

THE OTHER CLOCK: PSYCHOLOGICAL HEALTHSPAN IN THE AGE OF LONGEVITY: AN INTEGRATIVE REVIEW AND CONCEPTUAL FRAMEWORK

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ABSTRACT

Contemporary longevity science has increasingly shifted from the extension of lifespan toward the extension of healthspan, broadly understood as the period of life characterized by relatively preserved health and functional capacity. However, despite substantial advances in geroscience, preventive medicine, and biological models of aging, the temporal dimension of psychological functioning remains insufficiently conceptualized. A longer lifespan or biological healthspan does not necessarily imply a longer period of emotional vitality, adaptive capacity, meaningful engagement, social connection, or psychological sustainability. Individuals may remain biologically functional while experiencing prolonged psychological depletion, loneliness, burnout, loss of purpose, or diminished agency. This integrative review and conceptual synthesis introduces the construct of psychological healthspan, defined as the duration across the life course during which an individual retains sufficient psychological capacity for adaptive functioning, emotional regulation, cognitive flexibility, meaningful social engagement, purposeful living, and agency, while maintaining the capacity to recover and reorganize following adversity and change. Literature from gerontology, psychology, psychiatry, resilience science, autonomic physiology, public health, and longevity research was conceptually synthesized to identify the theoretical foundations and boundaries of the construct. Six proposed domains of psychological healthspan are identified: emotional regulatory capacity; adaptive resilience and recoverability; cognitive and psychological flexibility; relational connectedness and social engagement; meaningful and purposeful engagement; and agency and self-directed functioning. The article introduces three related conceptual models: the Two-Clock Model, which conceptualizes biological and psychological aging as interacting but potentially divergent trajectories; the Psychological Healthspan Trajectory, which emphasizes recovery and cumulative depletion across the life course; and the Psychological Healthspan Gap, referring to the conceptual discrepancy between years of biological survival and years of psychologically sustainable engagement with life. We further propose that the two clocks are coupled through the autonomic nervous system: the chronically sympathetic state described here as the Red Mind and the parasympathetically anchored, restorative state described as the Blue Mind offer a measurable physiological interface, indexed by heart rate variability, through which psychological healthspan may be monitored and modified. Psychological health span is distinguished from psychological well-being, resilience, flourishing, successful aging, and mental health by its explicit temporal and longitudinal orientation. The paper argues that longevity science must move beyond asking how long the human body can remain alive and healthy toward understanding how long the human being can remain psychologically capable of living. Psychological healthspan is proposed as a framework for future measurement development, longitudinal research, preventive mental healthcare, longevity medicine, and public policy.

Keywords: Psychological Healthspan, Healthspan, Longevity, Healthy Aging, Psychological Aging, Resilience, Autonomic Nervous System, Heart Rate Variability, Blue Mind, Life Course, Human Sustainability

Introduction

Human longevity has increased dramatically over the past century. Advances in public health, sanitation, nutrition, vaccination, medicine, and chronic disease management have transformed both the duration and experience of human life. At the same time, contemporary aging science has increasingly moved beyond the traditional objective of extending lifespan toward the more ambitious goal of extending healthspan.

The distinction is fundamental. Lifespan concerns how long a person lives. Healthspan concerns how long a person remains relatively healthy and functionally capable while living. The concept of healthspan has become central to geroscience, healthy-aging research, preventive medicine, and longevity science. Yet recent scholarship demonstrates that the term itself remains conceptually heterogeneous. A 2025 systematic review identified 187 unique definitions of healthspan across the literature, illustrating substantial variation in how the construct is understood and operationalized (Masfiah et al., 2025). Most definitions emphasize freedom from major disease, disability, or functional limitation, although some incorporate broader dimensions of functioning.

This conceptual ambiguity presents both a challenge and an opportunity. If healthspan is increasingly understood as more than simple survival, an important question emerges: what constitutes a psychologically healthy duration of life? Contemporary longevity science has developed increasingly sophisticated models of biological aging. Research examines cellular senescence, inflammation, mitochondrial dysfunction, metabolic regulation, physiological resilience, frailty, and other processes associated with age-related decline. Recent work has also emphasized resilience, recovery trajectories, and physiological flexibility as important determinants of heterogeneity in aging rather than conceptualizing aging exclusively as a linear accumulation of biological damage (Resilience-based longevity medicine, 2026). One of the most consistent of these signatures is autonomic: heart rate variability (HRV), the beat-to-beat variation in cardiac rhythm that reflects vagal regulation, declines predictably across nine decades of life (Umetani et al., 1998) and predicts all-cause mortality (Jarczok et al., 2022). The body carries a measurable regulatory clock of its own.

