Review of Progress in Proactive Health Research

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Abstract. To adapt to the national health strategy shift from disease-centered to health-centered, the concept of proactive health came into being. Since proactive health was first proposed in the 13th Five-Year National Science and Technology Innovation Plan of The State Council in 2016, scholars in the fields of medicine, sports, management, and other fields have carried out theoretical and applied research on proactive health from the perspectives of various disciplines, but there are few proactive health review studies. In view of this, this paper starts from the definition of the concept of proactive health, focuses on the two core tasks of proactive health risk prevention and health rehabilitation/promotion, systematically summarizes the existing research on proactive health, summarizes the status and shortcomings of proactive health research, and looks forward to the possible development trend in the future. The purpose of this study is to systematically review the past progress of proactive health to support and promote the future development of proactive health.

Keywords: Proactive health, Health risk prevention, Health promotion, Progress review

1 Introduction

Since the outbreak of COVID-19 in 2019, the defects of the traditional disease-centered health model have become increasingly prominent, and the traditional health model has been unable to meet the urgent needs of the public for whole-process and whole-cycle health. In terms of the proportion of healthy people, according to a global survey conducted by the World Health Organization, only about 5% of the world's people are in a healthy state [1]. In terms of the number of medical personnel, according to the China Health Statistical Yearbook, the total number of medical and health institutions in China was 2.223 billion in 2000, 5.838 billion in 2010, and 84.0 in 2022, an increase of nearly 400% com-pared with 2000. From the perspective of medical expenditure, according to the China Health Statistical Yearbook, the average medical expenditure of outpatients and inpatients in 2015 was 97.7 yuan and 2760.6 yuan respectively, while in 2021 it will be as high as 165.8 yuan and 3649.9 yuan [2]. In six years, the increase was as high as 69.70% and 32.2%, and the problems of high public disease rate and high medical cost were very serious, and showed an increasing trend. It is urgent to

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explore a way to solve the problem that the public do not get sick, get sick less, and have low-cost treatment.

Around the above issues, the state proposed a major strategy for healthy China from a top-level perspective, and promoted the transformation of the health concept from the traditional disease-centered to health-centered. The Outline of the Healthy China 2030 Plan clearly states that universal health is the fundamental purpose of building a healthy China, and prevention should be given priority and healthy lifestyles should be promoted. The "Opinions of The State Council on the implementation of the Healthy China Action" pointed out that we should promote the transformation of the treatment of diseases as the center to the people's health as the center, and implement the healthy China action. To the standard health China strategy and the public's actual needs of no illness, less illness, and low-cost treatment, in 2015, the Ministry of Science and Technology prospectively laid out the science and technology plan of China's population and health with health as the center, and innovatively proposed the concept of proactive health, and proactive health emerged. In 2016, the "13th Five-Year" National Science and Technology Innovation Plan of The State Council officially included proactive health in the special plan, proposing to take proactive health as the guidance, break through the difficulties and bottlenecks of human health status quantification and stratification, continuous dynamic collection of health information, health big data fusion analysis, personalized fitness technology.

Proactive health is an important measure to transform from traditional disease-centered to health-centered. Since its proposal, scholars in various fields have conducted preliminary exploration and research from the perspective of their own disciplines, but there are few research reviews focusing specifically on proactive health [3-5]. Therefore, starting from the concept and characteristics of proactive health, this study sorted out and summarized the researches related to proactive health, summarized the current research status and shortcomings in the field of proactive health [6], and proposed the development direction of proactive health in the future, to support and promote the in-depth development of the field of proactive health.

2 Proactive Health Concept Definition

From the perspective of the framework, the focus of proactive health is 1 center (health), 2 populations (healthy state and sub-healthy state), and 2 processes (preventive downward: proactive prevention of health risks; Promote upward: health imbalance rehabilitation/promotion),[7] multiple subjects participate (hospitals, schools, governments, enterprises, families, etc.), throughout the entire life cycle of individuals. From the concept point of view, proactive health is to protect and promote the health of the whole life cycle of the human body as the core, for healthy and sub-healthy people, in collaboration with the government, hospitals, communities, families and other parties, to carry out all activities in the two processes of downward health risk proactive prevention, upward health rehabilitation and promotion[8]; proactive health has six characteristics: universality, initiative, prevention, individuality, continuous integrity and synergy.

3 Review of Progress in Proactive Health Research

Proactive prevention of health risks is one of the core processes of proactive health attention, which aims to proproactively prevent the potential risks of the downward change of health status (healthy state - sub-health state/disease state, sub-health state - disease state) through health status perception, assessment and early warning. The existing research in the field of proactive health risk prevention focuses on the health risk prevention based on the new generation of information technology, precision medicine risk prevention, and the risk prevention of medical treatment without disease.

Health risk prevention based on the new generation of information technology mainly uses the new generation of information technology such as artificial intelligence, Internet of things and big data to perceive individual physiological health indicators and behavioral health indicators, and realizes health risk assessment and early warning based on the health assessment model.

Precision medicine is the result diagnosis and prevention of every node state of proactive health. Centering on health, modern medicine has gradually developed to the direction of "prevention first and prevention combined". Hu Hongyan et al. integrated the relevant information of precision medicine prevention, diagnosis and treatment of 10 major diseases, extracted, summarized, annotated and analyzed, and built a precision medicine prevention and treatment knowledge base suitable for Chinese people. Han Gang et al. believed that preventive medicine would become the future trend of healthy development.

