while the degree of stability of the complex psychological indicator system is measured by the value of psychological entropy flow, the total entropy value of the psychological system under the joint action of entropy and dissipation to maintain the state of movement, and the strength of the direction of its dynamic changes by the psychological entropy model of The intensity of its dynamic change direction is obtained by the weighted average of the entropy flow values of all levels of psychological dimensions in the psychological entropy model. Based on this, we have tried to adopt the following measurement methods.

3.3.1. Formulas for Measuring Psychological Entropy and Psychological Dissipation

The formula for measuring the entropy flow value D_s for each level of psychological dimension is as follows:

$$D_s = \sum_{i=1}^n K_i * ds_i \quad (1)$$

Where i : each psychological evaluation index that affects the entropy flow value in a certain type of psychological system in a specific situation;

k_i : Weights of the indicators in stage i .

The entropy weighting method is used here to measure the contribution of the effect produced by each indicator to the psychological system as a whole, and the weights are assigned sequentially:

$$K_i = \frac{1 - ds_i}{\sum_{i=1}^n (1 - ds_i)} \quad (2)$$

In the above two equations, ds_n is the value of psychological entropy flow measured by each indicator of the scale, calculated as:

$$ds_i = -K_B * X_i' * \ln(X_i') \quad (3)$$

$$\text{where} = X_i' \frac{4 - X_i}{7 - 1}$$

X_i : is the actual value measured by the i th indicator, with a predefined indicator level quasi-value of 4 under the likert seven-division two-table algorithm.

K_B : psychological entropy coefficient, calculated as $K_B = (\ln N) - 1$;

N : Number of measures within each level of psychological dimension.

3.3.2. Modeling of Psychological Entropy Dissipation

After obtaining the psychological entropy values am of the evaluation subject's m psychological dimensions at a certain moment, the dimension matrix A is built to contract the dimensions into a whole:

$$A = (a_1, a_2, \dots, a_m)$$

In addition to analyzing the role of the set of dimensions as a whole, the interaction of subindicators within each system should be measured, which is represented by the force magnitude matrix b_{ij} ($i, j=1, \dots, m$) to analyze the degree of synergy among the dimensions. Based on this, the interaction matrix B is established as follows:

$$B = (b_{ij})_{m \times m}$$

We constructed the dimension weight matrix C based on the weight C_i of each dimension entropy flow value in the overall psychological system entropy flow value:

$$C = (c_i)_{1 \times m}^T$$

Where, c_i ($i=1, \dots, m$) represent the weight of the entropy flow value of each first-level psychological stress resilience index system in the entropy flow value of the whole psychological system, respectively.

The total entropy flow value S of the mental system generated by the program is obtained by multiplying the dimension matrix A , the interaction matrix B , and the dimension weight matrix C :

$$S = A \times B \times C$$

When $S > 0$, it represents the increase of psychological positive entropy when individuals form or receive negative information, and the synergy of various dimensions in the psychological index system decreases, which leads to chaotic emotional thinking; when $S < 0$, it represents the dissipation of external positive information, and the increase of psychological negative entropy improves the synergy of the psychological system, so as to maintain the orderly upward state of emotional thinking. Through the above formula measurements, we initially constructed the psychological

entropy dissipation model of the psychological stress resistance index system.

4. Result

Fig. 2 uses a 7-point Likert scale model to show the level of adolescents' resilience with and without (with and without) team social practice activities. The questions in this questionnaire involve 16 related indicators, namely "stress relief, calmness, perseverance, optimism, sense of purpose, sense of competence, developmental orientation, sense of traits, intellectual curiosity, introspection, ability to

communicate, cooperation willingness, Communication willingness, flexibility, composure, and critical focus". Each question, there are seven options with "completely no, basically no, a little no, uncertain, a little, have, basic, have all" and give the seven options a score of 1-7. 0% left for negative effects and 0% right for positive effects, Positive influence leads to a more logical and organized thinking, which in turn leads to a healthier adolescent psyche. As can be seen in Fig. 2, the presence or absence of team-based social practice activities produces positive and negative impacts on adolescents' psychology on different indicators.

