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The holistic health economy and the healing industry in the AI era

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Abstract
This paper examines the emerging whole-person health economy and the AI-enabled healing industry by integrating theoretical, industrial, and governance perspectives. It first traces the evolution of health concepts from the biomedical model to Engel's biopsychosocial model and Stineman and Streim's biopsycho-ecological paradigm, and then adopts Lu's four-dimensional body–mind–spirit–society model as the analytical framework. The paper argues that whole-person health shifts the focus from disease treatment to preventive promotion, multidimensional well-being, and individual empowerment, thereby expanding health service demand beyond clinical settings into daily life, experiences, and risk management. The paper then analyzes the structural drivers of the global healing industry, including population aging, rising healthcare expenditure, consumer empowerment, digital technology innovation, and post-pandemic changes in health behavior. It reviews the industry's scope, classification, value chain, business models, profit sources, competitive landscape, and strategic positioning. Particular attention is given to how generative AI, big data, and machine learning can support health assessment, risk prediction, personalized intervention design, product development, and customer relationship management, while remaining subordinate to human professional judgment and real human care. The paper further addresses the high sensitivity of health data and the ethical challenges of algorithmic bias, informed consent, digital divides, automation bias, and emotional dependence. It proposes a four-layer integration architecture—data foundation, AI engine, service application, and experience integration—to connect the four health dimensions with integrated service delivery. The paper concludes that the future of the healing industry lies in moving from fragmented products toward an integrated whole-person health ecosystem in which technology and humanity, prevention and care, personalization and professional accountability, and innovation and governance are balanced. It offers implications for enterprises, policymakers, and future research on empirical validation, cross-cultural comparison, long-term effects, governance design, and health equity.

Keywords: Holistic health, healing industry, artificial intelligence, generative AI, body–mind–spirit–society model, health data governance, integrated care architecture

Introduction

The first driver is dramatic demographic change. Global population aging continues to deepen, and the proportion of older adults continues to rise, bringing with it a heavier burden of chronic disease and growing demand for medical care. The second driver is fiscal pressure on health systems. Health expenditure as a share of GDP continues to climb in many countries, and treatment-oriented health systems face severe challenges to financial sustainability, prompting policymakers to reconsider the allocation of resources between "treatment" and "prevention." The third driver is the awakening of consumer health awareness. The spread of the internet and social media has made health information easier to obtain than ever before. Consumers no longer passively accept physicians' authoritative instructions; instead, they actively search for information, compare options, and participate in their own health decisions. This empowerment trend makes people more willing to pay for preventive health products and services. Finally, breakthrough developments in digital technology provide unprecedented tools and possibilities, injecting key technological momentum into the growth of the healing industry.

At the same time, the rapid development of artificial intelligence is fundamentally changing how health services are delivered and how they are experienced. From wearable devices that collect continuous physiological data, to mobile applications that provide mental health support, to personalized health recommendations driven by large language models, technology continues to permeate every link in the health industry. It is especially noteworthy that healing domains that previously relied heavily on face-to-face human interaction—such as psychological companionship, spiritual growth, and social support—and were therefore difficult to standardize and scale, are now opening up possibilities for large-scale expansion because of AI's natural language understanding and conversational capabilities. However, compared with the vigorous development of industry, systematic academic research on the Holistic health economy remains insufficient. Existing literature tends to focus on single dimensions (such as physical health or mental health) and rarely integrates the four dimensions of body, mind, spirit, and society in a holistic discussion. There is also a lack of a complete analytical framework for how AI reshapes the value chain and business models of the healing industry. In addition, issues such as health data privacy, algorithmic bias, and ethical governance are becoming increasingly important with the spread of technology and urgently require in-depth investigation. Based on twelve authentic and publicly retrievable international journal articles, this study conducts an integrated theoretical and industry-oriented study in the hope of filling the above research gaps. In selecting the literature, the researcher balanced theoretical depth and industry vision so that the study possesses both academic rigor and practical reference value.

Holistic health and the Model

Holistic health is not a new concept, but its connotations have continued to enrich over time. In its Constitution, the World Health Organization defined health as "a state of complete physical, mental, and social well-being," moving beyond the negative view that "health is the absence of disease" and, for the first time, treating health as a positive, multidimensional state. For a long period, however, modern medical practice remained dominated by the biomedical model. This model assumes that every disease corresponds to a specific physiological cause and that the focus of treatment is to identify and eliminate that cause. Although this reductionist view achieved outstanding results in infectious disease control, surgery, and drug development, it also produced a deviation in which health systems "treat the disease but not the person," neglecting the influence of psychological and social factors on health.

Engel (1977) [2] published a classic paper in Science criticizing the biomedical model as neither scientifically necessary nor clinically sufficient, and formally proposed the biopsychosocial model. This model argues that health and disease are the result of interactions among biological, psychological, and social factors, and that medical care must return to the complete "person" rather than merely treating physiological lesions. This view became an important theoretical foundation of the modern Holistic health movement. Engel (1980) [3] later elaborated on the clinical application of the model, pointing out that in addition to physiological symptoms, physicians must understand patients' psychological states (such as emotions, beliefs, and coping styles) and social contexts (such as family, work, and economic conditions) in order to provide truly appropriate care. Stineman and Streim (2010) [11] further expanded this view into the biopsycho-ecological paradigm, emphasizing that health, disease, injury, and disability are products of the interaction between people and their environments: obstacles in the physical and social environment aggravate disability, whereas supportive environments promote recovery and social participation. This view extends the horizon of health from the individual level to the ecosystem level, echoing contemporary attention to the social determinants of health and providing a more inclusive theoretical foundation for Holistic health (Lu, 2026). Although the biopsychosocial model has been widely accepted, many scholars argue that it is still insufficient to cover the full range of human health. Especially in situations involving life-and-death issues, chronic illness, and existential anxiety, individuals' pursuit of meaning in life, inner peace, and transcendent experience has a crucial impact on well-being. Lu (2022), in discussing the spiritual implications of AI companion robots, pointed out that human beings have an inner craving for meaning, belonging, acceptance, and self-worth. Such needs are difficult to fully classify under the psychological or social dimensions and belong to the spiritual level. This study therefore adopts the four-dimensional body–mind–spirit–society Holistic health model constructed by Lu (2024).

