

Analysis of Healthy Aging Literacy Levels Among Middle-Aged Populations and Their Association with Health Behavior Choices

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Abstract: With the accelerating trend of global population aging, it is crucial to proactively build health reserves early in the life course. Healthy aging literacy, defined as the essential set of knowledge, skills, and abilities that individuals possess to promote health in old age, constitutes a core cognitive resource for shifting from passive disease response to proactive health management. This study focuses on middle-aged populations, systematically elaborating on the theoretical connotation, multidimensional structure, and the pathways through which healthy aging literacy influences health behaviors. The analysis reveals that this literacy is a dynamic system encompassing cognitive, functional, and decisional dimensions. The middle-aged population overall exhibits a "knowledge-practice gap," and its level is jointly influenced by socioeconomic status, individual psychological factors, and social support networks. Regarding the mechanism of action, healthy aging literacy promotes the adoption and maintenance of health behaviors by enhancing psychological pathways such as self-efficacy and optimizing outcome expectations. Furthermore, this process is moderated by contextual factors, demonstrating characteristics of dynamic interaction and co-construction. This study provides an integrative framework for understanding the psychological and behavioral mechanisms of healthy aging in midlife and offers insights for developing targeted intervention strategies.

Keywords: middle-aged populations; healthy aging literacy; health behaviors; association mechanism; influencing factors

Introduction

Against the backdrop of global population aging, healthy aging has become a critical societal goal. The achievement of this goal depends not only on conditions in old age but also on proactive preparation and capacity building during early life stages, particularly in midlife. The middle-aged period, serving as a crucial transitional phase connecting youth and old age, is characterized by multiple physiological and social role changes for individuals. The health perceptions and behavioral patterns formed during this period profoundly shape the health trajectories of later life. Within this context, the core value of healthy aging literacy—defined as an individual's comprehensive ability to proactively acquire, comprehend, evaluate, and apply relevant knowledge and resources to optimize future health in old age—is becoming increasingly prominent. However, there remains a lack of integrated and in-depth exploration regarding the systematic theoretical explanation of healthy aging literacy for middle-aged populations, the assessment of its current status, and the specific mechanisms through which it influences health behaviors. Therefore, this study aims to systematically analyze the theoretical connotation and multidimensional structure of healthy aging literacy, delineate the current status and influencing factors of this literacy among middle-aged populations, and reveal the theoretical pathways and dynamic mechanisms through which it influences health behavior choices. This holds significant theoretical value and practical importance for deepening the theoretical construction of healthy aging and identifying effective targets for health promotion interventions.

1. Theoretical Connotation and Multidimensional Composition of Healthy Aging Literacy

1.1 Definition of the Core Concept of Healthy Aging Literacy

Healthy aging literacy refers to the collection of knowledge, skills, and abilities that individuals

need to possess throughout their life course to promote the maintenance of good health as they enter old age. This concept not only focuses on the acquisition and understanding of health information but also emphasizes individuals' proactive ability to evaluate, judge, and apply relevant knowledge and resources to address physiological, psychological, and social changes associated with aging. Its core lies in enhancing self-management capabilities to achieve early identification of health risks, adaptive adjustments, and optimization of quality of life. In academic discourse, healthy aging literacy is regarded as a key mediating variable that connects health knowledge reserves with specific health practices. It moves beyond the narrow focus on information acquisition in traditional health literacy, extending its emphasis to lifelong health preparation and continuous development processes^[1].

1.2 Analysis of the Multidimensional Structure of Healthy Aging Literacy

Healthy aging literacy is not a unidimensional ability but a composite structure composed of multiple interrelated dimensions. The main dimensions include the cognitive dimension, the functional dimension, and the decision-making dimension. The cognitive dimension encompasses an individual's level of knowledge and understanding regarding the aging process, common chronic diseases, preventive health behaviors, and related service systems. The functional dimension focuses on an individual's operational ability to apply health information, utilize medical resources, and perform self-care skills in real-life situations. The decision-making dimension involves an individual's comprehensive literacy in engaging in critical thinking, risk assessment, and adaptive planning when faced with health-related choices. These dimensions interact to form a dynamic literacy system, enabling individuals to respond effectively within complex health environments. Analyzing this multidimensional structure helps deepen the understanding of the intrinsic mechanisms of healthy aging literacy and provides a theoretical foundation for subsequent measurement and intervention efforts.