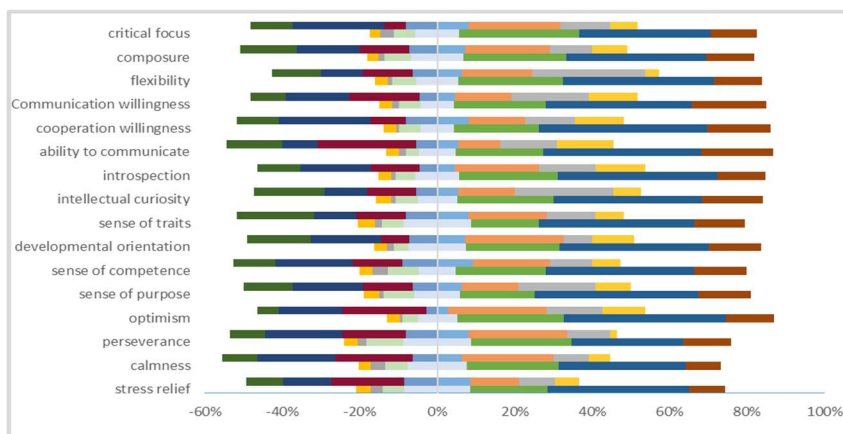


Fig. 2 Psychological Resistance Levels of Adolescents

5. Discussion

We divided the group of middle school students into two comparative levels, "with social practice" and "without social practice", and used the above psychological entropy

dissipation model formula to calculate the system entropy flow values of psychological stress tolerance indicators for each level of each level, as shown in Table 2:

Table 2. Resilience mental entropy fluxification table

norm		Indicator score (X _i)		The psychological entropy coefficient K _B	Entropy flow values in the heart of each dimension d _{s_i}		Weights K _i		Weighted score D		
Level 1 indicators (m)	Secondary indicators (n)	No team practice activities	With team practice activities		No team practice activities	With team practice activities	No team practice activities	With team practice activities	No team practice activities	With team practice activities	
positive attitude	decompression	4.4342	5.6311	0.7213	-0.1371	-0.2554	0.2368	0.2514	-0.0325	-0.0642	
	composure	5.5000	5.0106		-0.2500	-0.2164	0.2603	0.2436	-0.0651	-0.0527	
	willpower	6.8659	5.7898		-0.2546	-0.2603	0.2612	0.2523	-0.0665	-0.0657	
	hopeful	4.5658	5.8766		-0.1606	-0.2622	0.2417	0.2527	-0.0388	-0.0663	
Positive Mindset Psychological Entropy Flow Value (D _{s1})										-0.2029	-0.2489
self-improvement	sense of purpose	6.2354	6.2541	0.5581	-0.2053	-0.2053	0.1874	0.1683	-0.0385	-0.0345	
	competency	3.5894	4.9731		0.1024	-0.1647	0.1396	0.1626	0.0143	-0.0268	
	development-oriented	5.3546	6.4321		-0.1875	-0.2043	0.1847	0.1682	-0.0346	-0.0344	
	qualitative	4.3215	5.4326		-0.0875	-0.1909	0.1691	0.1663	-0.0148	-0.0317	
	curiosities	5.6977	5.6545		-0.1994	-0.1983	0.1865	0.1673	-0.0372	-0.0332	
	introspection	3.2315	5.6323		0.1469	-0.1977	0.1327	0.2312	0.0195	-0.0457	
Self-improvement Psychic Entropy Flow Value (D _{s2})										-0.0913	-0.2063
interpersonal connection	communication skills	2.3154	6.3872	0.9102	0.3246	-0.3338	0.2549	0.0640	0.0827	-0.0214	
	cooperative consciousness	1.3543	6.9787		0.3287	-0.3164	0.2533	0.0636	0.0833	-0.0201	
	Willingness to communicate	5.3216	5.9765		-0.3033	-0.3330	0.4918	0.1235	-0.1492	-0.0411	
Entropy flow values in the heart of human connections (D _{s3})										0.0168	-0.0826
address the difficulties	flexibility	5.6989	5.4963	0.9102	-0.3252	-0.3152	0.3359	0.3319	-0.1092	-0.1046	
	composure	5.1257	5.4623		-0.2858	-0.3132	0.3259	0.3313	-0.0931	-0.1038	
	Critical Focus	6.3215	6.2143		-0.3344	-0.3349	0.3382	0.3368	-0.1131	-0.1128	
Coping with Dilemmas Heart Entropy Flow Value (D _{s4})										-0.3155	-0.3212