Lu (2022) proposed a comprehensive healthcare model integrating Holistic health, incorporating health dimensions, medical and healing approaches, and health status into a single framework for subsequent research and practical application. He first reviewed the WHO definition of health. In 1948, the WHO stated that health is not merely the absence of disease or infirmity but a state of complete physical, mental, and social well-being. The 1986 Ottawa Charter emphasized that health promotion is the process of enabling people to increase control over and improve their health, and proposed five actions: building healthy public policy, creating supportive environments, strengthening community action, developing personal skills, and reorienting health services. In 1998, the WHO further incorporated "spiritual" into the definition of health, asserting that physical, mental, spiritual, and social dimensions are equally important. In 1983, the World Health Assembly formally proposed including the spiritual dimension in the definition of health, but because no consensus was reached on the wording of "mental" and "spiritual," the definition was ultimately not submitted to the 52nd Assembly for discussion in 1999. The author therefore pointed out that traditional definitions of health often include only body and mind while neglecting spirituality, and that future definitions should move toward Holistic health. Regarding health dimensions, Lu (2022) adopted an interactionist and "Holistic health" perspective, arguing that the body, mind, and spirit influence one another and that health should be viewed as the integration of physical, mental, spiritual, and social health. The author organized four types of health: physical health refers to the normal functioning of the body's organs and systems, with sufficient capacity to meet the needs of daily life; mental health refers to the ability to think clearly, express emotions, and cope with stress, sadness, and anxiety; spiritual health refers to having self-belief, a harmonious set of worldview, values, and outlook on life with society, the ability to love and be loved, and appropriate compassion; and social health refers to the ability to maintain harmonious relationships with others and to fit happily into the social system. The article also cited Maslow's hierarchy of needs, explaining that physiological, safety, love and belonging, and esteem needs are related to physical and mental health, and pointed out that Holistic health counseling models in Chinese cultural contexts must incorporate local religious and cultural characteristics and cannot directly apply the Western Christian concept of "spirituality."

Regarding medical and healing approaches, the article distinguished Western medicine, Eastern medicine, folk therapy, religion and belief, and sports and martial arts. Western medicine, based on anatomy, biology, and modern technology, diagnoses and treats disease through drugs, radiation, and surgery and is the mainstream of modern health systems worldwide. However, citing Dr. Yang Ding-I, the author noted that Western medicine often focuses on symptom control for chronic diseases rather than addressing root causes, and should move toward integrative preventive medicine of body and mind. Eastern medicine includes traditional Chinese medicine and Indian Ayurveda, emphasizing prevention, holistic diagnosis, and balance; Chinese medicine uses acupuncture, herbal medicine, dietary therapy, tuina, tai chi, and qigong to regulate yin and yang, qi, and meridians and restore balance of body, mind, and spirit. The article also introduced complementary and alternative medicine (CAM), which, according to the NIH, can be divided into five categories: natural products, mind–body medicine, body-based manipulations, energy medicine, and whole medical systems. A 2002 U.S. survey showed that 62% of adults used CAM, and the proportion among cancer patients was as high as 70%; however, alternative therapies still face controversy over the lack of

large-scale scientific evidence. Regarding health status, Lu (2022) drew on ICIDH, ICF, and Nagi's concepts to explain multidimensional assessment of disease, impairment, functional limitation, and disability. ICF uses codes for body functions (b), body structures (s), activities and participation (d), and environmental factors (e) as an international common language. The author pointed out that, according to the WHO definition, truly healthy individuals (the first status) and patients (the third status) together account for less than 25%, while about 75% of people are in a sub-health state (the second status); another WHO survey cited in the article reported that 5% are truly healthy, 20% are diagnosed patients, and 75% are in sub-health. Sub-health can be further divided into physical, mental, spiritual, and social sub-health. He also proposed a "fourth status: recovery." When sub-healthy individuals or patients enter the recovery status and are properly managed, they can return to the first status; if improperly managed, they return to the second status. In the recovery stage, Eastern medicine adjuvant therapies and exercise are often used.

Finally, Lu (2022) proposed a "comprehensive healthcare model" cube diagram integrating three parts: first, the four dimensions of body, mind, spirit, and society; second, approaches including Western medicine, Eastern medicine and folk therapy, religion and belief, and sports and martial arts; and third, the four statuses of health, sub-health, illness, and recovery. The conclusion stated that Holistic health should cover body, mind, spirit, and society, and that appropriate interventions should be provided according to different health statuses through diverse medical and healing approaches in order to promote recovery from sub-health or illness to health. This model can serve as a reference for subsequent research on integrated medicine, health promotion, and Holistic care. The four dimensions are not independent of one another but mutually permeable and dynamically interactive. Long-term psychological stress may impair immune function, social isolation may increase the risk of depression, and spiritual distress may also be transformed into psychological distress and affect the perception of physical symptoms. For example, an individual who suffers from long-term insomnia due to work stress (psychological) may experience imbalance in immune function and metabolism (physical), which may in turn reduce social activities (social), and social withdrawal may aggravate loneliness and a sense of meaninglessness (spiritual), forming a mutually reinforcing negative cycle. The goal of Holistic health is to promote balanced integration of the four dimensions and maximize overall well-being.

From the perspective of Engel's (1980) [3] clinical application, implementing the four-dimensional model in health services means that health professionals cannot judge an individual's status by a single indicator alone; they must simultaneously attend to physiological test results, psychological assessment, life context, and social support networks. Stineman and Streim (2010) [11] remind us that environmental factors—including living conditions, community resources, and access to care—are key external conditions determining whether the four dimensions can be balanced. Therefore, in practice, the Holistic health model requires both professional integration and understanding of and intervention in the individual's environment. The core differences between the two paradigms can be summarized as follows. In terms of core goals, traditional medicine focuses on treating disease and prolonging life, whereas Holistic health focuses on enhancing well-being, quality of life, and individual potential development; the former is disease-centered, while the latter is centered on the complete person. In terms of time orientation, traditional medicine is reactive, intervening after disease occurs, whereas Holistic health emphasizes proactive prevention and active promotion. In terms of the responsible subject, traditional medicine is led by physicians and nurses, whereas Holistic health regards the individual as the first person responsible for their own health, with professionals playing the roles of guides and supporters. In terms of intervention methods, the former relies on biomedical tools such as drugs, surgery, and instrument-based examinations, whereas the latter incorporates multiple approaches such as nutritional conditioning, exercise planning, stress adjustment, psychological support, and social environment adjustment. In terms of measurement indicators, the former emphasizes physiological data and mortality, whereas the latter incorporates subjective well-being, quality of life, and social participation. It must be emphasized; however, that Holistic health does not deny or replace traditional medicine. The management of acute severe illness and major trauma still relies heavily on biomedicine, and the two should be complementary rather than oppositional. The value of Holistic health is more evident in chronic disease management, recovery-stage conditioning, and health promotion. An ideal system should integrate the two into a continuum of care spanning "prevention—diagnosis—treatment—recovery—promotion." From an industry perspective, this shift has profound economic implications. When health is viewed as a continuous, multidimensional dynamic process rather than a binary state of "sick/not sick," demand for health services is no longer limited to diagnosis and treatment within the medical system but extends to health promotion, risk management, and experience optimization in all aspects of daily life. This is precisely the demand foundation for the rise of the healing industry and the fundamental reason why this study uses the body–mind–spirit–society model as its industry analysis framework.