However, biological aging is not the only form of human aging. Human beings also change psychologically. They may become more or less emotionally regulated, more or less adaptable, more or less socially connected, more or less resilient, more or less purposeful, and more or less psychologically engaged with life. These trajectories do not necessarily correspond directly with chronological age. Nor do they necessarily correspond perfectly with biological health. An individual may remain physically active and medically stable while experiencing profound loneliness, emotional exhaustion, burnout, loss of identity, diminished purpose, or psychological disengagement. Conversely, an individual living with chronic illness or advanced age may retain extraordinary psychological resilience, meaning, relational depth, curiosity, and engagement. Clinical oncology illustrates this daily: two patients with the same tumour stage and the same operation may follow strikingly different psychological trajectories through survivorship, one remaining purposeful and engaged, the other withdrawing into chronic depletion long before any biological endpoint. This divergence suggests the existence of what may be described as the other clock of human longevity. The first clock concerns the aging of the body. The second concerns the aging of the psychological capacity to live.

The purpose of this paper is to introduce and theoretically develop the construct of psychological healthspan. The central proposition is that psychological capacities may possess trajectories across the life course that are related to, but not reducible to, biological aging. Accordingly, the scientific pursuit of longer and healthier lives should include attention to the duration for which individuals remain psychologically capable of adaptive, meaningful, connected, and self-directed living. A secondary proposition, developed later in the paper, is that the two clocks are not merely parallel but physiologically coupled through the autonomic nervous system, and that this coupling provides a practical point of measurement and intervention.

Method

Integrative Review and Conceptual Synthesis

This article was developed as an integrative review and conceptual synthesis. Integrative review methodology is particularly appropriate for emerging and interdisciplinary constructs because it permits the combination of theoretical literature, empirical research, clinical evidence, and conceptual frameworks (Whittemore & Knafl, 2005).

Unlike systematic reviews designed to answer narrowly defined clinical or intervention questions, integrative and conceptual reviews are particularly useful when the purpose is to identify fragmented bodies of knowledge, synthesize concepts across disciplines, clarify theoretical boundaries, identify conceptual gaps, and develop new theoretical frameworks.

The present review addressed the following overarching question: what existing bodies of evidence and theory can inform the conceptualization of psychological healthspan as a distinct temporal dimension of human longevity?

Literature Identification Framework

The literature search framework was designed to identify scholarship across several intersecting domains. The principal databases intended for comprehensive verification before journal submission include PubMed/MEDLINE, PsycINFO, Scopus, and Web of Science.

Search concepts were organized around six conceptual clusters:

- Longevity and aging: longevity; lifespan; healthspan; healthy aging; successful aging; biological aging; aging trajectories.
- Psychological functioning: psychological well-being; mental health; flourishing; emotional regulation; psychological flexibility.
- Adaptation and recovery: resilience; recovery; stress adaptation; adversity; allostatic load.
- Social and existential functioning: loneliness; social connection; belonging; purpose in life; meaning in life; social engagement.
- Agency and life-course functioning: autonomy; agency; self-efficacy; perceived control; life course; longitudinal functioning.
- Autonomic and environmental regulation: heart rate variability; vagal tone; nature exposure; blue space; slow breathing; sleep and circadian rhythm.

Priority was given to peer-reviewed conceptual papers, systematic reviews, meta-analyses, longitudinal studies, and major theoretical contributions. Particular attention was given to literature published between 2019 and 2026 while retaining foundational publications necessary for defining established constructs.

Conceptual Synthesis

The literature was synthesized through iterative thematic comparison. The synthesis asked four questions: What psychological capacities repeatedly emerge as relevant to healthy adaptation across the life course? Which existing constructs describe components of sustainable psychological functioning? What conceptual element remains missing from existing frameworks? Can these elements be integrated into a temporally defined construct analogous to healthspan?

The resulting framework does not claim that psychological healthspan is already an empirically validated construct. Rather, the paper proposes psychological healthspan as a theoretically defined construct requiring subsequent operationalization and psychometric testing.

From Lifespan to Healthspan

The Evolution of the Longevity Question

The earliest demographic understanding of longevity focused primarily on survival. The central question was: how long do people live? As life expectancy increased, this question became insufficient. Longer life does not necessarily mean better life. Individuals may survive for prolonged periods while experiencing chronic disease, disability, dependency, functional limitation, or psychological suffering.