The research on proactive health risk prevention focuses on the new generation of information technology enabling health risk early warning, precision medicine risk prevention, medical treatment without disease risk prevention and other aspects.[9] The new generation of information technology enables health risk early warning to focus on the perception and early warning of individual physiological and behavioural health based on the new generation of information technology such as artificial intelligence and big data, which is currently in the exploration stage of insufficient perceptual accuracy and greater impact by individuals and the environment.[10] Precision medicine risk prevention focuses on three aspects: precision medicine guidance, smart medicine screening, and auxiliary drug prevention, providing a solution from the perspective of modern medicine for proactive health prevention. However, this method has existing defects such as being unable to be applied in a large area and its effectiveness needs to be further verified. The research on prevention of risk of non-disease in Chinese medicine is focused on physical examination of traditional Chinese medicine, integration of traditional Chinese medicine and modern information technology, etc. Considering the nature of traditional Chinese medicine is empirical science, its prevention scientific and effectiveness need to be further verified.

4 Health Imbalance Rehabilitation and Health Promotion

The research on the recovery of health imbalance and health promotion focuses on sports intervention, traditional Chinese medicine intervention and behaviour interven-

tion.

Exercise intervention is one of the effective ways to maintain and promote health. Scholars at home and abroad have conducted multi-angle and multi-level research on this important scientific issue. In 2007, the American Academy of Sports Medicine (ACSM) proposed "Exercise is Good Medicine" (EIM), which is of great significance in the prevention and treatment of chronic noncommunicable diseases. Current exercise intervention methods include results-oriented exercise intervention prescription and process-oriented exercise process monitoring. In the aspect of exercise intervention prescription, the purpose is to guide the exercise needed to promote and improve the physical health of individuals in the form of prescription. Personalized exercise prescription can be personalized according to people's subjective needs, human characteristics, user preferences and so on. Researchers at the University of Hong Kong found in a study of interventions in people with pre-diabetes that the same exercise interventions were effective for some participants and not for others.

From the construction of the theoretical system of TCM constitution to the development of constitution identification and intervention technology, to the transformation and application of the diagnosis and treatment mode of body discrimination, the health intervention of TCM intervention in the process of sub-health recovery and health maintenance includes a variety of intervention methods such as TCM prescription conditioning, acupoint acupuncture, dietary medicine diet, and traditional Chinese medicine exercise.

In recent years, with the continuous improvement of public health literacy, behavioral intervention to restore and promote health has gradually attracted the attention of experts and scholars, including diet intervention, sleep intervention, daily behavior and lifestyle intervention. In terms of dietary intervention, a study on dietary intervention for Health reviewed the effects of ketogenic diet on health, and the results showed that a number of clinical studies confirmed that ketogenic diet can significantly reduce body weight; Another study looking at the effects of a vegetarian diet on diabetes showed that a vegan diet for at least 3 months helped people who were overweight or had type 2 diabetes lose weight, but had little effect on hemoglobin A1C levels.

In all, in terms of sports intervention, the current sports intervention system has been preliminarily established, and many studies have shown the effectiveness and scientificity of sports intervention. However, further studies are needed in terms of sports mechanism and efficacy, and further integration with the medical field is needed in the future to improve the scientificity and accuracy of sports intervention. In the aspect of TCM intervention, the re-search mainly focuses on TCM prescription conditioning, acupoint acupuncture, dietary medicine diet, and TCM exercise.[11] At present, the effectiveness and scientific and friendly verification of TCM intervention are needed, and the differences of intervention effects need to be further discussed. In terms of behavioural intervention for recovery and health promotion., relevant researchers have carried out preliminary exploration from the aspects of intervention effectiveness and small-scale verification experiments, but the depth and breadth of research still need to be further expanded.

5 Conclusion and Prospect

5.1 The Accuracy of Health Status Perception and Scientific Evaluation are the Key Points of Health Risk Prevention

Proactive health risk prevention aims to achieve the advancement of health risk through risk prevention. The existing research focuses on health status perception and health risk assessment. Health status perception includes traditional medical perception and continuous perception based on smart wearable devices. The traditional medical perception is the diagnosis of health status at a single time point, with insufficient continuous integrity but relatively high accuracy. The continuous perception based on smart wearable devices can achieve continuous and complete collection and monitoring of health indicators, but the perceptual accuracy and credibility need to be improved. The research on health risk assessment mainly focuses on data-driven risk assessment and prediction. At present, exploration is carried out in the aspects of assessment model construction, method optimization and individuation, etc. The scientificity and credibility of the assessment process and results need to be verified on a large scale.

5.2 Improving the Effectiveness and Personalization of Health Intervention is the Core Task of Health Recovery and Promotion Process

Health promotion and promotion aims to promote the upward improvement of health status through health intervention means, representative intervention means include exercise, sleep, diet, behavioural intervention and so on. Exercise intervention has been proved to be one of the scientific and effective ways of health promotion, but how to issue personalized exercise prescription for different groups, and the efficacy and influence mechanism of exercise intervention still need further research. In terms of sleep, diet and behaviour intervention, existing studies have explored the effectiveness of intervention and data-empowered intervention, but the research has not yet formed a system, and the effectiveness of intervention varies from person to person.

5.3 Artificial Intelligence and Big Data Technology are the Power Sources Driving Proactive and Healthy Development

At present, researches in various fields of proactive health are generally faced with such problems as lack of accuracy, lack of personalization, and lack of large-scale scientific verification. The author believes that the core lies in the fact that there is no unified consensus theory on the judgment and evolution of health status, efficacy, and mechanism of health intervention, etc. Considering the complexity of the human body system, relying on traditional scientific theoretical research methods can no longer solve the above problems, it is necessary to combine the new generation of information technology represented by artificial intelligence and big data to improve the theory and mechanism system of proactive health driven by data, and promote the comprehensive deepening of proactive health development.

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