Global Trends in the Health and Healing Industry

Kickbusch and Payne (2003) [4] observed the rise of the "wellness revolution" at the beginning of this century, pointing out that a health-promotion industry led by the private sector was changing the landscape of traditional public health. They observed several important phenomena: health issues moved from professional media into mass media and became part of mainstream culture; the boundaries among food, nutritional supplements, and pharmaceuticals became increasingly blurred, and functional foods emerged; pharmaceutical companies began to enter preventive medicine and lifestyle-related product markets; and health consumers became more professional and proactive. These trends continued to accelerate and deepen after the entry of digital technology, forming today's large-scale healing economy. The rapid growth of the healing industry is not accidental but the result of multiple structural factors acting together. First, population aging is the most core driving force, as older populations have strong demand for functional maintenance and health investment. Second, the prevalence of lifestyle-related chronic diseases has prompted the public to shift from passive treatment to

preventive intervention, while traditional medicine has limited effectiveness and high costs in chronic disease control, leading more people to turn to more fundamental solutions such as nutrition, exercise, and stress management. Third, consumer empowerment awareness has risen; people actively collect information, compare options, and participate in health decisions, and are therefore more willing to pay for personalized, refined health experiences. Fourth, fiscal pressure on health systems in various countries has prompted policies to shift from treatment to health promotion, providing a supportive policy environment. Fifth, digital technology innovation has expanded the boundaries of healing services. Panesar and Panesar (2020) [9] pointed out that the spread of smartphones and the Internet of Things generates massive health data, driving global healthcare from volume-oriented to value-oriented. Yoo *et al*. (2023) [14] emphasized that digital therapeutics, which provide evidence-based therapeutic interventions through software programs, are revolutionizing the delivery of healthcare and blurring the boundary between treatment and prevention.

COVID-19 was an important turning point for the global health industry. The pandemic not only increased public attention to health but also accelerated the adoption of digital health services, fundamentally changing people's health behaviors and industry operating models. Isolation and social distancing measures brought emotional shocks such as loneliness, anxiety, and depression, making people realize that health is not merely the absence of viral infection but also includes psychological resilience, social connection, and inner stability. Facing the threat of death and the experience of life's impermanence also led many people to rethink the meaning of life and spiritual needs. These changes pushed the healing industry from a purely "physical health" orientation toward a more integrated "Holistic health" orientation. In addition, the pandemic accelerated the spread of the concept of "active health management." In the past, people mostly sought medical help only after becoming ill; the pandemic made people realize the importance of improving their own health foundations, and the idea that "prevention is better than treatment" became more deeply rooted. Exercise, nutrition, sleep, and stress management—previously regarded as non-essential health investments—are now viewed as rigid demand, and this cognitive shift has laid a demand foundation for the long-term growth of the healing industry. At the same time, the pandemic also fostered the formation of "remote health" habits: online consultation, virtual courses, and telemedicine moved from emergency measures to normal options, changing the geographic and temporal boundaries of health services, greatly improving accessibility, and giving more people who previously hesitated to seek help due to distance, time, or cost access to health services. For the industry, this transformation implies three structural impacts. First, the delivery channels of health services have shifted from physical-first to a balance of physical and virtual, with online-merge-offline (OMO) becoming a standard configuration. Second, health data collection has shifted from intermittent (at visits) to continuous (daily), greatly increasing the value of data assets. Third, consumers' health decisions have shifted from "following the doctor's orders" to "deciding for oneself with professional support," requiring companies to compete for loyalty through user experience and trust building.

The Asia-Pacific region is the fastest-growing region for the global healing industry. Its development characteristics include accelerated integration of traditional therapies and modern technology, high penetration of mobile digital services, rapid expansion of the middle-class driving health consumption, and population aging creating substantial demand for preventive medicine. Park *et al*. (2023) [10] used big-data text mining and social network analysis to study the Korean exercise healthcare industry and found that before the pandemic, industry keywords focused on smart management, future technology, and fitness research; after the pandemic, new dimensions such as rehabilitation, services, exercise education, and business appeared, indicating that the industry shifted from hardware-oriented to service- and experience-oriented. This finding is indicative for understanding the transformation of the healing industry in Northeast Asia. Cyranoski's (2017) [1] report on China's iCarbonX represents another innovative attempt: founded by the former CEO of BGI, the company integrated multi-omics data—genomics, proteomics, metabolomics, transcriptomics, and immune response—together with gut microbiome and lifestyle factors, using AI algorithms for analysis in an attempt to build a data-driven personal health management platform. Although such cases have subsequently experienced various ups and downs, the direction they reveal— "data + AI + Holistic health"—has become an industry consensus. Southeast Asia, meanwhile, closely combines healing with tourism; wellness tourism, spas, and traditional body–mind therapies constitute an important niche market, attracting health-oriented travelers from around the world.

Scope, Classification, and Market Niches of the Healing Industry

Kickbusch and Payne (2003) [4] proposed a classic classification framework dividing the healing industry into nine categories: nutrition products and services; food and beverages; fitness products and services; preventive medicine; voluntary medicine (including cosmetic surgery and lifestyle drugs); alternative medicine; health information media; health and wellness tourism; and health insurance. This classification covers a broad spectrum from physical products to intangible services and from professional businesses to mass consumption, showing that the healing industry is a cross-disciplinary congregation and is not limited to the medical system. Combining the four-dimensional body–mind–spirit–society model, this study defines the healing industry as "a cross-disciplinary industry congregation aimed at enhancing individuals' overall well-being, covering the four dimensions of body, mind, spirit, and society, and integrating products, services, experiences, and information." Its core characteristics include being consumer-centered, emphasizing prevention and promotion, valuing subjective experience and quality of life, and possessing the dual attributes of consumer market and professional services.