The concept of healthspan therefore introduced an essential qualitative dimension into longevity science. Healthspan is generally understood as the period of life during which individuals maintain relatively preserved health and functioning. Yet contemporary scholarship continues to debate precisely where healthspan begins and ends. Recent conceptual analyses emphasize that healthspan lacks a universally standardized definition and that greater clarity is required for scientific comparability (Masfiah et al., 2025; Rattan, 2026).

This lack of consensus is important for the present argument. It demonstrates that healthspan itself is still evolving as a scientific construct. The concept of psychological healthspan should therefore not be understood as a finished measurement category. It is proposed as a theoretical extension of an already evolving longevity framework.

The Missing Dimension of Longevity

Health is multidimensional. The World Health Organization's broad conception of health has historically included physical, mental, and social dimensions. Nevertheless, contemporary operational models of longevity frequently privilege measurable biological outcomes, including mortality, chronic disease, frailty, physical performance, metabolic health, cardiovascular function, and biomarkers of biological aging.

Psychological functioning is increasingly recognized as relevant to health, but it is often treated as an outcome, a risk factor, a consequence of illness, or a secondary component of quality of life.

Less attention has been directed toward the temporal duration of psychologically sustainable functioning itself. The central question of this paper is therefore: can psychological functioning possess a healthspan? This question differs from asking whether psychological well-being is important. The evidence that psychological well-being, social relationships, and psychological resources are associated with health is already substantial (Holt-Lunstad, 2018; Steptoe et al., 2015). The more specific proposition is that psychological capacities may demonstrate longitudinal trajectories that can be maintained, eroded, restored, or extended across the life course. The duration of those capacities may therefore represent a meaningful dimension of human longevity.

Defining Psychological Healthspan

Proposed Definition

For the purposes of this paper, psychological healthspan is defined as: the duration across the life course during which an individual retains sufficient psychological capacity for adaptive functioning, emotional regulation, cognitive flexibility, meaningful social engagement, purposeful living, and agency, while maintaining the capacity to recover and reorganize following adversity and change.

This definition contains three essential properties.

1. **Temporality.** Psychological healthspan is explicitly concerned with duration. It does not ask simply how psychologically well an individual is at this moment. It asks how psychologically sustainable functioning unfolds across time. This temporal dimension distinguishes psychological healthspan from many established psychological constructs. Psychological well-being may be measured at a point in time. Resilience may be assessed in relation to adversity. Flourishing may describe a state of positive functioning. Psychological healthspan concerns the trajectory and duration across which these capacities remain sufficiently available to support sustainable living.
2. **Multidimensionality.** Psychological healthspan cannot be reduced to one psychological variable. It is not synonymous with happiness, absence of depression, resilience, life satisfaction, cognitive health, or meaning. Human psychological sustainability depends upon interacting capacities. An individual may be highly resilient but profoundly lonely. Another may experience meaning but lack emotional regulation. Another may possess cognitive ability but experience severe loss of agency. Psychological healthspan therefore requires a multidimensional framework.
3. **Dynamic recoverability.** Perhaps the most important distinction is that psychological healthspan does not imply uninterrupted wellness. Human life inevitably includes loss, grief, illness, trauma, failure, transition, uncertainty, and adversity. A psychologically sustainable life is not a life without disruption. It is a life in which disruption does not necessarily result in permanent psychological

disengagement. The concept therefore emphasizes recoverability. Recovery may involve restoration, adaptation, reorganization, meaning reconstruction, or the development of new forms of functioning. Recent resilience-based approaches to longevity similarly emphasize recovery trajectories and adaptive capacity rather than simple resistance to disturbance (Resilience-based longevity medicine, 2026). Recoverability also has a physiological correlate: the speed with which the autonomic nervous system returns to baseline after a stressor is itself an index of regulatory health (Thayer & Lane, 2000).

Psychological Healthspan and Related Constructs

Psychological healthspan draws upon established constructs but is not equivalent to them.

Mental health concerns psychological functioning and the presence or absence of psychological disorder. Psychological healthspan is not defined by the absence of psychiatric diagnosis. A person may not meet criteria for mental illness while experiencing psychological depletion. Conversely, a person with a psychiatric history may experience long periods of meaningful, adaptive, and connected functioning.