1.3 Theoretical Foundations and Evolution of Healthy Aging Literacy

The theoretical construction of healthy aging literacy is rooted in multiple disciplinary fields. Its early conceptual origins can be traced back to the Health Belief Model and Social Cognitive Theory, which emphasize the influence of an individual's perception of health threats, self-efficacy, and outcome expectations on health actions. As research deepened, the Life Course Theory provided an important framework for healthy aging literacy, positing that health trajectories are shaped by early life experiences, cumulative risks and resources, and critical transition points. Building on this, modern health literacy models further conceptualize literacy as a product of the interaction between individual capabilities and the social environment, highlighting the moderating role of health system accessibility and complexity on an individual's literacy. The theoretical evolution demonstrates a shift from an individual-centered perspective to an ecological-integrative view. Healthy aging literacy is increasingly regarded as a dynamic, context-dependent construct, whose development is driven by both individual intrinsic factors and constrained by external social support networks and cultural backgrounds.

1.4 The Positioning and Significance of Healthy Aging Literacy in the Life Course

From a life course perspective, healthy aging literacy plays a pivotal role in bridging the past and the future. It is not solely targeted at the old-age stage but begins to accumulate and develop in midlife or even earlier. Midlife, as a key transitional phase within the life course, is often a period when individuals face composite challenges such as physiological functional changes, family role adjustments, and shifts in social participation. Enhancing healthy aging literacy during this time holds particular strategic significance. It provides individuals with the cognitive reserves and behavioral frameworks necessary to cope with future health risks, facilitating a paradigm shift from disease response to proactive health management. Cultivating healthy aging literacy contributes to the formation of continuous and positive health trajectories for individuals throughout their entire lifespan, offering a micro-level foundation for the societal goal of healthy aging. Its significance lies in empowering individuals, thereby strengthening their control over their own health processes. This, on a macro level, helps reduce the societal burden associated with age-related diseases and increases the overall population's healthy life expectancy.

2. Current Status, Characteristics, and Influencing Factors of Healthy Aging Literacy Among Middle-Aged Populations

2.1 Assessment of the Overall Level of Healthy Aging Literacy in Middle-Aged Populations

The overall assessment of healthy aging literacy among middle-aged populations is typically conducted through quantitative measurement using comprehensive scales that integrate knowledge, skill, and application dimensions. These scales specifically cover the understanding of core concepts of healthy aging, the critical evaluation of related information, the formulation of prevention and management decisions, and the capacity to implement long-term self-health management strategies. Both existing cross-sectional and cohort study data indicate a significant "knowledge-practice gap" in the literacy level of this group. This means that the mastery of basic health knowledge is generally higher than the ability to translate such knowledge into long-term planning and adaptive behaviors.

While most individuals can identify common risk factors for chronic diseases in old age, they exhibit significant deficiencies in comprehensively evaluating the credibility of various health information sources, formulating practical health reserve plans for the next two decades, and dynamically adjusting behavioral strategies based on their own physiological changes. This state of structural imbalance reveals that the healthy aging literacy system among middle-aged populations has not yet been fully developed. The lagging components-precisely the advanced cognitive and strategic capabilities most critical for addressing future uncertain health challenges-constitute potential points of risk exposure.

2.2 Group Differences and Distributional Characteristics of Healthy Aging Literacy

The distribution of healthy aging literacy among middle-aged populations exhibits a systematic and hierarchical pattern of differentiation, profoundly reflecting the inequalities in social resource allocation and individual life opportunities. Socioeconomic status constitutes the primary axis of this differentiation. Educational capital, occupational type, and income level collectively shape a gradient in literacy levels by influencing channels of information access, learning capacity, and the ability to invest in health. Gender differences present a complex picture. Women generally show greater advantages in relationship-oriented health care knowledge, adherence to preventive screenings, and the construction of emotional support networks. Men, conversely, may focus more on instrumental-rational navigation of health systems, participation in major medical decisions, and health planning aimed at maintaining productivity. This disparity partly stems from the internalization of socially constructed gender role expectations. Geographic disparities are manifested not only in the gap of information resource accessibility under the urban-rural dual structure but also extend to the collective understanding of "successful aging" shaped by different community cultures. These factors guide individuals to form varied priorities for health preparation and distinct pathways for literacy development, ultimately solidifying into literacy gaps across different population groups^[2].