Under the four-dimensional framework, the main business formats of the healing industry can be classified as follows. Body-dimension-related industries include: the health and fitness industry (gyms, online fitness courses, fitness testing, and personal training services); the nutritional health industry (functional foods, dietary supplements, organic foods, and weight management); the sleep health industry (bedding, sleep monitoring devices, and sleep improvement

services); the preventive medicine industry (health checkups, genetic testing, and health risk assessment); the traditional therapy industry (Chinese medicine, acupuncture, tuina, and Ayurveda); and the beauty and body industry (spas, beauty care, and body shaping). Mind-dimension-related industries include: mental health services (psychological counseling, psychotherapy, and workplace mental health programs); the stress management industry (meditation, mindfulness, and relaxation therapy); digital psychological tools (meditation apps, mood diaries, and digital therapeutics); and psychological growth courses (emotion management, interpersonal communication, and cognitive optimization). Spirit-dimension-related industries include: spiritual growth courses, the meditation industry, body–mind–spirit therapies (energy therapy, sound therapy, and aromatherapy), and spiritual tourism. Society-dimension-related industries include: health community platforms, workplace employee assistance programs, the community health industry, and interpersonal relationship growth courses. In practice, most products and services span multiple dimensions. For example, yoga involves physical exercise, psychological relaxation, and spiritual awareness; spas provide physical relaxation, psychological stress relief, and social opportunities; wellness tourism integrates physical conditioning, spiritual reflection, and interpersonal connection; and high-end health clubs often simultaneously provide fitness training, nutritional counseling, stress management courses, and member social networks, fully corresponding to the four dimensions. Under the Holistic health trend, cross-dimensional integrated services are increasingly popular and represent an important development direction. For businesses, understanding this cross-dimensional characteristic helps design more valuable product combinations and identify true competitors.

In terms of market structure, body-dimension-related industries remain the main force of the healing industry, accounting for approximately 60–70% of the overall market. The mind-dimension industry has grown fastest in the post-pandemic era; demand for mental health has surged, and digital mental health tools have lowered service thresholds and expanded market size. The spirit-dimension industry is relatively small in scale but characterized by high unit prices and high loyalty, reflecting people's pursuit of "beyond material satisfaction" after society becomes more affluent. The society-dimension industry mostly exists in the form of B2B corporate programs or government community programs; the individual consumer market is relatively fragmented, but the post-pandemic desire for real interpersonal connection is spawning new types of social health products. It is worth noting that Trothen (2022) [13] pointed out that even AI companion robots such as Replika can, to some extent, respond to people's spiritual needs for acceptance, understanding, and belonging, showing that there is real market space for the combination of technology and spirituality. This phenomenon also shows that demand in the healing industry is not entirely driven by "substantive health improvement"; a large part comes from people's emotional needs to be cared for, understood, and to belong. Understanding this psychological mechanism is an important foundation for healing companies in designing products and communicating brands. In an increasingly competitive environment, potential niche directions include: designing exclusive health plans for specific groups (older adults, chronic disease patients, and specific occupational groups); combining traditional therapies with digital technology to enhance personalization and scientific validation; developing experience-oriented healing services that use ritual, setting, and community to create differentiated competitiveness; using data-driven personalized health management to break through the bottleneck of "one-size-fits-all" standardization; and integrating the four dimensions into a one-stop Holistic health platform to solve the pain point of fragmented services in the existing market. If such platforms can effectively integrate professional resources and data, they have the potential to become platform-level participants in the industry.

Business Models of the Healing Industry

Drawing on the value chain perspective, the healing industry can be divided into upstream, midstream, and downstream segments, accompanied by supporting activities throughout the process. The upstream segment is content and technology R&D, covering basic scientific research, product development such as health foods and wearable hardware, course content design such as fitness and meditation, and technology R&D such as AI algorithms and digital therapeutics software. This segment has high entry barriers and requires professional knowledge and R&D investment, but it is also the easiest place to accumulate patents and technological barriers. The midstream segment is product manufacturing and service operations, responsible for transforming R&D results into deliverable products and services, covering physical product manufacturing, physical service operations such as gyms and spas, and digital service operations such as health apps and online course platforms. Key success factors lie in operational efficiency, quality control, and user experience design. The downstream segment is channel sales and customer management, covering physical and digital channels, customer service, community operations, and user data applications. Enterprises that control user relationships and data assets often have stronger bargaining power and can lead the value chain. In addition, supporting activities such as regulatory compliance and certification, supply chain management, quality assurance, financial management, human resources, and brand marketing run through the entire value chain. Regulatory compliance is particularly critical in the health industry because health products and services involve human safety and are subject to strict regulation. It is worth emphasizing that the value chain of the healing industry has a "data-penetrating" characteristic: whether in upstream research and development, midstream service operations, or downstream customer management, health-related data are generated and accumulated. These data are both the basis for service optimization and the raw material for AI model training. Therefore, data governance capability should be regarded as a core foundational capability running through the value chain, not merely an auxiliary function downstream.

The revenue sources of modern healing enterprises are increasingly diversified. Common sources include: core product and service revenue; value-added service revenue provided on top of the core offering; data revenue from aggregating de-identified data into industry insights and selling them to third parties; advertising and revenue-sharing income after accumulating large user traffic; brand licensing and franchise revenue; and service revenue paid

by insurers through cooperation with insurance companies. The choice of revenue structure reflects a company's strategic positioning: companies pursuing scale tend to emphasize subscriptions and product sales, while companies pursuing profit depth tend to favor value-added services and data monetization. It should be noted, however, that monetization of health data involves highly sensitive privacy ethics; if handled improperly; companies may trade short-term revenue for long-term loss of trust. The core of value creation in the healing industry lies not in the commodity itself but in consumers' expectations and experiences of "becoming healthier." Key elements of value creation include: building consumer trust through scientific evidence and third-party certification—Yoo *et al*. (2023) [14] emphasized that digital therapeutics must have an evidence base, which is the fundamental difference between them and general consumer applications; enhancing the fit between solutions and individual conditions through personalization—the core value of AI technology is to achieve large-scale personalization at reasonable cost; helping users persist in health behaviors through continuous companionship and instant feedback—this explains the enduring importance of "human factors" such as coaches, nutritionists, and communities in the health industry; using data to help consumers "see their own progress," thereby strengthening motivation and value perception; and providing integrated experiences across dimensions to create synergy and emotional brand connection.