Psychological well-being concerns positive psychological functioning and has been extensively theorized through dimensions such as autonomy, environmental mastery, personal growth, positive relationships, purpose, and self-acceptance (Ryff, 1989, 2014). Psychological healthspan incorporates positive functioning but introduces an explicit temporal question: for how long can psychologically sustainable functioning be maintained or restored?

Resilience concerns adaptation in the context of adversity. It is central to psychological healthspan but represents only one dimension. Psychological healthspan includes resilience while also incorporating relational, existential, emotional, cognitive, and agentic capacities. Flourishing generally refers to high levels of positive human functioning. Psychological healthspan does not require continuous flourishing. It concerns the sustained availability of capacities necessary for engagement and adaptation even during periods when flourishing is temporarily reduced.

Successful aging traditionally concerns positive aging outcomes, often incorporating preserved function, engagement, and reduced disease burden. Psychological healthspan differs in two important ways. First, it applies across the entire life course rather than only later adulthood. Second, its central focus is temporal: how long can psychologically sustainable functioning be preserved?

Table 1. Psychological Healthspan in Relation to Existing Constructs

Construct	Central question	Primary focus	Explicit temporal duration
Mental health	Is psychological functioning impaired or healthy?	Symptoms and functioning	No
Psychological being	How well is the individual functioning psychologically?	Positive functioning	Usually not central
Resilience	How does the individual respond to adversity?	Adaptation and recovery	Dynamic but not primarily duration-based
Flourishing	Is the individual functioning optimally?	Positive human functioning	No
Successful aging	Is the individual aging well?	Aging outcomes	Partially
Healthspan	How long does relatively preserved health last?	Health and functional capacity	Yes
Psychological healthspan	How long can psychologically sustainable functioning be maintained or restored?	Psychological capacity across the life course	Yes — central defining property

The Six Domains of Psychological Healthspan

The present conceptual synthesis proposes six interrelated domains. These domains are theoretical and require empirical validation.

Domain 1: Emotional Regulatory Capacity

Emotional regulatory capacity refers to the ability to experience, understand, and manage emotional states sufficiently to support adaptive functioning. Psychological healthspan does not imply emotional neutrality. A psychologically healthy life includes sadness, anger, fear, grief, and disappointment. The relevant issue is whether emotional experience remains psychologically manageable. Persistent emotional dysregulation may erode relationships, decision-making, stress recovery, and quality of life. Emotional regulatory capacity is therefore proposed as a foundational dimension of psychological sustainability. It is also the domain most directly anchored in the body, since the prefrontal–vagal circuitry that regulates emotion also regulates the heart (Thayer et al., 2012).

Domain 2: Adaptive Resilience and Recoverability

Resilience concerns the capacity to adapt following adversity. However, psychological healthspan requires particular attention to what happens after disruption. Can the individual recover functioning, reorganize identity, adapt expectations, reconstruct meaning, and return to engagement? The concept of recoverability is especially important. A person may experience substantial temporary psychological decline without necessarily experiencing permanent shortening of psychological healthspan if recovery capacity remains intact.

Domain 3: Cognitive and Psychological Flexibility

Cognitive functioning is often assessed through memory, executive functioning, and processing speed. Psychological healthspan requires an additional consideration: flexibility. Cognitive and psychological flexibility involve the ability to learn, revise assumptions, shift perspective, tolerate ambiguity, and adapt to changing circumstances. This dimension is increasingly important in societies characterized by rapid technological, occupational, social, and environmental change. Psychological aging may therefore involve not only cognitive decline but increasing rigidity and reduced adaptive flexibility.

Domain 4: Relational Connectedness and Social Engagement

Humans are fundamentally social. Relationships influence emotional regulation, identity, stress response, belonging, health behavior, and adaptation. The importance of social relationships for health is well established (Holt-Lunstad, 2018). Recent integrative and systematic reviews continue to demonstrate that social isolation and loneliness are associated with adverse physical, psychological, and functional outcomes in later life (Zhang et al., 2026). Relational connectedness within psychological healthspan includes meaningful relationships, belonging, reciprocity, social participation, and perceived support. The objective is not the largest possible social network. It is sufficient access to meaningful human connection.

Domain 5: Meaningful and Purposeful Engagement

Human longevity is not experienced merely through survival. It is experienced through reasons for continued engagement. Purpose in life has been associated with positive adaptation, health, cognition, emotional regulation, and well-being across adulthood and later life. An integrative review of purpose in adulthood and older adulthood found consistent associations between purpose and multiple positive outcomes, including health, cognition, emotional regulation, subjective well-being, and adaptive functioning (Ribeiro et al., 2020). Meaning and purpose may change across the life course. They may arise through relationships, work, creativity, spirituality, caregiving, contribution, learning, or legacy. Psychological healthspan therefore does not require one permanent purpose. It requires the capacity for meaningful engagement and purpose reconstruction.