2.3 Individual and Psychological Factors Influencing Healthy Aging Literacy

Individual cognitive architecture and psychological traits serve as the intrinsic processing centers for the formation and evolution of healthy aging literacy. Foundational cognitive abilities-particularly working memory capacity, information processing speed, and executive functions (including inhibitory control and cognitive flexibility)-constitute the physiological constraint platform for handling complex aging-related health information and engaging in multi-threaded future planning. Upon this platform, an individual's metacognitive strategies-that is, the monitoring and regulation of one's own cognitive processes-become particularly crucial. These strategies determine whether one can effectively identify gaps in knowledge and proactively seek to fill them.

At the psychological level, core self-evaluation and the sense of health control serve as two fundamental pillars. Core self-evaluation influences an individual's basic confidence and resilience when facing aging-related challenges; the sense of health control distinguishes between an internal locus of control (believing that health depends on one's own actions) and an external locus of control (viewing health as determined by fate or others). The former significantly drives proactive behaviors to acquire literacy. Additionally, the envisioning of "possible selves"-that is, an individual's positive or negative imagination of their future older self-serves as a prospective psychological construct that can either stimulate or inhibit the motivation to engage in cognitive and behavioral preparation for healthy aging.

2.4 The Influence of Social Environment and Support Systems on Healthy Aging Literacy

The development of healthy aging literacy is rooted within specific social-ecological contexts. The family environment constitutes the most immediate unit of influence, where the health beliefs of a spouse or children, patterns of health communication among family members, and intergenerational support can either effectively facilitate or constrain the health learning and behavioral attempts of middle-aged individuals. The community environment, serving as a meso-level carrier, provides important practical arenas and social references for enhancing literacy through its health education programs, health promotion activities, and peer social networks. The broader socio-cultural background establishes deep-seated norms and values. Societal definitions of "successful aging" or "active aging," expectations of the elder role, and the prevailing health culture subtly guide the level of importance middle-aged individuals place on healthy aging and the direction of their preparations. The media information environment, particularly the quality and comprehensibility of digital health information, has become an undeniable external force influencing public health literacy in modern society. Information overload and variable quality place higher demands on an individual's ability to discern information.

3. The Association Mechanism Between Healthy Aging Literacy and Health Behavior Choices

3.1 Theoretical Framework of How Healthy Aging Literacy Influences Behavior Choice

The influence mechanism of healthy aging literacy on health behavior choices can be explained through an integrated theoretical framework that combines health behavior theories with literacy competency models. Classic theories such as the Planned Behavior Theory and the Health Belief Model emphasize the central role of behavioral intention, while health literacy models highlight the critical function of information processing and decision-making abilities in translating intention into action. An integrative theoretical framework proposes that healthy aging literacy, as a higher-order capability, initially shapes positive behavioral intentions by enhancing an individual's perception of the susceptibility to and severity of health threats (such as age-related functional decline), as well as their evaluation of the long-term benefits of adopting preventive behaviors^[3].

Building upon this, the framework further indicates that healthy aging literacy directly influences the translation of intention into actual behavior by enhancing an individual's sense of self-efficacy and perceived behavioral control. Specifically, a higher level of literacy enables individuals to more effectively search for, understand, and apply complex health information to formulate concrete action plans, as well as to identify and overcome resource-related and situational obstacles during behavioral execution. Consequently, it provides continuous capability support throughout the complete chain from behavioral intention to behavioral implementation and, finally, to behavioral maintenance. This framework positions literacy as a fundamental enabling factor that permeates all stages of behavior change.

3.2 The Mediating Role of Cognitive and Psychological Pathways Between Literacy and Behavior

The influence of healthy aging literacy on health behaviors does not occur directly but is mediated through a series of internal cognitive and psychological pathways. The cognitive pathway is primarily manifested at the level of information processing and knowledge integration. A higher level of healthy aging literacy enables individuals to engage in deep processing and critical evaluation of various health information, forming a more structured and precise personal health knowledge system. This optimized cognitive structure helps individuals more quickly and accurately retrieve relevant knowledge for risk assessment and benefit judgment when facing behavioral choices, thereby making decisions more conducive to long-term health, such as scientific choices regarding nutritional intake and exercise modalities.

The core mediating variables within the psychological pathway include self-efficacy and outcome expectations. The enhancement of healthy aging literacy directly strengthens an individual's belief in their own ability to execute and persist in complex health management tasks, that is, their self-efficacy. This belief serves as a key psychological driver for initiating and maintaining health behaviors. Simultaneously, literacy promotes a more realistic and long-term prospective understanding of the behavior-outcome association. This enables individuals to look beyond immediate costs or short-term discomfort, clearly foreseeing the positive impact that adhering to health behaviors (such as regular

screenings and cognitive training) will have on their future quality of life and independence, thereby forming positive outcome expectations. The combined effect of these two psychological mechanisms constitutes a crucial psychological bridge through which literacy influences behavioral intention and adherence.