Strategic Positioning and Competitive Advantage of Holistic health Enterprises

The competitive landscape of the Holistic health industry presents a situation of "diverse participants and intensified cross-boundary competition and cooperation," with traditional industry boundaries increasingly blurred. Traditional medical institutions (hospitals, clinics, and health examination centers) have advantages in high medical professionalism, high consumer trust, and relatively complete data foundations; their disadvantages are a service orientation biased toward the medical model and slower innovation. Pharmaceutical and biotechnology companies have advantages in R&D capabilities and clinical trial experience, but disadvantages in consumer brand and channel capabilities. Technology companies and startups are the main force of digital health innovation; Topol (2019) [12] pointed out that AI and big data are changing the face of medicine from three levels—clinicians, health systems, and patients—ultimately realizing "high-performance medicine." However, technology companies' clinical expertise is relatively insufficient, and the safety of their products requires stricter validation. Consumer goods groups have complete brands and channels but easily fall into homogeneous product competition. Traditional body–mind therapy providers offer good service experiences and high customer loyalty, but are difficult to scale and have relatively weak evidence bases. Insurance companies hold large amounts of member data, but consumers are often wary of their health advice. This diverse competitive-cooperative landscape means that no single type of participant can independently dominate the market; strategic alliances and ecosystem cooperation to fill each other's gaps will be the norm in industry competition.

Based on the two dimensions of "professional depth" and "service breadth," Holistic health enterprises can adopt four typical positions. The vertical deep-cultivation type locks onto a single niche and pursues depth of technology and expertise; it is suitable for technology-oriented startups, but the market size is limited and it is easily integrated by platform enterprises. The horizontal integration type spans multiple health fields to provide one-stop services; user stickiness is high, data value is large, and the competitive moat is wide, but enormous resources are required to achieve integration. The technology-enabler type does not directly serve end consumers but provides AI models, SaaS platforms, and solutions to other health industry players; its business model is clear and customer loyalty high. The lifestyle type centers on brand aesthetics and healthy lifestyle concepts; product extensibility is broad and brand premium high, but long-term brand management is required.

Technical Foundations of Generative AI, Big Data, and Machine Learning

Artificial intelligence (AI) refers to a set of technologies that enable computers to simulate human intelligent functions, covering perception, reasoning, learning, judgment, decision-making, and natural language processing. By capability level, it can be divided into weak AI (also called narrow AI, which can only perform specific tasks; almost all current industry applications belong to this category), strong AI (with general intelligence capabilities, still at the theoretical stage), and super AI (intelligence surpassing humans, mostly discussed in science fiction and futures studies). By technological path, AI has gone through three stages: early rule-based expert systems, traditional machine learning, and current deep learning and generative AI. The core driving forces of its evolution are increased computing power, expanded data scale, and algorithmic innovation.

Generative AI is the most significant breakthrough in the AI field in recent years. Unlike traditional discriminative AI, which can only perform classification, prediction, and recognition, generative AI can produce new content such as text, speech, images, and code. Its core technology is based on large language models, which are pretrained on massive text data using the Transformer architecture and possess natural language understanding, multi-turn dialogue, reasoning and induction, and knowledge integration capabilities. In recent years, the capabilities of large language models have continued to evolve: from early models mainly focused on text generation to models with multimodal understanding and generation capabilities that can simultaneously process text, images, speech, and video; and from merely "generating content" to intelligent agent forms with planning, tool use, and task execution capabilities. This evolution has transformed generative AI from a "conversational tool" into a "digital assistant capable of autonomously executing tasks," greatly expanding its application potential in health services. For the healing industry, the most important significance of generative AI is this: services highly dependent on language interaction—such as psychological companionship, spiritual guidance, and health consultation—were previously difficult to standardize and scale because they required human participation. Generative AI's natural language capabilities make large-scale digitalization of these services possible for the first time. A user can describe their emotional state to an AI health assistant late at night and receive immediate responses, guidance, and suggestions without waiting for a counseling appointment. This "always available" feature

greatly lowers the threshold for health support and changes the traditional delivery pattern of health services, which required "appointment, fixed location, and fixed time." Panesar and Panesar (2020) [9] also pointed out that the spread of mobile devices and IoT sensors has caused the volume of health data to grow exponentially; these data are the key raw material for training and operating AI models and have laid the foundation for AI applications in health. At the same time, the limitations of generative AI must be recognized: it is essentially statistical language generation and may produce plausible but factually incorrect content. Therefore, in scenarios involving health decisions, AI outputs must undergo professional review and cannot serve as the basis for independent diagnosis or prescription.

Health data are not only large in volume but also extremely diverse in type, including structured data (such as test values and blood pressure records), semi-structured data (such as electronic medical records), and unstructured data (such as medical images, voice records, and text notes). The technical architecture of health big data can be divided into four levels. The data acquisition layer is responsible for collecting data from multiple sources such as wearable devices, mobile applications, medical test reports, questionnaires, and sensors; key challenges lie in integrating multi-source heterogeneous data, real-time streaming processing, and data quality control. The data storage layer uses hybrid architecture of relational databases, NoSQL databases, and data lakes to handle multiple data types and designs tiered access permissions to implement privacy protection. The data processing layer is responsible for data cleaning, transformation, and feature extraction; because health data are highly sensitive and subject to strict regulations, special processes such as de-identification and audit trail retention are required. The data application layer applies analysis results to risk prediction, personalized recommendations, and anomaly detection. The four levels support one another; vulnerability at any level limits the value of the overall system, and data governance must therefore run through all levels.