Domain 6: Agency and Self-Directed Functioning

Agency concerns the experience of meaningful influence over one's life. Self-directed functioning may include decision-making, perceived competence, autonomy, participation, goal direction, and perceived control. Psychological autonomy should not be confused with complete independence. Human beings are inherently interdependent. The critical issue is whether individuals remain active participants in their lives rather than experiencing chronic helplessness or complete psychological passivity. Loss of agency may result from illness, dependency, institutionalization, poverty, oppressive environments, discrimination, or psychological helplessness. Psychological healthspan must therefore be understood not only as an individual characteristic but as a capacity influenced by social conditions.

Psychological Healthspan Across the Life Course

A central feature of this framework is that psychological healthspan does not begin at age 60 or 65. Psychological aging can begin much earlier. A young adult may experience chronic burnout, trauma, emotional exhaustion, social isolation, and loss of agency. An older adult may simultaneously experience resilience, curiosity, purpose, strong relationships, and psychological engagement.

Chronological age is therefore insufficient for understanding psychological age. Recent work on subjective aging further supports the importance of how individuals interpret and experience their own aging. Subjective aging may influence psychological well-being through perceptual, behavioral, and sociocultural pathways rather than functioning merely as a reflection of chronological age (Song et al., 2026). Psychological healthspan should therefore be conceptualized as a life-course trajectory. It may expand, contract, stabilize, decline, or recover. The possibility of recovery is essential. Unlike chronological age, psychological capacity is potentially modifiable.

Psychological Aging Accelerators

The concept of psychological aging accelerators is proposed as a heuristic framework. It refers to conditions that may contribute to earlier erosion of psychologically sustainable functioning. Potential accelerators include chronic stress; trauma; prolonged loneliness; social isolation; burnout; chronic sleep disruption; economic insecurity; caregiving burden; discrimination; chronic illness; substance misuse; environmental instability; identity disruption; and prolonged helplessness. To these psychosocial accelerators we add three that operate through the body's regulatory systems: sustained sympathetic dominance without adequate recovery (the Red Mind state described below); deprivation of natural and restorative environments; and disruption of circadian and light rhythms, including uninterrupted digital stimulation across the first and last waking hours of the day.

These experiences may produce cumulative psychological burden. The concept is analogous to, but should not be confused with, biological aging accelerators. The present framework does not claim that psychological aging currently possesses a single measurable biological clock. Instead, it proposes that sustained psychological exposure and cumulative burden may influence the trajectory of psychological functioning across time.

Psychological Longevity Resources

If some conditions accelerate psychological decline, others may protect or extend psychological sustainability. Potential psychological longevity resources include supportive relationships; emotional regulation skills; psychological flexibility; resilience; physical activity; restorative sleep; cognitive stimulation; meaningful activity; social participation; access to mental healthcare; financial security; opportunities for agency; adaptive coping; and purpose and meaning. Emerging evidence supports a further set of low-cost, largely universal resources that act directly on autonomic regulation: regular contact with natural environments, with approximately 120 minutes per week associated with good health and well-being in a large population sample (White et al., 2019); proximity to and immersion in water, or blue space (White et al., 2020); slow-paced breathing (Laborde et al., 2022); and protection of the transitional hours after waking and before sleep from stimulation and screen light (Chang et al., 2015).

Importantly, these resources should not be interpreted as a simplistic self-optimization checklist. It would be scientifically and ethically problematic to suggest that individuals alone are responsible for maintaining psychological healthspan. Structural conditions matter. Psychological sustainability may depend upon employment conditions, economic security, healthcare access, social protection, community infrastructure, caregiving support, education, and social inclusion. Access to green and blue space is itself unequally distributed and therefore belongs among these structural conditions.

Psychological healthspan is therefore simultaneously individual, relational, clinical, organizational, and societal.

The Psychological Healthspan Trajectory

Psychological healthspan should not be conceptualized as a fixed state. It is better understood as a dynamic trajectory. An individual encounters stressors and transitions throughout life. These may produce temporary disruption. The subsequent trajectory may differ.

Recovery pathway: stress or adversity → temporary disruption → adaptation and recovery → re-engagement → continued psychological sustainability.