Based on the entropy flow values of the psychological resilience dimensions at each level of the team's social activities, we constructed a matrix A of the dimensions affecting the total psychological entropy value:

$$A_1 = (a_{11}, a_{12}, a_{13}, a_{14}) = (-0.2028, -0.0913, 0.0168, -0.3154)$$

$$A_2 = (a_{21}, a_{22}, a_{23}, a_{24}) = (-0.2488, -0.2062, -0.0825, -0.3211)$$

Then, the dimension weight matrix C for each influencing factor is calculated

:

$$c_{ii} = \frac{(1 - D_i) * e^{K_i}}{\sum_{j=1}^4 (1 - D_j) * e^{K_j}} \quad (i=1,2,3,4) \quad (4)$$

It can be found that the standardized psychological resilience sub-dimension levels calculated by the intensity magnitude of the psychological resilience components derived from each level of the system and then eliminating the nonlinear effect of the psychological entropy coefficient (i.e., the marginal cost of each dimension to increase its effect on the level of psychological resilience) of the respective system, and their share in the total psychological resilience level. The dimension weight matrices C calculated from Equation (4) with and without team practice activities are as follows, respectively:

$$C_1 = \begin{bmatrix} 0.2451 \\ 0.1889 \\ 0.2420 \\ 0.3238 \end{bmatrix} \quad C_2 = \begin{bmatrix} 0.2412 \\ 0.1979 \\ 0.2526 \\ 0.3083 \end{bmatrix}$$

Accordingly, the interaction matrix B of each psychological resilience evaluation index is constructed, and both it and the dimensional weight matrix C can explain the role of the sub-entropy flow values of the dimensions of psychological resilience on the total entropy of the psychological resilience system, and the value of the interaction matrix B can be determined using the entropy weight method for determining the dimensional weight matrix C using the following approach:

$$b_{ij} = \begin{cases} 1 & i = j \\ c_j / c_i & i \neq j \end{cases}$$

Substituting the specific values of the dimension weight matrix C yields the values of the interaction matrix B:

$$B_1 = \begin{bmatrix} 1 & 0.7706 & 0.9873 & 1.3210 \\ 1.2977 & 1 & 1.2812 & 1.7142 \\ 1.0128 & 0.7805 & 1 & 1.3380 \\ 0.7570 & 0.5834 & 0.7474 & 1 \end{bmatrix}$$

$$B_2 = \begin{bmatrix} 1 & 0.8204 & 1.0471 & 1.2778 \\ 1.2189 & 1 & 1.2763 & 1.5575 \\ 0.9550 & 0.7835 & 1 & 1.2204 \\ 0.7826 & 0.6420 & 0.8194 & 1 \end{bmatrix}$$

Finally, we derive the total psychological entropy flow value S for the level of psychological resilience possessed at each level of working experience:

$$S_1 = A_1 \times B_1 \times C_1 = -0.5744$$

$$S_2 = A_2 \times B_2 \times C_2 = -0.8820$$

6. Summary of Findings Conclusions and Recommendations

6.1. Analysis of Overall Psychological Resilience Level

According to the evaluation results of the psychological entropy model, the total psychological entropy value of the indicator system of the interviewed adolescents is less than zero, forming a negative entropy flow of stable psychological state, orderly thinking logic, and rising development of subjective emotions, which indicates that the overall psychological health of the interviewed adolescents is good, and that student groups with or without team-based social practice activities have a better ability to resist stress, have a good ability to adapt to psychology, and are able to cope with it rationally. Since this study has a sufficient survey sample and covers the mainstream group of educated adolescents, the conclusions of this study can be extrapolated to the group of secondary school students in second-tier cities in China.