The core concept of machine learning is to enable computers to automatically learn patterns from data without explicitly programmed rules. It can be divided into three major categories: supervised learning uses labeled data to learn the mapping between inputs and outputs and is commonly used for disease risk prediction and medical image interpretation; unsupervised learning discovers hidden structures and patterns in unlabeled data and is commonly used for user clustering and anomaly detection; reinforcement learning learns optimal strategies through a "trial–reward" mechanism and is suitable for dynamic adjustment of personalized interventions. Deep learning is a subfield of machine learning that uses multilayer neural networks to learn hierarchical features from data. It is particularly adept at processing unstructured data such as images, speech, and text and has numerous applications in medical image analysis, electronic medical record text processing, and drug development. Topol (2019) [12] discussed how technologies such as deep learning promotes "high-performance medicine" and realize collaboration between artificial intelligence and human expertise, while emphasizing that algorithm outputs must be carefully interpreted by clinical professionals because even highly accurate AI predictions cannot replace physicians' understanding of patients' individual situations, weighing of treatment risks, and assumption of ethical responsibility. When selecting algorithms, the health industry must balance accuracy, interpretability, data requirements, and regulatory requirements. Deep neural networks have high accuracy but are difficult to explain, which may raise trust and regulatory issues in health-related decisions. Traditional algorithms such as decision trees and logistic regression are highly interpretable but have limited ability to capture complex patterns. Ensemble learning methods can strike a compromise between accuracy and robustness. Therefore, practical approaches often "use interpretable models for decisions affecting user rights and deep models for perceptual tasks (such as image interpretation)," and establish comprehensive model validation and monitoring mechanisms.

AI Applications in Health Services Management

Health assessment and risk prediction are among the most mature AI application areas and the foundation of proactive health management. AI can integrate dozens or even hundreds of variables and capture complex nonlinear interactions among variables, breaking through the limitations of traditional few-indicator approaches. This characteristic is particularly suitable for dealing with complex systems such as health, which are "multifactorial, multipath, and dynamically evolving." Application scenarios include: chronic disease risk prediction, integrating age, sex, family history, lifestyle habits, and test data to predict future disease risk so that high-risk individuals can intervene early; mental health risk detection, using text, speech, and behavioral data to detect depression, anxiety, and other psychological states, which is particularly valuable for groups unwilling to seek help proactively, as the "low-pressure" nature of digital conversation helps lower the psychological threshold for seeking help; physiological anomaly detection, identifying early warning signs such as arrhythmia and blood glucose fluctuations in real time from continuous wearable data and establishing alert referrals with medical providers; and biological age assessment, integrating multiple data sources to assess an individual's aging degree and intervention effectiveness as a comprehensive indicator of health management outcomes. Panesar and Panesar (2020) [9] pointed out that AI and machine learning can process health data from sensors and mobile devices, assist early detection and risk assessment, and support a health model shifting from passive treatment to active management.

AI is also profoundly changing the R&D process of health products. In digital therapeutics development, Yoo *et al.* (2023) [14] explained that the technical architecture of digital therapeutics covers user data collection, data processing and analysis in a secure environment, and personalized treatment support. AI can help optimize intervention parameters, identify the user groups most likely to respond, and improve product efficacy and market competitiveness. In functional food and dietary supplement R&D, AI can shorten development cycles through literature and consumer feedback analysis. Algorithms for wearable devices and control systems for fitness equipment can be continuously optimized based on user data. Course and treatment design for service products such as spas, fitness, and meditation can also be iteratively improved through customer feedback and physiological data analysis, forming a data-driven development cycle of "design—test—feedback—

improvement." In addition, generative AI can assist in creating product copy and health education content; however, because such content involves health claims, professional review is still required to comply with regulatory requirements.

AI is reshaping customer service models in the health industry. Smart health assistants combined with generative AI can answer health questions, provide suggestions, and remind users about medication and appointments at any time, conduct multi-turn conversations with an experience close to human customer service, and remember user context to provide continuous and consistent service. User data-driven precise recommendations and personalized marketing push the most relevant content and products according to users' current health goals and behavioral states, improving conversion rates and reducing interference. Machine learning models can predict user churn risk and analyze causes, helping operations teams intervene and retain users in advance—for example, automatically sending encouraging messages or recommending restart plans when detecting that a user has not logged in for several consecutive days. Affective computing technology can detect users' emotional states, automatically adjust interaction tone, and transfer to human professionals when necessary, ensuring that high-risk situations receive appropriate handling. It is worth noting that the value of AI services often lies in their "always available, non-judgmental, and patient" characteristics, which precisely compensate for the limitations of human services in time and emotion. However, this does not mean AI can replace humans—professional judgment, ethical responsibility, and emotional warmth must still be borne by humans. The best service model is human–AI collaboration, with AI handling standardized, scaled tasks and humans focusing on complex interactions requiring judgment and warmth.

Health Data Privacy, Personal Data Protection, and AI Governance

Health personal data include highly private information such as physiological status, psychological status, disease history, and lifestyle habits, and possess multiple risk characteristics. Data are difficult to change: information such as genes, medical history, and constitution remains unchanged throughout life, so once leaked, the risk is permanent. Certain diseases (such as mental illness and hereditary diseases) still carry social stigma, and data leakage may lead to employment and insurance discrimination, causing irreparable social harm to the individual. Even if direct identifiers are removed, combining sufficient health data features still carries a high risk of re-identification; research shows that a few seemingly harmless data combinations can be enough to identify a specific person. Genetic data, because of family linkage, indirectly affect the privacy of blood relatives, extending the scope of data protection beyond the individual concerned. For these reasons, health data protection standards must be higher than those for general personal data. Any enterprise handling data in the health field should internalize this understanding as a basic premise of product design. Nebeker *et al*. (2019) [7] warned that consumer-oriented digital health products, ubiquitous sensors, and social network data make data collection more covert, larger-scale, and harder to regulate. The ethical challenges of digital health research are far greater than those of traditional medical research and require shared responsibility among all stakeholders to promote responsible digital health practice. When users engage in psychological conversations with AI, they also tend to unintentionally disclose large amounts of private details, increasing the risk of data leakage and misuse. This "over-disclosure" phenomenon deserves particular attention in conversational AI interfaces.