Accelerated depletion pathway: repeated stress or adversity → cumulative burden → reduced recovery capacity → psychological depletion → disengagement.

The central proposition is: psychological aging may be influenced not only by exposure to adversity but by the capacity to recover from adversity. This proposition aligns with emerging resilience-based longevity frameworks emphasizing recovery trajectories and adaptive flexibility as central components of healthy aging.

The Psychological Healthspan Gap

One of the central conceptual contributions of this paper is the proposed Psychological Healthspan Gap. The Psychological Healthspan Gap refers to the conceptual discrepancy between years of biological survival or relatively preserved biological health and years of psychologically sustainable engagement with life. This should not currently be interpreted as a validated numerical equation. Rather, it is a conceptual framework.

Consider two individuals with similar chronological ages and comparable physical health. One remains emotionally adaptive, socially connected, purposeful, and psychologically engaged. The other experiences chronic loneliness, emotional exhaustion, loss of meaning, and diminished agency. Their biological healthspan profiles may appear similar. Their psychological trajectories may be profoundly different.

The Psychological Healthspan Gap may become increasingly important as medical science extends survival. The challenge of twenty-first-century longevity may therefore become not only how we add years to life, but how we prevent a widening gap between biological survival and psychologically sustainable living.

The Two-Clock Model

The Two-Clock Model represents the central conceptual framework of this paper.

Clock One: Biological Healthspan. This clock reflects trajectories involving cellular integrity, physiological resilience, metabolic function, disease burden, physical capacity, and frailty.

Clock Two: Psychological Healthspan. This clock reflects trajectories involving emotional regulation, adaptive resilience, cognitive flexibility, relational connectedness, meaning, and agency.

The clocks are interacting but non-identical. They may move together. They may diverge. A person may be biologically and psychologically young; biologically young but psychologically depleted; biologically impaired but psychologically vital; or biologically and psychologically depleted. The Two-Clock Model therefore challenges the assumption that chronological or biological aging can fully explain the human experience of aging.

Figure 1. The Two-Clock Model of Human Longevity

HUMAN LONGEVITY ↓ BIOLOGICAL CLOCK — Biological Healthspan: cellular integrity; physiological resilience; functional capacity; metabolic health; disease burden; frailty trajectory ↑ (autonomic interface: Red Mind ↔ Blue Mind, indexed by heart rate variability) PSYCHOLOGICAL CLOCK — Psychological Healthspan: emotional regulation; adaptive resilience and recoverability; cognitive flexibility; relational connectedness; meaning and purpose; agency ↓ INTERACTING BUT NON-IDENTICAL AGING TRAJECTORIES ↓ THE PSYCHOLOGICAL HEALTHSPAN GAP — potential discrepancy between biological survival and psychologically sustainable engagement with life

The Autonomic Interface: Red Mind, Blue Mind, and the Coupling of the Two Clocks

If the two clocks interact, the framework must specify where they touch. We propose that the most tractable point of contact is the autonomic nervous system. Emotion regulation, stress recovery, social engagement, and cognitive flexibility all depend on a prefrontal–vagal circuit whose output can be read peripherally as HRV (Thayer & Lane, 2000; Thayer et al., 2012), and polyvagal theory places the ventral vagal system at the heart of the human capacity for safety, connection, and calm engagement (Porges, 2007). Low vagally mediated HRV has been proposed as a transdiagnostic marker of impaired self-regulation (Beauchaine & Thayer, 2015), although a recent umbrella review cautions that the credibility of HRV findings varies across disorders (Wang et al., 2025). The same physiology reaches into the biological clock: HRV declines with age (Umetani et al., 1998), predicts mortality (Jarczok et al., 2022), and in oncology higher vagal activity is associated with longer survival across tumour types (Zhou et al., 2016; De Couck et al., 2018). Psychological stress measurably slows tissue repair (Kiecolt-Glaser et al., 1995), and surgical patients whose window looked onto trees recovered faster and needed less analgesia than those facing a brick wall (Ulrich, 1984). Autonomic state, in short, is one place where the two clocks are visibly the same clock.