6.2. Characterization of Psychological Entropy by Dimension

The dimensions of the psychological indicator system show varying effects on overall psychological resilience:

The dimension of "coping with difficulties" has the highest value of psychological negative entropy flow, which is more than 0.3, and becomes the main factor of psychological resilience, reflecting that regardless of whether there is a team practice activity or not, through the appropriate difficulty of the challenge set, can have a positive impact on the psychological growth of adolescents to cope with the difficulties, and when we inevitably encounter difficulties in life, we can positively face and solve it. When we inevitably encounter difficulties in life, we can face and solve them correctly with a positive mindset.

In the dimension of "Interpersonal Connection", the difference between the psychological upflow values with and without team practice activities is larger, which indicates that interpersonal connection is the place where the gap between the mental health of students with and without team practice activities is widened. The psychological entropy flow value of interpersonal connection without team practice activities is positive and the psychological entropy flow value of interpersonal connection with team practice activities is negative. This indicates that students without team practice only focus on individual learning is not conducive to the growth of interaction skills and cooperation consciousness. On the contrary, students with team practice activities can promote the psychological development of interaction ability,

sense of cooperation and willingness to communicate, which is conducive to breaking through the self-centeredness, thinking differently and strengthening the sense of social responsibility.

Meanwhile, Table 2 shows that the psychological health of students with team practice activities is higher than that of students without team practice. In unexpected events, timely interpersonal communication support has a positive effect on both subjective psychological perception and objective coping ability, and can simultaneously enhance the psychological resilience of individuals and cooperative groups. The manifestation of depression in some students, on the other hand, reflects that they have too much positive entropy in interpersonal connection and are not good at communicating with others to find solutions. When the value of positive entropy flow is large to a certain extent, the mental health becomes very chaotic, so the symptoms of depression are produced. This shows the importance of the impact of interpersonal connection on the mental health of adolescents.

The dimension of "self-improvement" reflects the role of mental health promotion for adolescents with and without team practice activities. Table 2 shows that the entropy value of practical activities with teams is lower than that of practical activities without teams, mainly because there is an entropy increase in the sense of competence and introspection in the dimension of self-improvement, and under the entropy dissipation mechanism, the negative entropy offsets the entropy increase and realizes the entropy decrease in the dimension of self-actualization, which helps adolescents to stay away from the equilibrium state in the process of learning and to form a learning mind stream, which is also in line with the requirements of the adolescent learning and growth stage that drive adolescents to continuously expand their knowledge system to adapt to the progress of the times. This is also in line with the learning and growth requirements of adolescents, which drive adolescents to continuously expand their knowledge system in order to adapt to the enrichment of learning and working life brought about by the progress of the times.

Among the secondary indicators, the value of psychological entropy flow of learning mode of team practice activities contributes more to psychological resilience. Therefore, we can conclude that in the perspective of emphasizing the cultivation of comprehensive quality talents and enhancing the life happiness index, social cooperation and harmony of talents and their sustainable development, adding team practice activities to the original teaching mode has a better effect on the contribution of negative psychological entropy flow value.

7. Conclusion

This study provides a dissipative structure model assessment mechanism for adolescents' psychological healthy growth with the psychological entropy flow value as a quantitative index. Using the psychological entropy dissipative structure theory to introduce a crisis psychological warning mechanism, the psychological entropy dissipative model can better determine the intensity of the role of educational activities on the sustainable and healthy growth of adolescent psychology. In the next step, we intend to increase the sample size and expand the comparative assessment of multiple types of quality education activities, and strengthen the correction and improvement of the model, so that it can be further applied to the assessment and analysis

of the contribution of each category in the comprehensive quality assessment system to the cultivation of adolescents' psychological health and sustainable growth.

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