Given the high sensitivity of health data, countries around the world regulate it strictly through legislation. The EU General Data Protection Regulation (GDPR) classifies health data as a special category of personal data, generally prohibiting processing and granting data subjects rights to information, access, rectification, erasure, and data portability, with strict restrictions on cross-border transfers. The U.S. Health Insurance Portability and Accountability Act (HIPAA) regulates the confidentiality, integrity, and availability of protected health information within the healthcare system, but consumer-grade health apps and wearable devices fall outside its jurisdiction, creating a gap in the health privacy system; data protection on such platforms mainly relies on the Federal Trade Commission's fair information practices and state laws. Taiwan's Personal Data Protection Act and China's Personal Information Protection Law also classify medical and health data as special or sensitive personal data, requiring specific consent and strict protective measures. Although national frameworks differ in detail, they collectively show several trends: increasingly higher protection levels for health data, increasingly stronger transparency requirements for algorithmic decision-making, and increasingly strict regulation of cross-border data flows. Multinational health enterprises must therefore adopt a "highest-standard" compliance strategy, using the standards of the strictest market as the baseline for global operations, in order to satisfy the regulatory requirements of all jurisdictions simultaneously.

Core challenges in practical implementation include the following. Algorithmic bias: insufficient samples of specific groups in training data may reduce model prediction accuracy for those groups and even cause systemic discrimination; the response is to establish data diversity review mechanisms and regular fairness testing to ensure acceptable performance for users of different sexes, ages, and socioeconomic backgrounds. Automation bias and attribution of responsibility: humans may over-trust AI outputs and neglect their own professional judgment, and responsibility when AI errs is ambiguous; the response is to clarify AI's auxiliary positioning, emphasize final human decision-making authority, and establish certification and accountability systems. The informed consent dilemma: repeated secondary use of data makes traditional one-time consent insufficient, and users can hardly foresee how data will be used in the future; dynamic consent mechanisms and privacy-enhancing technologies such as federated learning can be explored to train models while protecting raw data. The digital divide: AI health services rely on smart devices and digital literacy, so non-digital service channels should be retained, low-threshold interfaces designed, and digital equity promoted to ensure that older adults and disadvantaged groups are not excluded from health services. In addition, there is an ethical issue that is often overlooked but increasingly important: psychological dependence and emotional attachment. If conversational AI plays a

companionship and support role over the long term, users may develop emotional dependence and even delay seeking timely professional human help; especially in spiritual companionship contexts, users may regard AI responses as authoritative life guidance. Trothen (2022) [13] warned that although technology can respond to some spiritual needs, it may also alienate people from real relationships; Young (2019) [15] emphasized that digital technology cannot replace empathy, compassion, and witness between real people. Health enterprises designing such products should proactively disclose AI identity, design timely referral mechanisms, and avoid designs that induce excessive dependence. This is one of the keys to whether the AI healing industry can gain social trust.

AI Healing Industry Datasets and Market Analysis

The core asset of the AI healing industry is data, and data quality determines the upper limit of AI models. Health data sources can be divided into four major categories. User-reported data include scales and questionnaires, dietary records, and goal setting; they can capture subjective feelings and life context and are the main data source for the psychological and spiritual dimensions, but they have high reporting burden and uneven accuracy, and generative AI's natural conversational interface can significantly lower the input threshold. Passive sensor data come from wearable devices, mobile phone sensors, and home medical devices; they are continuous, objective, and impose no burden on users, but they can only quantify the physiological level, and device adherence affects data continuity. Medical test data include health checkups, electronic medical records, and genetic testing; they have the highest accuracy and professionalism, but access thresholds are high, regulatory restrictions are numerous, and most are intermittent data. Behavioral context data include app usage behavior and consumption records; they can supplement life context but raise the highest privacy concerns and must avoid excessive inference. Each of the four types has strengths and weaknesses; a mature data strategy should build a data portfolio through multi-source complementarity and clearly record the measurement context and limitations of each data source.

In addition to traditional demographic variables, the health industry can conduct refined user segmentation based on health status (healthy, sub-healthy, and chronically ill), health motivation (appearance, health, performance, emotion, and social orientation), health literacy, and technology acceptance. It can also use app usage trajectory analysis, identification of health behavior changes stages, association rule mining, and natural language sentiment analysis to discover potential consumer needs and product innovation opportunities. For example, behavior change theory points out that users at different stages of change—from "not considering change" to "maintaining change"—need very different intervention strategies: those in the preparation stage need motivation activation and barrier removal, while those in the action stage need habit formation support and setback management. If AI can identify the stage a user is in, it can provide more precise intervention content and greatly improve program effectiveness. Such data-driven market analysis also helps enterprises validate market demand, adjust target customer groups, and set pricing strategies before products are launched, reducing the risk of new product failure.

Park *et al*. (2023) [10] demonstrated the use of big-data text mining and social network analysis to compare keyword changes and market structure shifts in the Korean exercise healthcare industry before and after COVID-19. Compared with traditional questionnaire surveys, this data-driven method can capture market dynamics more immediately and objectively. The iCarbonX model reported by Cyranoski (2017) [1] also illustrates that a personalized health platform integrating multi-omics data and lifestyle data represents the industry direction of data-driven health management. The market analysis capability of AI health services must also be compared with users' real needs. Data can reveal "what users did" but may not explain "why users did it." Therefore, a mature analytical system combines quantitative data with qualitative research (in-depth interviews, focus groups, and user testing) to cross-validate the reasonableness of data interpretation. This analytical approach— "quantitatively driven, qualitatively calibrated"—can leverage the scale advantages of big data while avoiding the trap of numbers departing from human nature; it is an important principle for market analysis in the Holistic health industry. In summary, data collection and analysis are no longer back-office support functions for enterprises but strategic assets that determine product direction, service quality, and competitive position.

Four-Dimensional AI Healing Industry Integration Architecture

Most health products on the existing market address only a single dimension; users need to install multiple apps, data are scattered, and recommendations contradict one another, making it difficult to obtain holistic support. For enterprises, single-point products also easily fall into price competition and are unlikely to build lasting customer relationships. The philosophy of Holistic health requires service providers to view individuals with an integrated perspective. This study integrates the four dimensions of body, mind, spirit, and society and proposes a bottom-up four-layer AI healing industry integration architecture as a reference blueprint for enterprise product development and service design. The core idea of this architecture is "data as the foundation, AI as the engine, services as the interface, and experience as the ultimate goal," emphasizing the integrated use of four-dimensional data and the collaborative delivery of four-dimensional services. The bottom layer is responsible for collecting, storing, and managing data corresponding to the four dimensions: physical data include wearable devices, health checkups, and physiological test data; psychological data include mood records, psychological scales, and dialogue texts; spiritual data include values assessments, meditation practice records, and life narrative data; social data include community participation, interpersonal interaction, and social support records. This layer must fully implement privacy by design and data governance mechanisms to ensure data quality, privacy protection, and regulatory compliance.