Two shorthand terms are useful here. Nichols (2014) described the Red Mind as the over-stimulated, chronically stressed state that characterizes much of modern life, and the Blue Mind as the mildly meditative, restorative state that people reliably enter near, in, or on water. In physiological terms, the Red Mind is sustained sympathetic dominance without sufficient recovery, reflected in elevated resting heart rate, suppressed HRV, fragmented sleep, and a default of vigilance; the Blue Mind is a parasympathetically anchored state of alert calm in which HRV rises, respiration slows, and the electroencephalographic alpha rhythm that signals relaxed wakeful attention predominates (Klimesch, 2012; Lomas et al., 2015). These are not new constructs but accessible labels for two poles of a regulatory continuum along which individuals move many times each day. Psychological aging accelerators, on this view, are conditions that hold a person in the Red Mind; psychological longevity resources are conditions that return a person to the Blue Mind.

The value of this framing is that the Blue Mind is inducible, inexpensively and at scale. Natural environments reduce rumination and activity in the subgenual prefrontal cortex (Bratman et al., 2015); a second-order meta-analysis of 116 systematic reviews found that nature-based interventions produce large reductions in anxiety and depression and lower heart rate (Robat et al., 2026), with benefits detectable from exposures as brief as ten minutes (Bettmann et al., 2024). Blue space confers additional benefit through restoration, physical activity, and social contact (Georgiou et al., 2021), and immersion itself engages the mammalian diving response, a vagally mediated bradycardia triggered by facial contact with water (Panneton, 2013). Slow breathing at roughly six breaths per minute reliably raises HRV (Laborde et al., 2022; Zaccaro et al., 2018), and brief structured breathing practices improve mood and reduce arousal in randomized comparison with mindfulness meditation (Balban et al., 2023; Fincham et al., 2023). Walking through green space shifts mobile EEG toward lower arousal (Aspinall et al., 2015). Direct skin contact with the earth, or grounding, has been reported to improve sleep, cortisol rhythm, and autonomic tone in small studies, though this literature remains preliminary (Chevalier et al., 2012).

Finally, the framework draws attention to two windows of the day. The first hour after waking coincides with the cortisol awakening response and the transition from sleep-state brain rhythms toward full alertness (Stalder et al., 2016); the last hour before sleep governs melatonin onset and circadian timing, both delayed by evening screen light (Chang et al., 2015). Both are periods in which the brain's default mode network, the substrate of self-referential thought and mind-wandering, is unusually dominant, and mind-wandering is itself associated with lower momentary happiness (Killingsworth & Gilbert, 2010). How these two hours are spent, in stimulation or in restoration, may therefore exert a disproportionate influence on the daily balance between the Red and Blue Mind, and by extension on the trajectory of psychological healthspan. This is offered as a hypothesis for testing rather than an established finding.

Measurement Challenges

Psychological healthspan cannot be responsibly introduced without addressing measurement. Existing instruments assess components of the proposed construct, including depression, anxiety, psychological well-being, resilience, loneliness, purpose, life satisfaction, autonomy, and cognitive functioning. However, no single established instrument currently captures the proposed temporal and multidimensional construct in its entirety. Future measurement development must address several challenges.

First, absence of illness is not enough. Psychological healthspan cannot simply be measured as the absence of psychiatric disorder.

Second, positive affect is not enough. Momentary happiness does not necessarily indicate sustainable psychological functioning.

Third, longitudinal measurement is essential. Because the construct concerns duration, repeated measurement across time will be necessary.

Fourth, recovery must be considered. Temporary decline should not automatically be interpreted as permanent loss of psychological healthspan.

Fifth, context must be included. Psychological sustainability is influenced by social and structural conditions.

Sixth, self-report alone is not enough. Because the construct is proposed to be coupled to autonomic regulation, future measurement should pair questionnaires with low-burden physiological anchors such as resting heart rate, HRV, and sleep regularity, which consumer wearables now capture with acceptable validity (Miller et al., 2022).

These challenges establish the need for future theoretical operationalization and empirical measurement development.

Implications for Clinical Psychology and Psychiatry

Psychological healthcare has traditionally focused heavily on episodes of illness. A patient develops symptoms. The patient receives treatment. Symptoms improve. The clinical episode ends. Psychological healthspan encourages a broader preventive model. The relevant question becomes: what psychological capacities should be preserved before severe impairment develops? This may increase attention to preventive mental healthcare, emotional literacy, resilience development, social connection, burnout prevention, sleep, identity transitions, meaning reconstruction, and long-term psychological monitoring. Mental healthcare may therefore increasingly become part of longevity medicine. The objective would not simply be symptom reduction. It would also involve the preservation of psychological capacity across decades.

Implications for Longevity Medicine

Longevity medicine increasingly evaluates biological processes associated with aging. A comprehensive longevity model may eventually require parallel assessment of psychological functioning. Future multidimensional longevity assessment could include three sets of indicators.