3.3 The Role of Healthy Aging Literacy in Promoting Behavior Maintenance and Change

The value of healthy aging literacy for health behaviors is manifested not only in the initial adoption stage but also, more profoundly, in the processes of long-term maintenance and adaptive change of behaviors. Regarding behavior maintenance, individuals with high literacy possess stronger capabilities for self-monitoring and self-regulation. They are able to set reasonable phased goals and make dynamic fine-tuning to their behavioral plans based on personal feedback (such as medical examination indicators and functional status) and environmental changes. This cognitive-based self-regulatory ability helps individuals overcome the sense of fatigue brought about by habituation and effectively cope with challenges and relapse risks during the behavior maintenance process, thereby promoting the institutionalization and integration of health behaviors into daily life.

When facing turning points in health status or drastic changes in the external environment, healthy aging literacy plays a crucial role in driving adaptive behavioral changes. For instance, upon being diagnosed with a chronic disease or entering a new life stage (such as retirement), individuals need to quickly acquire new disease management knowledge or adjust their lifestyles. A high level of healthy aging literacy equips them with stronger abilities to seek information, learn new skills, and integrate resources, thereby enabling them to more proactively and effectively reconstruct their health behavior patterns and achieve a successful transition from one steady state of health behavior to another. This capacity to promote behavioral flexibility and adaptability represents the core manifestation of how healthy aging literacy ensures individuals can engage in effective health management continuously throughout the entire aging process.

3.4 Contextual Moderation and Dynamic Mechanisms of the Literacy-Behavior Association

The association between healthy aging literacy and health behavior choices is not fixed but is moderated by multi-level contextual factors, demonstrating characteristics of dynamic evolution. Micro-level contexts, such as the degree of family support, workplace stress, and immediately accessible health resources, can significantly moderate the efficiency with which literacy translates into behavior. Even if an individual possesses a high level of literacy, their ability to convert that literacy into concrete action may be inhibited if they are in a micro-context characterized by high pressure, low support, or scarce resources^[4]. Conversely, a supportive micro-environment can amplify the positive effects of literacy.

From a broader perspective of dynamic mechanisms, the relationship between literacy and behavior exhibits bidirectional and diachronic characteristics. On the one hand, healthy aging literacy guides and shapes health behavior choices; on the other hand, sustained health behavior practices and the positive outcomes they bring (such as improved health status and enhanced self-confidence) can, in turn, reinforce an individual's health beliefs and motivate further learning and literacy enhancement, forming a virtuous cycle of "literacy improvement-behavioral practice-positive feedback-further literacy improvement." This dynamic mechanism of mutual construction indicates that healthy aging literacy and health behaviors during middle age form a symbiotic system that mutually shapes and co-evolves. The strength and pattern of their association continuously adjust according to the individual's life course stage, social role transitions, and accumulated experiences.

Conclusion

Through a systematic analysis of the theoretical connotation of healthy aging literacy, its current characteristics among middle-aged populations, and its association mechanism with health behaviors, this study reveals that healthy aging literacy is a dynamic competency system rooted in the life course perspective and integrating cognitive, functional, and decisional dimensions. The level of healthy aging literacy among middle-aged populations exhibits a structural imbalance between foundational knowledge and advanced application abilities. Furthermore, its distribution is complexly influenced by structural factors such as socioeconomic status, gender roles, and regional culture, as well as multi-level factors including individual cognitive functions, psychological traits, and family and

community support networks. More critically, healthy aging literacy does not exist in isolation; it influences health behavior choices through an integrative theoretical framework, wherein the optimization of cognitive appraisal and psychological pathways such as self-efficacy and positive outcome expectations play a central mediating role. This influence permeates the entire process of health behavior initiation, maintenance, and adaptive change, and a dynamically interactive relationship, moderated by context, exists between literacy and behavior.

Looking ahead, future research should further focus on developing culturally adapted measurement tools suitable for China's middle-aged populations to accurately assess the shortcomings in literacy. Building on this, it is essential to design and validate theoretically based, multi-level, and personalized intervention programs. For instance, enhancing critical information evaluation skills through digital health education or strengthening self-efficacy and planning skills through group support could effectively bridge the "knowledge-practice gap." Such efforts would empower middle-aged individuals to establish a solid cognitive and behavioral foundation for achieving healthy aging.

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