The middle layer is the brain of the entire architecture and contains five functional modules: the Holistic health assessment module integrates four-dimensional data and calculates health indicators for each dimension; the multidimensional risk prediction module predicts not only physiological disease risks but also psychological crises and social isolation risks; the personalized recommendation module generates cross-dimensional intervention

suggestions based on user status and goals; the natural interaction module provides a conversational interface as the main interaction channel between users and the system; and the dynamic adjustment module revises plans in real time based on user feedback and data changes. The key to this layer is cross-dimensional cross-analysis. AI must not view the four dimensions separately; it must identify interactions and cycles among dimensions. For example, stress (psychological) affects sleep quality (physical), poor sleep reduces willingness to socialize (social), and insufficient social interaction aggravates low mood (psychological). The system must be able to see such cyclical relationships and propose integrated intervention strategies. In addition, the design of the engine layer must consider the long-term evolution of individual differences: users' health status, goals, and life situations change over time, and the model must have continuous learning and personalized adaptation capabilities rather than fixing subsequent recommendations based solely on initial assessment results. At the same time, model outputs must undergo professional review and risk stratification; high-risk situations (such as suicidal ideation or severe physiological abnormalities) must automatically trigger human intervention and referral processes, ensuring that the AI system has a sound safety net beyond normal operation.

The third layer translates engine capabilities into concrete products and services. Physical services include personalized exercise, nutrition, sleep optimization, and chronic disease risk management. Psychological services include emotional support, stress adjustment, and psychological education (not clinical treatment). Spiritual services include mindfulness meditation guidance, life value exploration, and spiritual growth tools; however, Trothen (2022) [13] reminded us that AI can only serve as an auxiliary, and true spiritual experience requires life experience and real interaction and cannot be fully replaced by technology. Young (2019) [15] also pointed out that AI can support practitioners in spiritual preparation work (such as sermon preparation and care assistance) but cannot replace real-person spiritual companionship and witness. Social services include health partner matching, supportive communities, and family shared health management. Services at this layer can be purely digital or in an online-merge-offline (OMO) form; the key is that services are coherent, data interoperable, and experiences consistent. In design, each service should clearly define risk boundaries: which situations are handled autonomously by AI, which require referral to human professionals, and which require emergency intervention. This risk stratification mechanism is a key prerequisite for the safe operation of integrated services. The top layer is the experience integration layer, responsible for presenting diverse services in a unified and smooth manner: a personal health dashboard visualizes four-dimensional health status and change trends; a unified AI health coach entry point integrates the conversational interfaces of all services so that users do not need to switch among multiple apps; an integrated Holistic health action plan covers four-dimensional goals and arranges execution rhythm according to priority and feasibility; and progress tracking and feedback mechanisms regularly review progress, give encouragement, and adjust direction. The design principles of this layer are simplicity, perceptibility, and meaningfulness, making users feel that they are becoming healthier within a complete support system.

Conclusions

This study systematically explores the Holistic health economy and the AI healing industry. The main findings are as follows. First, Holistic health inherits Engel's (1977, 1980) [2, 3] biopsychosocial model and Stineman and Streim's (2010) [11] biopsycho-ecological paradigm and incorporates the spiritual dimension to form the four-dimensional body–mind–spirit–society model, advocating a shift from passive disease treatment to proactive promotion of Holistic well-being. The maturity of AI technology makes this integrated care model commercially scalable on a large scale for the first time. Second, the global healing industry is growing rapidly; the "wellness revolution" foreseen by Kickbusch and Payne (2003) [4] has accelerated and deepened in the post-pandemic era, with clear trends toward digitalization, prevention, and personalization. The Asia-Pacific region has unique opportunities for combining traditional therapies with AI. Third, generative AI, big data, and machine learning can empower the healing industry in multiple layers, including health assessment, plan design, product R&D, and customer management. However, AI is only a tool and cannot replace human professional judgment and real-life experience; the best model is human–AI collaboration. Fourth, health data are highly sensitive; the digital health ethical challenges warned by Nebeker *et al*. (2019) [7] are even more severe in the AI era, and issues such as algorithmic bias, informed consent dilemmas, and the digital divide require comprehensive governance frameworks. Fifth, the current market is fragmented in services; the four-layer integration architecture proposed in this study can provide a reference for enterprises and policy, representing the industry's development direction from single-point products to integrated ecosystems (Lu, 2026). In terms of theoretical contribution, this study adopts the four-dimensional body–mind–spirit–society Holistic health model constructed by Lu (2022), organizes the connotations and interactions of each dimension, establishes an analytical framework for the AI healing industry covering theory, value chain, business models, and governance issues, and proposes a four-layer integrated industry architecture as a reference blueprint for subsequent research. In terms of practical contribution, the industry trend, business model, and strategic positioning analysis in this study can provide strategic planning references for health enterprises; the analysis of key value chain links and competitive advantages can help investors judge the potential and risks of targets; and the review of ethical and governance issues can provide policy makers with a reference for regulatory adjustment.

For enterprises, it is recommended to establish Holistic health thinking, avoid fragmented operations, and plan long-term integration paths; value data assets while prioritizing the bottom line of privacy ethics, because trust once lost is difficult to regain; balance technology and humanity, using AI to augment human capacity rather than blindly replace it, letting AI handle standardized tasks while humans focus on interactions requiring judgment and warmth; and emphasize clinical validation, building scientific trust on an evidence base (OpenAI, 2026). Yoo *et al*.'s (2023) [14] reminder about digital therapeutics applies equally to broader health products and services. For policy authorities, it is recommended to establish a tiered and classified digital health regulatory mechanism that balances innovation and consumer protection according to risk level—adopting

lighter regulation for low-risk health promotion products and requiring clinical validation and continuous monitoring for high-risk products involving medical decisions; improve the health data governance system, implement privacy-enhancing technologies, release data value under the premise of protecting personal data, and promote interoperability standards for health data to avoid data silos hindering integrated services; pay attention to the digital divide, retain non-digital service channels, and prevent AI health services from widening health inequality; and support cross-disciplinary talent cultivation in medicine, psychology, and information technology to strengthen the development foundation of the Holistic health industry.

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