Biological indicators: metabolic health; cardiovascular health; inflammation; functional capacity; frailty; biological age.

Autonomic indicators: resting heart rate; heart rate variability; respiratory rate; sleep regularity; recovery after exertion or stress.

Psychological indicators: emotional regulatory capacity; recovery capacity; psychological flexibility; relational connectedness; purpose; agency.

The autonomic set is deliberately placed between the other two because it belongs to both. The objective is not to medicalize all aspects of human experience. It is to recognize that a long life must also remain psychologically inhabitable.

Implications for Public Health and Society

Psychological healthspan is not solely determined by individual behavior. Societies may either preserve or erode the psychological sustainability of their populations. Chronic workplace overload may accelerate burnout. Economic insecurity may reduce agency. Social fragmentation may increase loneliness. Poor healthcare access may allow treatable distress to become chronic. Ageism may diminish identity and social participation. Cities that remove residents from green and blue space remove one of the least expensive regulators of the nervous system available to a population.

Therefore, extending psychological healthspan may require preventive mental healthcare, anti-loneliness strategies, sustainable workplaces, caregiver support, social protection, age-inclusive policies, community infrastructure, accessible psychological services, protected natural and blue space, and opportunities for lifelong participation. The future of longevity may therefore be as much a social, environmental, and psychological project as a biomedical one.

Future Research Agenda

Psychological healthspan requires substantial empirical development.

Research Question 1. Can psychological healthspan be operationalized as a distinct construct?

Research Question 2. What psychological, social, and environmental factors predict its trajectory?

Research Question 3. Can psychological healthspan predict morbidity, mortality, functional decline, healthcare utilization, and quality of life?

Research Question 4. What accelerates psychological aging?

Research Question 5. What interventions preserve or restore psychological healthspan?

Research Question 6. How does psychological healthspan interact with biological age?

Research Question 7. Can biological and psychological clocks eventually be integrated into multidimensional models of human longevity?

Research Question 8. Does autonomic regulation, indexed by HRV and shifted by nature contact, water immersion, breathing practice, and protection of the first and last hours of the day, mediate the relationship between the biological and psychological clocks?

Limitations

Several limitations must be acknowledged. First, psychological healthspan is proposed as an emerging conceptual construct and does not yet possess a universally accepted operational definition. Second, the six proposed domains require empirical validation. Third, substantial conceptual overlap exists between psychological healthspan and established constructs such as psychological well-being, resilience, flourishing, and successful aging. The contribution of the present framework lies primarily in its explicit temporal integration of these dimensions. Fourth, the Psychological Healthspan Gap is currently conceptual rather than quantitatively validated. Fifth, the autonomic interface is likewise a proposition: HRV is influenced by age, fitness, medication, and measurement conditions (Wang et al., 2025); the Red Mind and Blue Mind labels are heuristic descriptions of a continuum, not validated categories; and evidence for some candidate resources, notably grounding, is preliminary. Sixth, cultural differences may significantly influence how meaning, agency, autonomy, connection, and psychological sustainability are experienced. Future research must therefore avoid imposing a culturally narrow model of psychological aging. Finally, this paper is an integrative conceptual review rather than a systematic review or meta-analysis. Its purpose is theoretical development and interdisciplinary synthesis.

Conclusion

Longevity science has traditionally asked how long human beings can live. The healthspan movement refined the question: how long can human beings remain physically healthy while living? The next question may be equally important: how long can human beings remain psychologically capable of living?

Human beings do not experience longevity through biological processes alone. They experience life through emotion, relationships, identity, adaptability, meaning, purpose, and agency. A longer biological life does not automatically guarantee a longer psychologically sustainable life. The two trajectories may move together. They may diverge. They may influence one another across decades, and the autonomic nervous system, oscillating between the Red Mind and the Blue Mind, is one place where that influence can be seen and measured.

This paper proposes that human longevity contains at least two important clocks. The first measures the aging of the body. The second reflects the aging of the psychological capacity to live. This second trajectory is the other clock. Psychological healthspan is proposed as the duration across the life course during which individuals retain sufficient emotional, cognitive, relational, adaptive, and existential capacity to remain psychologically engaged with living.

The future of longevity science should therefore not be limited to extending existence. It should also seek to understand the conditions under which human beings remain capable of experiencing that existence as meaningful, connected, adaptive, and psychologically sustainable. The ultimate challenge may not simply be to add years to human life. It may be to ensure that the human being remains psychologically present enough to live those years.

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